EXACT SCIENCES IN THE KARMA ANTIQUITY

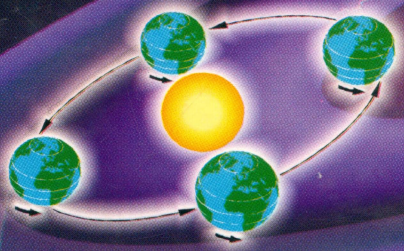
By

LAXMI CHANDRA JAIN

With The Collaboration Of

PRABHA JAIN

VOLUME -1

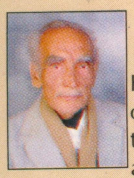


THE TILOYAPANNTTĪ

THE INFORMATION ABOUT THE THREE UNIVERSES

SHRI BRAHMI SUNDARI PRASTHASHRAM

21, Kanchan Vihar, Vijay Nagar, JABALPUR



About the Author

He was born at Saugar (M.P.) on 1st July, 1926. He passed the M.Sc. examination in applied mathematics from the university of Saugar in 1949. Interestingly, he also holds a Diploma in Homoeopathy and Biochemistry (1971).

He joined the Madhya Pradesh State Educational Service in 1951, and served various Government Colleges in various capacities till his retirement in 1984 as Principal of the Govt. P.G. College, Chhindwara. Since then he is the Honorary Director of the Acharya Shri Vidyasagara Research Institute, Vijay Nagar, Jabalpur.

Prof. Jain is a well-known scholar, especially, in the field of Jaina mathematics. He has carried out deep studies of Sanskrit and Prakrit texts of the Jaina School. He is very proficient in mathematical systems theory.

He is proliferous writer both in Hindi and English. His writings are full of variety, covering publications in unified field theory, history of Indian mathematics, and popular articles which are related to general topics as well as to history of science. Special mention may be made of his recently completed huge INSA project on the Labdhisara about 1000 A.D. which is on advanced theory of Karma System. He has also completed an INSA project on the "Prastara Ratnavali", as well as third project from INSA on the Mathematical Contents of the Digambara Jaina Texts on Karananuyoga Group.

The work of Professor L.C. Jain, Dr. R.C. Gupta (Unesco representative in India) and Professor J. Needham shall go a long way in filling up the gaps in the history of science in India.

For more than three decades, Prof. L.C.Jain has been dedicated to ancient mathematics. His vast knowledge of Jaina sources and long experience has made him a great authority of Jaina exact sciences. He has a good knowledge not only of ancient languages (including Sanskrit and Prakrit) and of ancient exact sciences but also of several modern languages and modern mathematical sciences.

Recently, he has been awarded the Prakrit Jnana Bharti Education Trust, Bangalore Award for his meritorious services in scientific studies of Prakrit Literature. His work, The Tao of Jain Sciences, has also been awarded by the Kundkund Gyan Pith, Indore.

THE EXACT SCIENCES IN THE KARMA ANTIQUITY

BY

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VOLUME - I

MATHEMATICAL CONTENTS OF THE TILOYAPAṆṆATTĪ

(INFORMATION ABOUT THE THREE UNIVERSES)

PUBLISHED BY

SANJAY KUMAR JAIN, M.A.,
TREASURER, SHRI BRĀHMĪ SUNDARĪ PRASTHĀŚRAM SAMITI
21, KANCHAN VIHAR, VIJAYNAGAR, JABALPUR

THE EXACT SCIENCES IN THE KARMA ANTIQUITY

Compiled from the project Mathematical Contents of Digambara Jaina Texts of the Karaṇānuyoga Group, financially supported by the Indian National Science Academy, New Delhi, vide sanction No. HS/442/1001/dated 02-06-1992, conducted by professor L.C. Jain at the N.E.S. Science College, affiliated to Rani Durgavati University, Jabalpur. Printed under INSA permission vide their letter No. HS/4912/ dated 22-03-2001.

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CONTENTS

VOLUME I

1. COVER PAGE 4
2. ACKNOWLEDGEMENT 5
3. SOME REMARKS ON THE WORKS OF PROFESSOR L. C. JAIN 6
4. PREFACE 7
5. FOREWORD 8
6. LIST OF ABBREVIATIONS 9
7. ROMAN TRANSLITERATION OF DEVANĀGARĪ 12
8. INTRODUCTION 1-74
9. ENGLISH AND HINDI TRANSLATION OF THE MATHEMATICAL VERSES OF THE TILOYAPAṆṆTTĪ WITH FULL TEXT IN PRAKRIT 1-99
10. NOTES ON THE MATHEMATICAL VERSES 1- Last

VOLUME II

1. COVER PAGE
2. ACKNOWLEDGEMENT
3. SOME REMARKS ON THE WORKS OF PROFESSOR L. C. JAIN
4. PREFACE
5. FOREWORD
6. LIST OF ABBREVIATIONS
7.ROMAN TRANSLITERATION OF DEVANĀGARĪ
8. ENGLISH AND HINDI TRANSLATION OF THE MATHEMATICAL VERSES OF THE TRILOKASĀRA WITH FULL TEXT IN PRAKRIT
9. NOTES ON THE MATHEMATICAL VERSES

VOLUME III

1. COVER PAGE
2. ACKNOWLEDGEMENT
3. SOME REMARKS ON THE WORKS OF PROFESSOR L. C. JAIN
4. PREFACE
5. FOREWORD
6. LIST OF ABBREVIATIONS
7.ROMAN TRANSLITERATION OF DEVANĀGARĪ
8. ENGLISH AND HINDI TRANSLATION OF THE MATHEMATICAL VERSES OF THE JAMBŪDĪVA-PAṆṆTTĪ SAṀGAHO AND LOKA-VIBHĀGA WITH FULL TEXT IN PRAKRIT
9. NOTES ON THE MATHEMATICAL VERSES

विषयानुक्रमणिका हिन्दी में-तिलोयपण्णत्तिके अधिकार- १. सामान्य जगस्वरूप निरूपण प्रज्ञप्ति २. नारक लोक स्वरूप निरूपण प्रज्ञप्ति ३. भवनवासी लोक स्वरूप निरूपण प्रज्ञप्ति ४. मनुष्यलोक स्वरूप निरूपण प्रज्ञप्ति ५. तिर्यक् लोक स्वरूप निरूपण प्रज्ञप्ति ६. व्यंतर लोक स्वरूप निरूपण प्रज्ञप्ति ७. ज्योतिर्लोक स्वरूप निरूपण प्रज्ञप्ति ८. सिद्ध लोक स्वरूप निरूपण प्रज्ञप्ति।

त्रिलोकसारके अधिकार-१. लोकसामान्याधिकार २. भवनाधिकार ३. व्यंतरलोकाधिकार ४. ज्योतिर्लोकाधिकार ५. वैमानिकलोकाधिकार ६. नरतिर्यक्लोकाधिकार

जंबूदीवपण्णत्तिके अधिकार-१. उपोद्घात २. भरत ऐरावत क्षेत्र वर्णन ३. पर्वत नदी व भोगभूमि वर्णन ४. महाविदेहाधिकार ५. महाविदेहाधिकारमें मन्दरगिरि जिनभवन वर्णन ६. महाविदेहाधिकारमें देव उत्तरकुरु विन्यास प्रस्तार ७. महाविदेहाधिकारमें कक्षाविजय वर्णन ८. महाविदेहाधिकारमें पूर्वविदेह वर्णन ९. महाविदेहाधिकारमें अपरविदेह वर्णन १०. लवणसमुद्रवर्णन ११. दीप सागर नरक गति देवगति सिद्धक्षेत्र वर्णन १२. ज्योतिर्लोक वर्णन १३. प्रमाण परिच्छेद

लोकविभागके अधिकार-१. जम्बूद्वीप विभाग २. लवणसमुद्रविभाग ३. मानुषक्षेत्र विभाग ४. समुद्र विभाग ५. काल विभाग ६. ज्योतिर्लोक विभाग ७. भवनवासिक लोक विभाग ८. अधोलोक विभाग ९. मध्यमलोक में व्यंतर लोक विभाग १०. स्वर्ग विभाग ११. मोक्ष विभाग

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THE ADORED SUPREME

AT WHOSE WORSHIPPED LOTUS-FEET

THE AUTHORS

HAVE FOUND PEACE AND EQUINIMITY

Cover page

The cover design gives the modern and the ancient scenirio of the three universes, what we call today as the cosmos. The images of the great scientists appear at the centre, with the very known figures of Newton, Einstein, Raman and other Indian scientists, with that of Kalpana who sacrified her life for the cause of space research. The background boundaries are those of the ancient Jaina Universe explored explicitly by Vīrasenācārya (ninth century, A.D.) who is noted for his well known commentaries, the Dhavalā and the Jayadhavalā Prakrit texts of the Ṣaṭkhaṇḍāgama and the Kaṣāyaprābhṛta texts compiled by the preceptors Puṣpadanta and Bhūtabali (c. 2nd century A.D.), the disciples of Dharasenācārya, and by Gunadharācārya (c.1st century B.C.), respectively. The image of Dr. A.P.J. Abdul Kalām, a missile-scientist, par excellence, rising to the supreme post of the Hon. President of India, will be able to inspire the little children to accomplish his dream of INDIA 2020. Mention may also be made of the third slogan, JAI VIJÑĀNA, given by the Hon. Indian Prime Minister, Shri Atal Behari Bajpai, which goes a long way to awaken the scientific spirit of ancient India, once again.

ACKNOWLEDGEMENT

THE AUTHORS EXPRESS THEIR THANKS TO THE INDIAN NATIONAL SCIENCEACADEMY, NEW-DELHI, FOR FINANCIAL GRANT. THEY ALSO ACKNOWLEDGE THEIR OBLIGATION TO SHRI DEV KUMAR SINGH KASLIWAL AND SHRI AJIT KUMAR SINGH KASLIWAL FOR THEIR FINANCIAL SUPPORT IN COMPOSING THE MATTER.

THE FORMER AUTHOR WOULD LIKE TO EXPRESS HIS SOLEMN AND CHERISHED GRATITUDE TO HIS BELOVED LATE WIFE SMT. GULAB RANI WHO COOPERATED HIM FOR MORE THAN HALF A CENTURY IN HIS RESEARCH, TEACHING AND ADMINISTRATIVE WORKS.

INDEBTEDNESS IS DUE TO THE FOLLOWING ACADEMICIANS FOR THEIR TIMELY HELP:

PROFESSOR Kazuo Kondo (Yotsukaido, Japan)

PROFESSOR Alexander Volodarsky (Moscow, Russia)

PROFESSOR Rogers Billard (Paris, France)

PROFESSOR R.E. Kalman (Gainesville, Florida, U.S.A.)

PROFESSOR Shun- ichi Amari (Saitama, Japan)

PROFESSOR Takao Hayashi (Kyoto, Japan)

PROFESSOR Yukio Ohashi (Tokyo, Japan)

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PROFESSOR R.C. Gupta (Jhansi, India)

PROFESSOR G. Sahasrabudhe (Nagpur, India)

PROFESSOR Lakhmi C. Jain (Adelaide, Australia)

For reserch prupose some figures have been demonstrated as they appear in various texts available in Temple Libraries, and the authors owe their gratitude to the publications and their authors, specifically in the Tiloyapaṇṇattī and the Trilokasāra texts, commented upon by Pūjya shri 105 Āryikā Viṣuddhamati.

SOME REMARKS ON THE WORKS OF PROF. L. C. JAIN

I have been able only briefly to glance over pages of your remarkable book, 'The Tao of Jaina Sciences' you kindly sent me. I was impressed by the profound back ground of your presentation. I have to confess that I had to be stuck at every term I met technical terms in languages of Indian origin.....

Your way of attributing the differentiation of bio-creature classes to different kinds of karmas restricting them reminds me of the fundamental groups in defining different kinds of geometry according to the Erlangen Programme

Kazuo Kondo
Prof. Emeritus, Tikyo University

I'm very happy to hear of your progress in your most important historical research..... please do replace the book and keep me informed (Via abstracts of summaries) of your progress so that I may give further work and thought to this area.

R.E.Kalman
Research Professor, University of Florida

The Tao of Jaina Sciences is a veritable mine of information on the history and philosophy of the Jaina sciences. It is indeed a mile-stone in the history of world on Indian Philosophy as it discusses at length the Jaina sciences in the context of the complex of old and new philosophies spread across the globe.

C.K. Jain Secretary-General
Loka Sabha, New Delhi

During recent times a vast number of research and investigation work has been carried out in lokottara mathematics of the Jaina School. The foremost credit of this goes to Professor Laxmi Chandra Jain, who has greatly contributed in bringing to light these achievements of the Jainas and also in correlating them with corresponding results of modern mathematics. Indeed, it is important and immeasurable.

R. C. GUPTA
M.Sc.(Goldmedalist), Ph.D.(Hist. of Math.)

PREFACE



In this era of science, information technology and global communication, a new worldwide interest in history of science has been generated. That mathematics played and still plays a prominent role in the development of science and technology is well recognized. But certain cultural, religious, and other humanistic aspects of application of mathematical sciences are still not well and widely known.

The culture and civilization of India has a continuous tradition of more than five millennia. The broad-hearted liberalism in India based on the principles of ahiṁsā, anekāntavāda, etc., gave rise to many systems of thought and philosophy. The Jaina School carry the unique distinction of regarding mathematics as part and parcel of their religion and philosophy.

The Theory and practice of Karma ("action") in its various forms have been a significant way of thinking and working in the Indian life-style through the ages. Through karma-yoga one can attain the goal of life. In this regard the Jaina Theory of Karma is a very remarkable, scientific and spiritual system. It gives the quantitative details in terms of the socalled Karma-paramāṇus by using symbols and various measures. Naturally, in giving the quantitative details, mathematics played its key role and considerable mathematical thinking is involved in the process. Thus roots of many modern mathematical concepts can be traced to anicent Jaina canonical and other texts devoted to Karaṇānuyoga and exposition of the Jaina Karma Theory.

Professor L.C. Jain through his research projects under the auspices of the Indian National Science Academy, New Delhi, carried out detailed study and investigations of many important texts such as Tiloyapaṇṇattī, Lokavibhāga, Trilokasāra, Labdhisāra, and Jambūdīva Paṇṇattī Saṁgaho. It is very gratifying to know that the "Shri Brāhmī Sundarī Prasthāśrama", Jabalpur, has decided to publish the life-long work of professor L.C. Jain on these texts in a series of several volumes. It is a huge task. The series, when completed, is to make available to scholars and public the original Sanskrit/Prakrit verses, their Hindi/ English translation with detailed notes and exposition. Indeed the set of volumes will be on asset in the field of Jaina Sciences and Indology.

It is hoped that the exposition and mathematical formulation of the Jaina Karmic fruition, creation, and its annihilation, etc., will open a new vista in the history of science in India. I wish that the exposition will be within the reach of scholars. The first volume is related to the contents of Tiloyapaṇṇattī which is a very significant text of the Karaṇānuyoga type belonging to the Digambara Jaina School.

Jhansi
July 14, 2003

R. C. GUPTA
M.Sc.(Goldmedalist), Ph.D.(Hist. of Math.),
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Member, International Acad. of Hist. of Science, Paris, and
former Indian Representative, International
Commission of Host. of Mathematics of the I. M.U. and I.U.H.P.S.

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FOREWORD

"The Exact Sciences in the Karma Antiquity" constituted a series of the Indian National Science Academy Projects (1984-1995), operated at this University by Professor L.C. Jain, with the assistance of Dr. Prabha Jain. The series of publications also included several other research works pursued by the authors for the History of Science in India.

This series of works forms the foundation for research into the mysterious, symbolic and mathematical theory of Karma, in the ancient Prakrit Texts. During the last century, there has been an increasing interest in the ancient Indian scientific awakening and achievements. This publication, I am confident, will be welcomed into the world of historical learning where problems about the scripts, place value notation, comparability of transfinite sets, as well as the biological phenomena still persist.

I appreciate the hard labour of the authors and hope that this would go a long way to serve the cause of the humanity.

My best wishes,

(Justice Gulab Gupta)

LIST OF ABBREVIATIONS

WORK

ABT	Āryabhaṭīya of Āryabhaṭācārya
AGS	Āṅgasuttāṇi
APN	Ādipurāṇa of Ācārya Jinasena
ASG	Artha Saṁdṛṣṭi of Ṭoḍaramala
BBS	Bhadrabāhu Saṁhitā of Ācārya Bhadrabāhu
BJK	Bṛhajjātakaṁ of Varāhamihira Ācārya
BKS	Bṛhatkṣetrasamāsa of Ācārya Jinabhadra
BSG	Bṛhatsaṅgrahaṇī sūtra of Ācārya Candrasūri
BTS	Bhāṣikā Ṭīkā of Ṭoḍaramala
CPJ	Candraprajñapti Sūtram
DVL	Dhavalā Commentary of Vīrasenācārya
DVS	Dravyasaṁgraha of Muni Nemicandra
GJK	Gommaṭasāra Jīvakāṇḍa of Ācārya Nemicandra Siddhānta Cakravartī
GKK	Gommaṭasāra Karmakāṇḍa of Ācārya Nemicandra Siddhānta Cakravartī
GNG	Gaṇitānuyoga (Collection) by Muni K.L. 'Kamal'
GSS	Gaṇitasārasaṅgraha of Mahāvīrācārya
GTK	GaṇitaTilaka of Ācārya Śrīpati
JDL	Jayadhavalā Commentary of Vīrasenācārya and Jinasenācārya
JGD	Jaina Gem Dictionary. by J. L. Jaini
JKP	Jyotiṣa Karaṇdakam Prakīrṇakam
JLV	Jaina Lakṣaṇāvalī by B. C.Siddhānta śāstrī
JPS	Jaṁbūdīvapaṇṇattī Saṁgaho of Ācārya Paumnandi (Sholapur)
JPT	Jaṁbūdīva-paṇṇattī Saṁgaho (Bombay)
KJP	Kevala Jñāna Praśna Cūḍāmaṇi of Ācārya Samantabhadra
KPS	Kasāya Pāhuḍa Suṭta of Ācārya Guṇadhara
LKS	Laghukṣetrasamāsa of Ācārya Ratnaśekhara

LVG	Loka Vibhāga of Ācārya Siṁhasūri
LVV	LaghuVidyānuvāda by Ācārya Kunthusāgara
LVY	Loka Vijaya Yantra (of Ācārya Bhadrabāhu ?)
MBD	Mahābandha of Bhagavanta Ācārya Bhūtabali
MBK	Mahābhāskarīya of Bhāskarācārya
MHP	Mahāpurāṇa of Puṣpadanta
PGT	Pāṭīgaṇita of Śrīdharācārya
PJP	Praśna Jñāna Pradīpikā
PSD	Pañca-Siddhāntikā of Varāhamihira Ācārya
PSK	Pañcāstikāya of Ācārya Kundakunda
SKG	Ṣaṭkhaṇḍāgama of Bhagavanta Ācārya Puṣpadanta and Bhagavanta Ācārya Bhūtabali
SPJ	Sūrya-Prajñapti Sūtram
SSD	Sūrya-Siddhānta
SVS	Sarvārthasiddhi of PūjyaPāḍa
TLS	Trilokasāra of Ācārya Nemicandra Siddhāntacakravartī
TPT	Tiloyapaṇṇattī of Ācārya Yativṛṣabha
TVT	Tattvārthavārtika of Bhaṭṭācārya Akalaṅkadeva
UPN	Uttarapurāṇa of Ācārya Guṇabhaḍra
VDJ	Vedāṇga Jyotiṣa of Lagadha Ācārya
VTN	Vrata Tithi Nirṇaya (by N.C. Śastrī)
YTR	Yantrarāja of Mahendra Guru
YTS	Yantraśiromaṇi of Śrīviśrāma

JOURNALS

AHEI	Archives of History of Exact Sciences
AORS	Annals of Bhaṇḍārkara Oriental and Research Society
ARAS	Archaeo-Astronomy
ARVC	Arhat Vacana (Indore)
ASCN	Āsthā Aura Cintana (Felicitation Volume)

ASRE	Asiatic Research
BAMT	Bibliothica Mathematica
BCMS	Bulletin of Calcutta Mathematical Society
CNTR	Centaurus
EPGI	Epigraphica Indica
GNBT	Gaṇita Bhāratī
HRST	Historia Scientiarum
IDIR	Indo-Iranian Journal
IDST	Indological Studies
IJHS	Indian Journal of History of Science
HRMT	Historia Mathematica
ISJM	Proc. International Seminar on Jaina Maths and Cosmology (DJICR, Hastināpura)
JAOS	Journal of American Oriental Society
JASC	Journal of Asiatic Society, Calcutta
JASI	Journal of Astronomical Society of India
JBRS	Journal of Bihar-Orissa Research Society
JGKV	Journal of Gaṅgānātha Jhā Kendrīya Sanskrit Vidyapīṭth (Allahabad)
JNAQ	Jaina Antiquary (Arrah)
JNSB	Jaina Siddhānta Bhāskara (Arrah)
JRAS	Journal of Royal Asiatic Society of Great Britain and Ireland
JRHA	Journal of History of Astronomy
MASI	Memoirs of Archaeological Survey of India
MTED	Mathematics Education
NISI	National Institute of Science in India
SCMT	Scripta Mathematica
TSPJ	Tulsī Prajñā (J.V.B.I. - Ladnun)

Roman Transliteration of Devanāgarī

VOWELS

Short:	अ	इ	उ	ऋ	ऌ	and	ऽ
	a	i	u	ṛ			ḷ
Long:	आ	ई	ऊ	ए	ओ	ऐ	औ
	ā	ī	ū	e	o	ai	au
Anusvāra:	.	=	ṁ				
Visarga:	:	=	ḥ				
Non-aspirant	अ	=	ऽ				

CONSONANTS

Classified:	क्	ख्	ग्	घ्	ङ्			
	k	kh	g	gh	ṅ			
	च्	छ्	ज्	झ्	ञ्			
	c	ch	j	Jh	ñ			
	ट्	ठ्	ड्	ढ्	ण्			
	ṭ	ṭh	ḍ	ḍh	ṇ			
	त्	थ्	द्	ध्	न्			
	t	th	d	dh	n			
	प्	फ्	ब्	भ्	म्			
	p	ph	b	bh	m			
Unclassified:	य्	र्	ल्	व्	श्	ष्	स्	ह्
	y	r	l	v	ś	ṣ	s	h
Compound:	क्ष्	त्र्	ज्ञ्					
	kṣ	tr	jñ					

पढमो महाधियारो

जगसेढिघणपमाणो लोयायासो सपंच दव्वरिदी । एस अणंताणंता लोयायासस्स बहुमज्झे ।।६१।।

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जीवा पोग्गलधम्माधम्मा काला इमाणि दव्वाणि । सव्वं लोयायासं आधूइय पंच चिट्ठंति ।।६२।।

एत्तो सेढिस्स घणप्पमाणाण णिण्णयरं परिभासा उच्चदे -

पल्लसमुद्दे उवमं अंगुलयं सूइपदरघणणामं । जगसेढिलोयपदरो अलोओ अट्ठप्पमाणाणि ।।६३।।

प. १ | सा. २ | सू. ३ | प्र. ४ | घ. ५ | ज. ६ | लोकप्र. ७ | लोय ८ |

ववहारुद्धारद्धा तियपल्ला पढमयम्मि संखाओ । विदिए दीवसमुद्दा तदिए मिज्जेदि कम्मठिदी ।।६४।

खंदं सयलसमत्थं तस्स य अद्धं भणंति देसो त्ति । अद्धद्धं च पदेसो अविभागी होदि परमाणू ।।६५।।

परमाणूहिं अणंताणंतेहिं बहु विहेहि दव्वेहिं। उवसण्णासण्णो त्ति य सो खंदो होदि णामेण ।।१०२।।

उवसण्णासण्णो वि य गुणिदो अट्ठेहि होदि णामेण । सण्णासण्णो त्ति तदो दु इदि खंधो पमाणट्ठं ।।१०३।।

अट्ठट्ठे गुणिदेहिं सण्णासण्णेहिं होदि तुडिरेणू । तित्तियमेत्तहदेहिं तुडिरेणूहिं पि तसरेणू ।।१०४।।

तसरेणू रथरेणू उत्तमभोगावणीए वालग्गं । मज्झिम भोग खिदीए वालं पि जहण्ण [illegible] दिवालं ।।१०५।।

कम्ममहीए वालं लिक्खं जूवं जवं च अंगुलयं । इगि उत्तरा य भणिदा पुव्वेहिं अट्ठ गुणिदेहिं ।।१०६।।

तिवियप्पमंगुलं तं उच्छेहपमाणअप्पअंगलुयं । परिभासाणिप्पण्णं होदि हु उदिसेहसूचिअंगुलयं ।।१०७।।

तं चिय पंच सयाइं अवसप्पिणिपढमभरहचक्किस्स । अंगुल एकं चेव य तं तु पमाणंगुलं णाम ।।१०८।।

जस्सिं जस्सिं काले भरहेरावदमहीसु जे मणुवा । तस्सिं तस्सिं ताणं अंगुलमादंगुलं णाम ।।१०६।।

उस्सेहअंगुलेणं सुराण णरतिरियणारयाणं च । उस्सेहंगुलमाणं चउदेवणिकेदणयराणि ।।११०।।

दीवोदहि सेलाणं वेदीण णदीण कुंडजगदीणं । वस्साणं च पमाणं होदि पमाणंगुलेणेव ।।१११।।

भिंगारकलसदप्पणवेणुपडहजुगाण सयणसगदाणं । हलमुसलसत्तितोमरसिंहासणबाणणालिअक्खाणं ।।११२।।

चामरदुंदुहिपीढच्छत्ताणं णरणिवासणगराणं । उज्जाणपहुदियाणं संखा आदंगुलं णेया ।।११३।।

छहिं अंगुलेहिं वादो बेवादेहिं विहत्थिणामा य । दोण्णि विहत्थी हत्थो बेहत्थेहिं हवे रिक्कू ।।११४।।

बेरिक्कूहिं दंडो दंडसमा जुगधणूणि मुसलं वा । तस्स तहा णाली वा दोदंडसहस्सयं कोसं ।।११५।।

चउकोसेहिं जोयण तं चिय वित्थारगत्तसमवट्टं । तत्तियमेत्तं घणफलमाणेज्जं [illegible] लेहिं ।।११६।।

समवट्टवासवग्गे दहगुणिदे करणिपरिधओ होदि । वित्थारतुरिमभागे परिधिहदे तस्स खेत्तफलं ।।११७।।

उणवीस जोयणेसुं चउवीसेहिं तहावहरिदेसु । तिविहवियप्पे पल्ले घणखेत्तफला हु पत्तेकं ।।११८।।

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उत्तमभोगखिदीए उप्पण्णविजुगलरोमकोडीओ । एक्कादिसत्तदिवसावहिम्मि च्छेत्तूण संगहियं ।।१६।।

अइवट्टेहिं तेहिं रोमग्गेहिं णिरंतरं पढमं । अच्चंतं णविदूणं भरियव्वं जाव भूमिसमं ।।१२०।।

दंडपमाणंगुलए उस्सेहंगुल जवं च जूवं च । लिक्खं तह कादूणं वालग्गं कम्मभूमीए ।।१२१।।

अवरंमज्झिमउत्तमभोगखिदीणं च वाल अग्गाइं । एक्केक्कमट्ठघणहदरोमा ववहारपल्लस्स ।।१२२।।

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ऽ०	६६	५००	८	८	८	८	८	८	८	८
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अट्ठरसं अंताणे सुण्णाणिं दोणवेक्कदोएक्का । पणणवचउक्कसत्ता सगसत्ता एक्कतिय सुण्णा ।।१२३।।

दोअट्ठसुण्णतिअणहतियच्छदोण्णिपणचउतिण्णि य । एक्कचउक्काणिं ते अंक कमेण पल्लस्स ।।१२४।।

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ववहाररोमरासिं पतेक्कमसंखकोडिवस्साणं । समयसमं छेत्तूणं विदिए पल्लम्हि भरिदम्हि ।।१२६।।

समयं पडि एक्केक्कं वालग्गं पेलिदम्हि सो पल्लो । रित्तो होदि स कालो उद्धारं णाम पल्लं तु ।।१२७।।

एदेणं पल्लेणं दीवसमुद्दाण होदि परिमाणं । उद्धाररोमरासिं छेत्तूणमसंखवाससमयसमं ।।१२८।।

पुव्वं व विरविदेणं तदियं अद्धारपल्लणिप्पत्ती । णारयतिरियणरसुराण विण्णेया कम्मट्ठिदी तम्हि ।।१२९।।

एदाणं पल्लाणं दहप्पमाणाउ कोडिकोडीओ । सागरउवमस्स पुढं एक्कस्स हवेज्ज परिमाणं ।।१३०।।

अद्धारपल्ल छेदो तस्सासंखेयभागमेत्ते य । पल्लछणंगुलवग्गिदसंवग्गिदयम्हि सूइजगसेढी ।।१३१।।

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तं वग्गे पदरंगुलपदराइ घणे घणंगुलं लोगो । जगसेढीए सत्तम भागो रज्जू पभासंते ।।१३२।।

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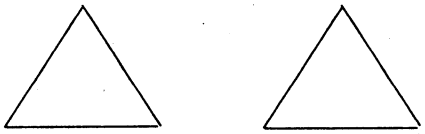
आदिणिहणेण हीणो पगदिसरूवेण एस संजादो । जीवाजीवसमिद्धो सव्वण्हावलोइओ लोओ ।।१३३।।

धम्माधम्मणिबद्धा गदिरगदी जीवपोग्गलाणं च । जेत्तिय मेत्ताआसे लोयाआसो स णादव्वो ।।१३४।।

लोयायासट्ठाणं सयंपहाणं सदव्वछक्कं हु । सव्वमलोयायासं तं सव्वासं हवे णियमा ।।१३५।।

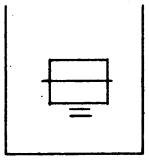
सयलो एस य लोओ णिप्पण्णो सेढिविंदमाणेण । तिवियप्पो णादव्वो हेट्ठिममज्झिल्लउट्ठभेएण ।।१३६।।

हेट्ठिमलोयायारो वेत्तासणसण्णिहो सहावेण । मज्झिमलोयायारो उब्भियमुरअद्धसारिच्छो ।।१३७।।



उवरिम लोयाआरो उब्भियमुरवेण होइ सरिसत्तो । संठाणो एदाणं लोयाणं एण्हिं साहेमि।।१३८।।

संदिट्ठी - वादरं



तंमज्झे मुहमेक्कं भूमि जहा होदि सत्त रज्जूवो । तह छिंदिदम्मि मज्झे हेट्ठिमलोयस्स आयारो ।।१३९।।

दोपक्खखेत्तमेत्तं उच्चलयंतं पुण ट्ठवेदूणं । विवरीदेणं मेलिदे वासुच्छेहा सत्त रज्जूओ ।।१४०।।

मज्झम्हि पंच रज्जू कमसो हेट्ठोवरिम्हि इगि रज्जू । सग रज्जू उच्छेहो होदि जहा तह य छेत्तूणं ।।१४१।।

हेट्ठोवरिदं मेलिदखेत्तायारं तु चरिमलोयस्स । एदे पुव्विल्लस्स य खेत्तोवरि ठावए पयदं ।।१४२।।

उद्धियदिवड्ढमुरवध जोवमाणो य तस्स आयारो । एक्कपदे सगबहलो चोद्दसरज्जूदवो तस्स ।।१४३।।

तस्स य एक्कम्हि दए वासो पुव्वावरेण भूमि मुहे । सतेक्कपंचएक्का रज्जूवो मज्झहाणिचयं ।।१४४।।

छेत्तठियचउखंडं सरिसट्ठाणं आई घेत्तूणं । तमणुज्झोभयपक्खे विवरीयकमेण मेलिज्जो ।।१४५।।

एवज्जिय अवसेसे खेत्ते गहिऊण पदर परिमाणं । पुव्वं पिव कादूणं बहलं बहलम्मि मेलिज्जो ।।१४६।।

एवमवसेस खेत्तं जाव समप्पेदि ताव घेत्तव्वं । एक्केक्कपदरमाणं एक्केक्कपदेस बहलेणं ।।१४७।।

एदेण पयारेणं णिप्पण्णत्तिलोयखेत्तदीहत्तं । वासउदयं भणामो णिस्संदं दिट्ठिवादादो ।।१४८।।

सेढिपमाणायामं भागेसु दक्खिणुत्तरेसु पुढं । पुव्वावरेसु वासं भूमिमुहे सत्त येक्कपंचेक्का ।।१४९।।

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चोद्दसरज्जुपमाणो उच्छेहो होदि सयललोगस्स । अद्धमुरज्जस्सुदवो समग्गमुरवोदयसरिच्छो ।।१५०।।

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हेट्ठिममज्झिमउवरिम लोउच्छेहो कमेण रज्जूवो । सत्त य जोयणलक्खं जोयणलक्खूणसगरज्जू ।।१५१।।

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इह रयणसक्करावालुपंकधूमतममहातमादिपहा । मुरवद्धम्मि महीओ सत्त च्चिय रज्जुअन्तरिया ।।१५२।।

मज्झिमजगस्स हेट्ठिमभागादो णिग्गदो पढमरज्जू । सक्करपहपुढवीए हेट्ठिमभागम्मि णिट्ठादि ।।१५४।।

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तत्तो दोइदरज्जू वालुवपहहेट्ठि समप्पेदि । तह य तइज्जा रज्जू पंकपहहेट्ठस्स भागम्मि ।।१५५।।

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धूमपहाए हेट्ठिमभागम्मि समप्पदे तुरियरज्जू । तह पंचमिया रज्जू तमप्पहाहेट्ठिमपएसे ।।१५६।।

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महतमहेट्ठिमयंते छट्ठी हि समप्पदे रज्जू । तत्तो सत्तमरज्जू लोयस्स तलम्मि णिट्ठादि ।।१५७।।

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मज्झिमजगस्स उवरिमभागादु दिवड्ढरज्जूपरिमाणं । इगिजोयणलक्खूणं सोहम्मविमाणधयदंडे ।।१५८।।

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वच्चदि दिवड्ढरज्जू माहिंदसणक्कुमारउवरिम्मि । णिट्ठादि अद्धरज्जू बंभुत्तरउड्ढभागम्मि ।।१५९।।

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अवसादि अद्धरज्जू काविट्ठस्सोवरिट्ठ भागम्मि । स च्चिय महसुक्कोवरि सहसारोवरि अ स च्चेय ।।१६०।।

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ततो य अद्धरज्जू आणदकप्पस्स उवरिमपएसे । स य आरणस्स कप्पस्स उवरिमभागम्मि गेविज्जं ।।१६१।।

तत्तो उवरिमभागे णवाणुत्तरओ होंति एक्करज्जूवो । एवं उवरिमलोए रज्जुविभागो समुद्दिट्ठ ।।१६२।।

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णियणियचरिमिंदयधयदंडग्गं कप्पभूमिअवसाणं । कप्पादीदमहीए विच्छेदो लोयविच्छेदो ।।१६३।।

सेढीए सत्तंसो हेट्ठिमलोयस्स होदि मुहवासो । भूमीवासो सेढीमेत्ताअवसाणउच्छेहो ।।१६४।।

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मुहभूमिसमासमद्धिय गुणिदं पुण तह य वेदेण। घणघणिदं णादव्वं वेत्तासणसण्णिए खेत्ते ।।१६५।।

हेट्ठिमलोए लोओ चउगुणि सगहिदो विंदफलं । तस्सद्धे सयलजुगो दोगुणिदो सत्तपरिभागो ।।१६६।।

$$\equiv ४ \quad \equiv २$$

$$७| \quad ७|$$

छेत्तूणं तसणालिं अण्णत्थं ठाविदूण विंदफलं । आणेज्ज तप्पमाणं उणवण्णेहिं विभत्तलोयसमं ।।१६७।।

सगवीसगुणिदलोओ उणवण्णहिदो अ सेसखिदिसंखा । तसखित्ते सम्मिलिदे चउगुणिदो सगहिदो लोओ ।।१६८।।

$$\equiv २७ \quad \equiv ४$$

$$४६ | \quad ७|$$

मुरजायारं उड्ढं खेत्तं छेत्तूण मेलिदं सयलं । पुव्वावरेण जायदि वेत्तासण सरिस संठाणं ।।१६९।।

सेढीए सत्तमभागो उवरिमलोयस्स होदि मुहवासो । पण गुणिदो तब्भूमी उस्सेहो तस्स इगिसेढी ।।१७०।।

$$- | \quad -५|$$

$$७ | \quad ७$$

तियगुणिदो सत्तहिदो उवरिमलोयस्स घणफलं लोओ । तस्सद्धे खेत्तफलं तिउणो चोद्दसहिदो लोओ ।।१७१।।

$$\equiv ३| \equiv ३|$$

$$७ \quad १४$$

छेत्तूणं तस णालिं अण्णत्थं ठाविऊण विंदफलं। आणेज्ज तं पमाणं उणवण्णेहिं विभत्त लोय समं ।।१७२।।

$$\equiv १|$$

$$४६$$

विंसदि गुणिदो लोओ उणवण्ण हिदो य सेस खिदि संखा। तस खेत्ते सम्मिलिदे लोओ तिगुणो अ सत्तहिदो ।।१७३।।

$$\equiv २०| \quad \equiv ३|$$

$$४६ \qquad ७$$

घणफलमुवरिमहेट्ठिमलोयाणं मेलिदम्मि सेढिघणं । वित्थररुइबोहत्थं वोच्छं णाणावियप्पे वि ।।१७४।।

सेढियसत्तमभागो हेट्ठिमलोयस्स होदि मुहवासो । भूवित्थारो सेढी सेढि त्ति य तस्स उच्छेहो ।।१७५।।

$$-$$

$$७ |-|-|$$

भूमिय मुहं विसोहिय उच्छेहहिदं मुहाउ भूमीदो । सव्वेसु क्खेत्तेसुं पत्तेक्कं वड्ढिहाणीओ ।।१७६।।

तक्खयवड्ढिपमाणं णियणियउदयाहदं जइच्छाए । हीणब्भहिए संते वासाणि हवंति भूमुहाहिंतो ।।१७७।।

$$- \quad ६|$$

$$४६$$

उणवण्णभजिदसेढी अट्ठसु ठाणेसु ठाविदूण कमे । वासट्ठं गुणआरा सत्तादि छक्कवड्ढिगदा ।।१७८।।

$$-७| \; -१३| \; -१९| \; -२५| \; -३१| \; -३७| \; -४३| \; -४९|$$

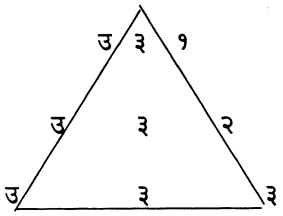
$$४६ \quad ४६ \quad ४६ \quad ४६ \quad ४६ \quad ४६ \quad ४६ \quad ४६$$

सत्तघणहरिदलोयं सत्तसु ठाणेसु ठाविदूण कमे। विंदफले गुणयारा दसपभवा छक्कवड्ढिगदा ।।१७६।।

≡ १० | ≡ १६ | ≡ २२ | ≡ २८ | ≡ ३४ | ≡ ४० | ≡ ४६

३४३ ३४३ ३४३ ३४३ ३४३ ३४३ ३४३

उदओ हवेदि पुव्वावरेहि लोयंत उभय पासेसु । तिदुइगिरज्जुपवेसे सेढी दुतिभागतिदसेढीओ ।।१८०।।



भुजपडिभुजमिलिदद्धं विंदफलं वासमुदयवेदहदं । एक्काययत्तबाहू वासद्धहदा य वेदहदा ।।१८१।।

वादालहरिदलोओ विंदफलं चोद्दसावहिदलोओ । तब्भंतर खेत्ताणं पणहदलोओ दुदालहिदो ।।१८२।।

≡| ≡| ≡ ५ ।

४२ १४ ४२

एदं खेत्तपमाणं मेलिय सयलं पि दु गुणिदं कादुं । मज्झिमखेत्ते मिलिदे चउगुणिदो सगहिदो लोओ ।।१८३।।

≡ ४ |

७

रज्जुस्स सत्तभागो तियछदुपंचेक्कचउसगेहिं हदा । खुल्लयभुजाण रुंदा वंसादी थंभ बाहिरए ।।१८४।।

– ३ | – ६ | – २ | – ५ | – १ | – ४ | – ७ |

४६ ४६ ४६ ४६ ४६ ४६ ४६

लोयंते रज्जुघणा पंच च्चिय अद्धभागसंजुता । सत्तमखिदिपज्जंता अट्ठाइज्जा हवंति फुडं ।।१८५।।

≡ ११ | ≡ ५

३४३ | २ | ३४३ | २ |

उभयेसिं परिमाणं बाहिम्मि अब्भंतरम्मि रज्जुघणा । छट्ठक्खिदिपेरंता तेरस दोरूवपरिहत्ता ।।१८६।।

≡ १३ |

३४३ | २ |

बाहिरछब्भाएसुं अवणीदेसुं हवेदि अवसेसं । सतिभागछक्कमेत्तं तं चिय अब्भंतरं खेत्तं ।।१८७।।

≡ १ | ≡ ३८ |

३४३ ६ | ३४३ | ६ |

आहुट्ठं रज्जुघणं धूमपहाए समासमुद्दिट्ठं । पंकाए चरिमंते इगिरज्जुघणा तिभागूणं ।।१८८।।

≡ |७ | ≡ २ |

३४३ | २ | ३४३ | ३ |

रज्जु घणा सत्त च्चिय छब्भागूणा चउत्थपुढवीए । अब्भंतरम्मि भागे खेत्तफलस्स प्पमाणमिदं ।।१८९।।

≡ | ४१ |

३४३ | ६ |

रज्जुघणद्धं णवहदतदियखिदीए दुइज्जभूमीए । होदि दिवड्ढाए दो मेलिय दुगुणं घणो कुज्जा ।।१९०।।

≡ | ९| ≡ ३ |

३४३| २| ३४३| २ |

दुगुणिदे ≡ | ६३ |

३४३ |

तेतीसब्भहियसयं सव्वच्छेत्ताण सव्वरज्जुयाण । ते ते सव्वे मिलिदा दोण्णि सया होंति चउहीणा ।।१९१।।

≡ १३३ | मिलिदे ≡ १९६|

३४३ ३४३

एक्केक्करज्जुमेत्ता उवरिमलोयस्स होंति मुहवासा । हेट्ठोवरि भूवासा पण रज्जू सेढिअद्धमुच्छेहो ।।१९२।।

— — भू । — |— |

७ । ७ २ । २ ।

भूमीए मुहं सोहिय उच्छेहहिदं मुहादु भूमीदो । खयवड्ढीण पमाणं अडरूवं सत्तपविहत्तं ।।१९३।।

८ ।

७ ।

तक्खयवड्ढिपमाणं णियणियउदयाहदं जइच्छाए । हीणब्भहिए संते वासाणि हवंति भूमुहाहिंतो ।।१९४।।

अट्ठगुणिदेगसेढी उणवण्णहिदम्मि होदि जं लद्ध । स च्चेय वड्ढिहाणी उवरिमलोयस्स वासाणं ।।१९५।।

रज्जूए सत्तभागं दससु ट्ठाणेसु ठाविदूण तदो । सत्तोणवीसइगितीसपंचतीसेक्कतीसेहिं ।।१९६।।

सत्ताहियवीसेणं तेवीसेहिं तहोणवीसेण । पण्णरस वि सत्तेहिं तम्मि हदे उवरि वासाणि ।।१९७।।

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४९ ७| ४९ १९| ४९ ३१| ४९ ३५| ४९ ३१| ४९ २७| ४९ २३| ४९ १९| ४९ १५| ४९ ७|

उणदालं पण्णत्तरि तेत्तीसं तेत्तियं च उणतीसं । पणवीसमेकवीसं सत्तरसं तह य बावीसं ।।१९८।।

एदाणि य पतेक्कं घणरज्जूए दलेण गुणिदाणि । मेरुतलादो उवरिं उवरिं जायंति विंदफलं ।।१९९।।

≡ | ३९| ≡ ७५ | ≡| ३३ | ≡ | ३३ | ≡| २९ | ≡| २५| ≡ | २१| ≡| १७ |≡ | २२

३४३ |२ | ३४३ | २ | ३४३ | २| ३४३ |२ | ३४३ | २ | ३४३ | २ | ३४३ | २ | ३४३ |२ | ३४३ | २

थंभुच्छेहा पुव्वावरभाए बम्हकप्पपणिधीसु । एक्कदुरज्जुपवेसे हेट्ठोवरि चउदुगहिदे सेढी ।।२००।।

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छप्पणहरिदो लोओ ठाणेसुं दोसु ठविय गुणिदव्वो । एक्कतिएहिं एदं थंभंतरिदाण विदफलं ।।२०१।।

एदं विय,

विंदफलं संमेलिय चउगुणिदं होदि तस्स कादूण । मज्झिमखेत्ते मिलिदे तियगुणिदो सगहिदो लोओ ।।२०२।।

≡ १ |≡ ३ | ≡ | ३

५६ | ५६ | ७ |

सोहम्मीसाणोवरि छ च्चेय रज्जूउ सत्तपविभत्ता । खुल्लयभुजस्स रुंदं इगिपासे होदि लोयस्स ।।२०३।।

— ६|

४९

माहिंदउवरिमंते रज्जूओ पंच होंति सत्तहिदा । उणवण्णहिदस्सेढी सत्तगुणा बह्मपणधीए ।।२०४।।

$$-\frac{५}{४६}\Big|-\frac{७}{४६}\Big|$$

कापिट्ठउवरिमंते रज्जूओ पंच होंति सत्तहिदा । सुक्कस्स उवरि मंले सत्त हिदा ति गुणिदो रज्जू ।।२०५।।

$$-\frac{५}{४६}\Big|-\frac{३}{४६}\Big|$$

सहसारउवरिमंते सगहिदरज्जू य खुल्लभुजरुंदं । पाणदउवरिमचरिमे छ रज्जूओ हवंति सत्तहिदा ।।२०६।।

$$-\frac{१}{४६}\Big|-\frac{६}{४६}\Big|$$

पणिधीसु आरणच्चुदकप्पाणं चरिमइंदयधयाणं । खुल्लय भुजस्स रुंदं चउ रज्जूओ हवंति सत्तहिदा ।।२०७।।

$$-\frac{४}{४६}\Big|$$

सोहम्मे दलमुत्ता पण रज्जूओ हवंति तिण्णि बहि । तम्मिस्सपुव्वसेसं तेसीदी अट्ठपविहत्ता ।।२०८।।

$$\equiv\frac{६}{३४३\ २}\Big|\quad\equiv\frac{२५}{३४३}\Big|\equiv\frac{८३}{३४३}\Big|$$

बह्मुत्तरहेट्ठुवरिं रज्जुघणा तिण्णि होंति पत्तेक्कं । लंतवकप्पम्मि दुगं रज्जुघणो सुक्ककप्पम्मि ।।२०९।।

$$\equiv\frac{३}{३४३}\Big|\equiv\frac{३}{३४३}\Big|\equiv\frac{२}{३४३}\Big|\equiv\frac{१}{३४३}\Big|$$

अट्ठाणउदिविहत्तो लोओ सदरस्स उभयविंदफलं । तस्स य बाहिरभागे रज्जुघणो अट्ठमो अंसो ।।२१०।।

$$\equiv\frac{७}{३४३}\Big|\equiv\frac{१}{३४३}\Big|$$

तम्मिस्ससुद्धसेसे हवेदि अब्भंतरम्मि विंदफलं । सत्तावीसेहि हदं रज्जूघणमाणमट्ठहियं ।।२११।।

$$\equiv\frac{२७}{३४३}\Big|$$

रज्जुघणा ठाणदुगे अट्ठाइज्जेहिं दोहि गुणिदव्वा । सव्वं मेलिय दुगुणिय तस्सिं ठावेज्ज जुत्तेण ।।२१२।।

$$\equiv\frac{५}{३४३\ २}\Big|\equiv\frac{२}{३४३}\Big|\equiv\frac{७०}{३४३}\Big|$$

एत्ता दलरज्जूणं घणरज्जूओ हवंति अडवीसं । एक्कोणवण्णगुणिदा मज्झिमखेत्तम्मि रज्जुघणा ।।२१३।।

$$\equiv\frac{२८}{३४३}\Big|\equiv\frac{४६}{३४३}\Big|$$

पुव्ववण्णिदखिदीणं रज्जूए घणा सत्तरी होंति । एदे तिण्णि वि रासी सत्तत्तालुत्तरसयं मेलिदा ।।२१४।।

$$\equiv\frac{७०}{३४३}\Big|\equiv\frac{१४७}{३४३}\Big|$$

अट्ठविहं सव्वजगं सामण्णं तह य दोण्णि चउरस्सं । जवमुरअं जवमज्झं मंदरदूसाइगिरिगडयं ।।२१५।।

सामण्णं सेढिघणं आयदचोरस्स वेदकोडिभुजा । सेढी सेढीअद्धं दुगुणिदसेढी कमा होंति ।।२१६।।

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भुजकोडीवेदेसुं पत्तेक्कं मुरवखिदिए बिंदुफलं । तं पंचवीसहदं जवमुरवमहिए जवखेत्तं ।।२१७।।

≡ २५ | ≡ ५ |

७० १४

पहदो णवेहि लोओ चोद्दसभजिदो य मुरवविंदफलं । सोढिस्स य घणमाणं उभयं पि हवेदि जवमुरवे ।।२१८।।

घणफलमेक्कम्मि जवे पंचत्तीसद्धभाजिदो लोगो । तं पणतीसद्धहदं सेढिघणं होदि जवखेत्ते ।।२१९।।

≡ ३५|

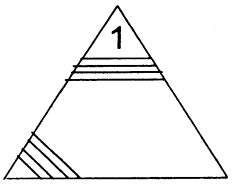
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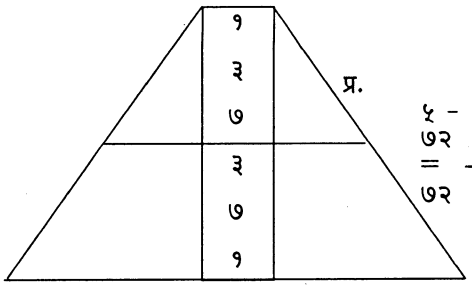
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चदुतियइगतीसेहिं तियवीसेहिं गुणिदरज्जूओ । तियतियदुच्छदुच्छभजिदमंदरखेत्तफलं ।।२२०।।

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पण्णरसहदा रज्जू छप्पण्णहिदा तडाण वित्थारो । पत्तेक्कंतक्करणे खंडिदखेत्तेण चूलिया सिद्धा ।।२२१।।

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पणदालहदा रज्जू छप्पण्णहिदो हवेदि भूवासो । उदओ दिवड्ढरज्जू भूमितिभागेण मुहवासो ।।२२२।।

भूमीए मुहं सोहिय उदयहिदे भूमुहादु हाणिचया । छक्केक्कुमुहरज्जू उस्सेहा दुगुणसेढीए ।।२२३।।

तक्खयवड्ढिविमाणं चोद्दसभजिदाइ पंचरूवाणिं । णियणियउदए पहदं आणेज्जं तस्स तस्स खिदिवासं ।।२२४।।

मेरुसरिच्छम्मि जगे सत्तट्ठाणेसु ठविय उड्ढुड्ढं । रज्जूओ रुंदट्ठे वोच्छं गुणयारहाराणि ।।२२५।।

छव्वीसब्भहियसयं सोलसएक्कारसादिरित्तसया । इगिवीसेहि विहत्ता तिसु ट्ठाणेसु हवंति हेट्ठादो ।।२२६।।

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एक्कोणचउसयाइं दुसयाचउदालदुसयमेक्कोणं । चउसीदी चउठाणे होदि हु चउसीदि पविहत्ता ।।२२७।।

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मंदरसरिसम्मि जगे सत्तसु ठाणेसु ठविय रज्जुघणं। हेट्ठादु घणफलस्स य वोच्छं गुणगारहाराणि ।।२२८।।

चउसीदिचउसयाणं सत्तावीसधिया य दोण्णि सया । एक्कोणचउसयाइं वीससहस्सा विहीणसगसट्ठी ।।२२९।।

एक्कोणं दोण्णि सया पणसट्ठिसयाइं णवजुदाणिं पि । पंचत्ताल एदे गुणगारा सत्तठाणेसु ।।२३०।।

णव णव अट्ठ य वारसवग्गो अट्ठं सयं च चउदालं । अट्ठं एदे कमसो हारासत्तेसु ठाणेसु ।।२३१।।

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सत्तहिददुगुणलोगो विदफलं बाहिरुभयबाहाणं । पणभजिदुगुणं लोगो दूसस्सब्भंतरोभयभुजाणं ।।२३२।।

तस्साइं लहुबाहुं छग्गुणलोओ अ पणत्तीसहिदो । विदफलं जवखेत्ते लोओ सत्तेहिं पविहत्तो ।।२३३।।

तं पणतीसप्पहदं सेढिघणं घणफलं च तम्मिस्सं । सत्तहिदो होदि अधो चउगुणिदो लोय खिदी एदे ।।२३४।।

सामण्णे विदफलं भुजकोडिसेढिचउरज्जूओ । बहुजवमज्झे मुरवे जवमुरयं होदि णियमेण ।।२३५।।

तम्मि जवे विदफलं चोद्दसभजिदो य तियगुणो लोओ । मुरवमहीविंदफलं चोद्दसभजिदो य पणगुणो लोओ ।।२३६।।

घणफलमेक्कम्मि जवे लोओ बादालभाजिदो होदि । तं चउवीसप्पहदं सत्तहिदो चउगुणो लोगो ।।२३७।।

रज्जूवो ते भागं वारसभागो तहेव सत्तगुणो । तेदालं रज्जूओ बारसभजिदा हवंति उड्ढड्ढं ।।२३८।।

सत्तहदबारसंसा दिवड्ढगुणिदा हवेइ रज्जू य । मंदरसरिसायामे उच्छेहा होइ खेत्तम्मि ।।२३९।।

अट्ठावीसविहत्ता सेढी मंदरसमम्मि तडवासे । चउतडकरणक्खंडिदखेत्तेणं चूलिया होदि ।।२४०।।

अट्ठावीसविहत्ता सेढी चूलीय होदि मुहरुंदं । तत्तिगुणं भूवासं सेढी बारसहिदा तदुच्छेहो ।।२४१।।

अट्ठाणवदिविहत्तं सत्तट्ठाणेसु सेढि उड्ढुड्ढं । ठविदूण वासहेदुं गुणगारं वत्तइस्सामि ।।२४२।।

अडणउदी बाणउदी उणणवदी तह कमेण बासीदी । उणदालं बत्तीसं चोद्दस इय होंति गुणगारा ।।२४३।।

हेट्ठादो रज्जुघणा सत्तट्ठाणेसु ठविय उड्ढुड्ढे । विंदफलजाणणट्ठं गुणगारं बत्तइस्सामि ।।२४४।।

गुणगारा पणणउदी एक्कासीदेहि जुत्तमेक्कसयं । सगसीदेहिं दुसयं तियधियदुसया पणसहस्सा ।।२४५।।

अडवीसं उणहत्तरि उणवण्णं उवरि उवरि हारा य । चउ चउवग्गं बारं अडदालं तिचउक्कचउवीसं ।।२४६।।

चोद्दसभजिदो तिहदो होदि विंदफलं बाहिरुभय बाहूणं । लोओ पंचवहित्तो दूसस्सब्भंतरोभयभुजाणं ।।२४७।।

तस्साइं लहुबाहू तिगुणियलोओ य पंचतीसहिदो । विंदफलं जवखेत्ते चोद्दसभजिदो हवे लोगो ।।२४८।।

एक्कस्सि गिरिगडए चउसीदीभाजिदो हवे लोओ । तं अट्ठतालपहदं विंदफलं तम्मि खेत्तम्मि ।।२४९।।

एवं अट्ठवियप्पो हेट्ठिमलोओ य वण्णिदो एसो । एण्हिं उवरिमलोयं अट्ठपयारो णिरूवेमो ।।२५०।।

सामण्णे विदफलं सत्तहिदो होइ तिगुणिदो लोगो । विदिए वेदभुजाए सेढी कोडी तिरज्जूओ ।।२५१।।

तदिए भुयकोडीओ सेढी वेदो वि तिण्णि रज्जूओ। बहुजवमज्झे मुरये जवमुरयं होदि तक्खेत्तं ।।।२५२।।

तम्मि जवे विंदफलं लोगो सत्तेहि भाजिदो होदि । मुरयम्मि य विंदफलं सत्तहिदो दुगुणिदो लोओ ।।२५३।।

घणफलमेक्कम्मि जवे अट्ठावीसेहिं भाजिदो लोओ। तं बारसेहि गुणिदं जवखेत्ते होदि विंदफलं ।।२५४।।

तिहिदो दुगुणिदरज्जू तिंयभजिदा चउहिदा तिगुणरज्जू। एक्कतीसं च रज्जू बारसभजिदा हवंति उड्ढुड्ढं ।।२५५।।

चउहिदतिगुणिदरज्जू तेवीसं ताओ बारपडिहत्ता । मंदरसरिसायारे उस्सेहो उड्ढखेत्तम्मि ।।२५६।।

अट्ठाणवदिविहत्ता तिगुणा सेढी तडाण वित्थारो । चउतडकरणक्खंडिदखेत्तेणं चूलिया होदि ।।२५७।।

तिण्णि तडा भूवासो ताण तिभागेण होदि मुहरुंदं । तच्चूलियए उदओ चउभजिदा तिगुणदा रज्जू ।।२५८।।

सत्तट्ठाणे रज्जू उड्ढुड्ढं एक्कवीसपविभत्तं । ठविदूण वासहेदुं गुणगारं तेसु साहेमि ।।२५९।।

पंचुत्तरएक्कसयं सत्ताणउदी तियधियणउदीओ । चउसीदी तेवण्णा चउदालं एक्कवीस गुणगारा ।।२६०।।

उड्ढुड्ढं रज्जुघणं सत्तसु ठाणेसु ठविय हेट्ठादो । विंदफलजाणणट्ठं वोच्छं गुणगारहाराणि ।।२६१।।

दुजुदाणिं दुसयाणिं पंचाणउदी य एक्कवीसं च । सत्तत्तालजुदाणिं बादालसयाणि एक्करसं ।।२६२।।

पणणवदियधियचउदससयाणि णव इय हवंति गुणगारा । हारा णउ णव एक्कं बाहत्तरि इगि विहत्तरी चउरो ।।२६३।।

चोदसभजिदो तिउणो विदफलं बाहिरोभयभुजाणं । लोओ दुगुणो चोद्दसहिदो य अब्भंतरम्मि दूसस्स ।।२६४।।
तस्स य जव खेत्ताणं लोओ चोद्दसहिदो दु विंदफलं । एत्तो गिरिगड खंडं वोच्छामो आणुपुव्वीए ।।२६५।।
छप्पण्णहिदो लोओ एक्कस्सिं गिरिगडम्मि विंदफलं । तं चउवीसप्पहदं सत्तहिदो तिगुणिदो लोगो ।।२६६।।
अट्ठविहप्पं साहिय सामण्णं हेट्ठउट्ठ होदि जयं । एण्हिं साहेमि पुढं संठाणं वादवलयाणं ।।२६७।।
गोमुत्तमुग्गवण्णा घणोदधी तह घणाणिलो वाऊ । तणुवादो बहुवण्णो रुक्खस्स तयं व वलय तियं ।।२६८।।
पढमो लोयाधारो घणोवही इह घणाणिलो तत्तो । तप्परदो तणुवादो अंतम्मि णहं णिआधारं ।।२६९।।
जोयणवीससहस्सा बहलं तम्मारुदाण पत्तेक्कं । अट्ठखिदीणं हेट्ठे लोअतले उवरि जाव इगिरज्जू ।।२७०।।

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सगपणचउजोयणयं सत्तमणारयम्मि पुहवि पणधीए । पंचचउतियपमाणं तिरीयखेत्तस्स पणिधीए ।।२७१।।

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सगपंचचउसमाणा पणिधीए होंति बह्म कप्पस्स । पणचउतियजोयणया उवरिमलोयस्स यंतम्मि ।।२७२।।

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कोसदुगमेक्ककोसं किंचूणेक्कं च लोय सिहरम्मि । ऊणपमाणं दंडा चउस्सया पंचवीसजुदा ।।२७३।।

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तिरियक्खेत्तप्पणिधिं गदस्स पवणत्तयस्स बहलत्तं । मेलिय सत्तमपुढवीपणिधीगयमरुदबहलम्मि ।।२७४।।
तं सोधिदूण तत्तो भजिदव्वं छप्पमाण रज्जूहिं । लद्धं पडिप्पदेसं जायंते हाणि वड्ढीओ ।।२७५।।

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अट्ठछचउदुगदेयं तालं तालट्ठतीसछत्तीसं । तियभजिदा हेट्ठादो मरुबहलं सयलपासेसु ।।२७६।।

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उड्ढजुगे खलु वड्ढी इगिसेढीभजिदअट्ठजोयणया । एदं इच्छप्पहदं सोहिय मेलिज्ज भूमिमुहे ।।२७७।।
मेरुतलादो उवरि कप्पाणं सिद्धखेत्तपणिधीए । चउसीदी छण्णउदी अडजुदसय बारसुत्तरं च सयं ।।२७८।।
एत्तो चउचउहीणं सत्तसु ठाणेसु ठविय पत्तेक्कं । सत्त विहत्ते होदि हु मारुद वलयाण बहलत्तं ।।२७९।।

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तीसं इगिदालदलं कोसा तियभाजिदा य उणवण्णा । सत्तमखिदिपणिधीए बह्मजुगे वाउबहलत्तं ।।२८०।।

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दोछब्बारसभागब्भहिओ कोसो कमेण वाउघणं । लोयउवरिम्मि एवं लोयविभायम्मि पण्णत्तं ।।२८१।।

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२ ६ १२

वादवरुद्धक्खेत्ते विंदफलं तह य अट्ठ पुढवीए । सुद्धायासखिदीणं लवमेत्तं वत्तइस्सामो ।।२८२।।

संपहि लोगपेरंतट्ठिदवादवलयरुद्धखेत्ताणं आणयणविधाणं उच्चदे- लोगस्स तले तिण्णिवादाणं बहलं वादेक्कस्स य वीससहस्सा य जोयणमेत्तं। तं सव्वमेगट्ठं कदे सट्ठिजोयणसहस्सबाहल्लं जगपदरं होदि। णवरि दोसु वि अंतेसु सट्ठिजोयणसहस्सउस्सेहपरिहाणखेत्तेण ऊणं एदमजोएदूणं सट्ठिसहस्सबाहल्लं जगपदरमिदि संकप्पिय तच्छेदूण पुढं ठवेदव्वं। = ६०००० । पुणो एगरज्जूस्सेधेण सत्तरज्जूआयामेण सट्ठिजोयणसहस्सबाहल्लेण दोसु पासेसुं ठिदवादखेत्तं बुद्धीए पुधं करिय जगपदरपमाणेण णिबद्धे वीससहस्साहिअजोयणलक्खस्स सत्तभागबाहल्लं जगपदरं होदि। = १२०००० । तं पुव्विल्लक्खेत्तस्सुवरि ७
ठिदे चालीस जोयणसहस्साहियपंचण्हं लक्खाणं सत्तभागबाहल्लं जगपदरं होदि। = ५४०००० । पुणो अवरासु दोसु दिसासु ७
एगरज्जुस्सेधेण तले सत्तरज्जुआयामेण मुहे सत्तभागाहियछरज्जुरुंदत्तेण सट्ठिजोयणसहस्सबाहल्लेण ठिदवाद खेत्ते जगपदरपमाणेण कदे वीसजोयणसहस्साहियपंचपंचासजोयणलक्खाणं तेदालीससतिसदभागबाहल्लं जगपदरं होदि। = ५५२०००० ३४३
एदे पुव्विल्लखेत्तस्सुवरिं पक्खित्ते एगूणवीसलक्खअसीदिसहस्सजोयणाहियतिण्हं कोडीणं तेदालीससतिसदभागबाहल्लं जगपदरं होदि। = ३१९८०००० । पुणो सत्तरज्जुविक्खंभतेरहरज्जुआयामसोलहबारह (-सोलहबारह-) जोयणबाहल्लेण दोसु वि पासेसु ३४३
ठिदवादखेत्ते जगपदरपमाणेण कदे चउसट्ठिसदजोयणूणअट्ठारहसहस्सजोयणाणं तेदालीससतिसदभागबाहल्लं जगपदरमुप्पज्जदि। = १७८३६ । पुणो सत्तभागाहियछरज्जुमूलविक्खंभेण छरज्जुउच्छेहेण एकरज्जुमुहेण सोलहबारहजोयणबाहल्लेण दोसु वि पासेसु ३४३
ठिदवादक्खेत्तं जगपदरपमाणेण कदे बादालीसजोयणसदस्सतेदालीससतिसदभागबाहल्लं जगपदरं होदि। = ४२०० । पुणो ३४३
एगपंचएगरज्जुविक्खंभेण सत्तरज्जुउच्छेहेण बारहसोलहबारहजोयणबाहल्लेण उवरिमदोसु वि पासेसु ठिदवादखेत्तं जगपदरपमाणेण कदे अट्ठासीदिसमहियपंचजोयणसदाणं एगूणवण्णास भागबाहल्लं जगपदरं होदि। = ५८८ । उवरि रज्जुविक्खंभेण सत्तरज्जु- ४९
आयामेण किंचूणजोयणबाहल्लेण ठिदवादखेत्तं जगपदरपमाणेण कदे तिउत्तरतिसदाणं बेसहस्सविसदचालीसभागबाहल्लं जगपदरं होदि। = ३०३ । एदं सव्वमेगत्थ मेलाविदे चउवीसकोडिसमहियसहस्सकोडीओ एगूणवीसलक्खतेसीदिसहस्सचउसदसत्तासीदि- २२४०
जोयणाणं णवसहस्ससत्तसयसट्ठिरूवाहियलक्खाए अवहिदेगभागबाहल्लं जगपदरं होदि। = १०२४१९८३४८७ । १०९७९०
पुणो अट्ठण्हं पुढवीणं हेट्ठिमभागावरुद्धवादखेत्तघणफलं वत्तइस्सामो-

तत्थ पढमपुढवीए हेट्ठिमभागावरुद्धवादखेत्तघणफलं एक्करज्जुविक्खंभसत्तरज्जुदीहा सट्ठिजोयणसहस्सबाहल्लं एसा अप्पणो बाहल्लस्स सत्तमभागबाहल्लं जगपदरं होदि। = ६०००० । विदियपुढवीए हेट्ठिमभागावरुद्धवादखेत्तघणफलं सत्तभागूणबेरज्जु- ७
विक्खंभा सत्तरज्जुआयदा सट्ठिजोयणसहस्सबाहल्ला असीदिसहस्साहियसत्तण्हं लक्खाणं एगूणवण्णासभागबाहल्लं जगपदरं होदि। = ७८०००० । तदियपुढवीए हेट्ठिमभागावरुद्धवादखेत्तघणफलं बेसत्तमभागहीणतिण्णिरज्जुविक्खंभासत्तरज्जुआयदा सट्ठिजोयण ४९
सहस्सबाहल्ला चालीससहस्साधियएक्कारसलक्खजोयणाणं एगूणवंचासभागबाहल्लं जगपदरं होदि। = ११४०००० । चउत्थपुढवीए ४९

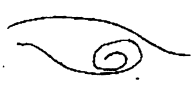
हेट्ठिमभागावरुद्धवादखेत्तघणफलं तिण्णिसत्तमभागूणचत्तारिरज्जुविक्खंभा सत्तरज्जुआयदा सट्ठिजोयणसहस्सबाहल्ला पण्णरसलक्खजोयणाणं एगूणवंचासभागबाहल्लं जगपदरं होदि। = १५००००। पंचमपुढवीए हेट्ठिमभागावरुद्धवादखेत्तघणफलं
४६
चत्तारिसत्तमभागूणपंचरज्जुविक्खंभा सत्तरज्जुआयदा सट्ठिजोयणसहस्सबाहल्ला सट्ठिसहस्साहियअट्ठारसलक्खाणं एगूणवंचासभाग बाहल्लं जगदपदरं होदि। = १८६०००। छट्ठपुढवीए हेट्ठिमभागावरुद्धवादखेत्तघणफलं पंचसत्तमभागूणछरज्जुविक्खंभा
४६
सत्तरज्जुआयदा सट्ठिजोयणसहस्सबाहल्ला वीससहस्साहियबावीसलक्खाणमेगूणवंचासभागबाहल्लं जगपदरं होदि। = २२२०००
४६
सत्तमपुढवीए हेट्ठिमभागावरुद्धवादखेत्तघणफलं छसत्तमभागूणसत्तरज्जूविक्खंभा सत्तरज्जुआयदा सट्ठिजोयणसहस्सबाहल्ला सीदिसहस्साधियपंचवीसलक्खाण एगूणवंचासभागबाहल्लं जगपदरं होदि। = २५८०००। अट्ठमपुढवीए हेट्ठिमभागवादावरुद्धखेत्त घणफलं
४६
सत्तरज्जुआयदा एगरज्जुविक्खंभा सट्ठिजोयणसहस्सबाहल्ला एसा अप्पणो बाहल्लस्स सत्तभागबाहल्लं जगपदरं होदि। = ६०००।
७
एदं सव्वमेगट्ठ मेलाविदे येत्तियं होदि- = १०६२०००।
४६
।।एवं वादावरुद्धखेत्तघणफलं समत्तं ।।

संपहि अट्ठण्हं पुढवीणं पत्तेक्कं विंदफलं थोरुच्चएण वत्तइस्सामो-

तत्थ पढमपुढवीए एगरज्जुविक्खंभा सत्तरज्जुदीहा वीससहस्सूणबेजोयणलक्खबाहल्ला एसा अप्पणो बाहल्लस्स सत्तमभागबाहल्लं जगपदरं होदि। = १८०००। विदियपुढवीए सत्तमभागूणबेरज्जु विक्खंभा सत्तरज्जुआयदा
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बत्तीसजोयणसहस्सबाहल्ला सोलससहस्साहियचदुण्हं लक्खाणमेगूणवंचासभागबाहल्लं जगपदरं होदि। = ४१६०००।
४६
तदियपुढवीए बेसत्तमभागहीणतिण्णिरज्जुविक्खंभा सत्तरज्जुआयदा अट्ठावीस जोयणसहस्सबाहल्ला बत्तीससहस्साहियपंचलक्ख जोयणाणं एगूणवंचासभागबाहल्लं जगपदरं होदि। = ५३२०००। चउत्थपुढवीए तिण्णिसत्तमभागूणचत्तारिरज्जुविक्खंभा
४६
सत्तरज्जुआयदा चउवीसजोयणसहस्सबाहल्ला छजोयणलक्खाणं एगूणवंचासभागबाहल्लं जगपदरं होदि। = ६००००।
४६
पंचमपुढवीए चत्तारिसत्तभागूणपंचरज्जु विक्खंभा सत्तरज्जुआयदा वीसजोयणसहस्सबाहल्ला वीससहस्साहिय छण्णं लक्खाणमेगूण वंचासभागबाहल्लं जगपदरं होदि। = ६२०००। छट्ठमपुढवीएपंचसत्तभागूणछरज्जुविक्खंभा सत्तरज्जुआयदा सोलसजोयणसहस्स
४६
बाहल्ला वाणउदिससहस्साहियपंचण्हं लक्खाणमेगूणवंचासभागबाहल्लं जगपदरं होदि। = ५६२०००। सत्तमपुढवीए
४६
छसत्तमभागूणसत्तरज्जुविक्खंभा सत्तरज्जुआयदा अट्ठजोयणसहस्सबाहल्ला चउदालसहस्साहियतिण्णं लक्खाणमेगूणवंचासभाग बाहल्लं जगपदरं होदि। = ३४४०००। अट्ठमपुढवीए सत्तरज्जुआयदा एक्करज्जुरुंदा अट्ठजोयणबाहल्ला सत्तमभागाहियेयज्जोयण
४६
बाहल्लं जगपदरं होदि। = ८। एदाणि सव्व मेलदे येत्तियं होदि- = ४३६४०५६।
७ ४६

एदेहिं दोहिं खेत्ताणं विंदफलं संमेलिय सयललोयम्मि अवणीदे अवसेसं सुद्धायासपमाणं होदि।

तस्स ठवणा-



पढमो महाधियारो समत्तो

विदुओ महाधियारो

लोयबहुमज्झदेसे तरुम्मि सारं व रज्जुपदरजुदा । तेरसरज्जुच्छेहा किंचूणा होदि तसणाली ।।६।।
ऊणपमाणं दंडा कोडितियं एक्कवीस लक्खाणं । बासट्ठिं च सहस्सा दुसया इगिदाल दुतिभाया ।।७।।

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अथवा-

उववादमारणंतिय परिणदतसलोयपूरणेण गदो । केवलिणो अवलंबिय सव्वजगो होदि तस णाली ।।८।।
खरपंकप्पब्बहुला भागा रयणप्पहाए पुढवीए । बहलत्तणं सहस्सा सोलस चउसीदि सीदी य ।।९।।

१६००० | ८४००० | ८०००० |

खरभागो णादव्वो सोलसभेदेहिं संजुदो णियमा । चित्तादीओ खिदिओ तेसिं चित्ता बहु वियप्पा ।।१०।।
एदाए बहलत्तं एक्कसहस्सं हवंति जोयणया । तीए हेट्ठा कमसो चोद्दस अण्णा य ट्ठिदमही ।।१५।।
पुव्वावरदिब्भाए वेत्तासणसंणिहाओ संठाओ । उत्तरदक्खिणदीहा अणादिणिहणा य पुढवीओ ।।२५।।
चुलसीदी लक्खाणं णिरयबिला होंति सव्व पुढवीसुं । पुढविं पडिपत्तेक्कं ताण पमाणं परूवेमो ।।२६।।

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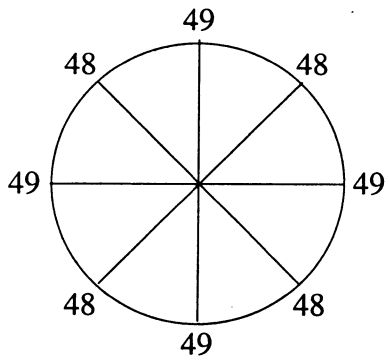
तीसं पणवीसं च य पण्णरसं दस तिण्णि होंति लक्खाणि । पण रहिदेक्कं लक्खं पंच य रयणाइ पुढवीणं ।।२७।।

३००००० | २५००००० | १५००००० | १००००० | ३००००० | ९९९९५ | ५ | ५ |

सत्तमखिदिबहुमज्झे बिलाणि सेसेसु अप्पबहुलंतं । उवरिं हेट्ठे जोयणसहस्समुज्झिय हवंति पडलकमे ।।२८।।
इंदयसेढीबद्धा पइण्णया य हवंति तिवियप्पा । ते सव्वे णिरय बिला दारुण दुक्खाण संजणणा ।।३६।।
तेरसएक्कारसणवसगपंचतिएक्क इंदया होंति । रयणप्पहपहुदीसुं पुढवीसुं आणुपुव्वीए ।।३७।।

१३ | ११ | ९ | ७ | ५ | ३ | १

पढमम्हि इंदयम्हि य दिसासु उणवण्ण सेढिबद्धा य । अडदालं विदिसासुं विदियादिसु एक्क परिहीणा ।।३८।।



एक्कंततेरसादी सत्तसु ठाणेसु मिलिदपरिसंखा । उणवण्णा पढमादो इंदिय पडिणामयं होंति ।।३९।।
दिसिविदिसाणं मिलिदा अट्ठासीदीजुदा य तिण्णि सया । सीमंतएण जुत्ता उणणवदी समधिया होंति ।।५५।।

३८८ | ३८९ |

उणणवदी तिण्णिसया पढमाए पढमपत्थले होंति । बिदियादिसु हीअंते माघवियाए पुढं पंच ।।५६।।

३८९ |

अट्ठाणं पि दिसाणं एक्केक्कं हीयदे जहा कमसो । एक्केक्क हीयमाणे पंच च्चिय होंति परिहाणे ।।५७।।

इट्ठिंदयप्पमाणं रूऊणं अट्ठताडिया णियमा । उणणवदीतिसएसुं अवणिय सेसो हवंति य प्पडला ।।५८।।

अथवा-

इच्छे पदरविहीणा उणवण्णा अट्ठताडिया णियमा । सा पंचरूवजुत्ता इच्छिद सेढिंदया होंति ।।५९।।

उद्दिट्ठं पंचूणं भजिदं अट्ठेहि सोधए लद्धं । एगुणवण्णाहिंतो सेसा तत्थिंदया होंति ।।६०।।

आदीओ णिद्दिट्ठा णियणियचरिमिंदयस्स परिमाणं । सव्वत्थुत्तरमट्ठं णियणियपदराणि गच्छाणि ।।६१।।

तेणवदिजुत्तदुसया पणजुददुसया सयं च तेत्तीसं । सत्तत्तरि सगतीसं तेरस रयणप्पहादि आदीओ ।।६२।।

२९३ | २०५ | १३३ | ७७ | ३७ | १३ |

तेरसएक्कारसणवसगपंचतियाणि होंति गच्छाणि । सव्वट्ठत्तरमट्ठं रयणप्पहपहुदि पुढवीसु ।।६३।।

१३ | ११ | ९ | ७ | ५ | ३ सव्वुत्तर ८ |

चय हदमिच्छूण पदं रूवूणिच्छाए गुणिदचयजुत्तं । दुगुणिदवदणेण जुदं पददलगुणिदं हवेदि संकलिदं ।।६४।।

चयहदमिच्छूणपदं १/१३ | ८ | रूवूणिच्छाएगुणिदचयं १/१ | ८ | जुदं ९६ | दुगुणिदवदणादि सुगमं |

एक्कोणमवणिइंदयमद्धिय वग्गिज्ज मूलसंजुत्तं । अट्ठगुणं पंचजुदं पुढविंदय ताडिदम्मि पुढवि धणं ।।६५।।

पढमा इंदयसेढी चउदालसयाणि होंति तेत्तीसं । छस्सय दुसहस्साणिं पणणउदी बिदिय पुढवीए ।।६६।।

४४३३ | २६९५ |

तियपुढवीए इंदयसेढी चउदससयाणि पणसीदी । सत्तुत्तराणि सत्त य सयाणि ते होंति तुरिमाए ।।६७।।

१४८५ | ७०७ |

पणसट्ठी दोण्णि सया इंदयसेढीए पंचमखिदीए । तेसट्ठी चरिमाए पंचाए होंति णायव्वा ।।६८।।

२६५ | ६३ | ५ |

पंचादी अट्ठ चयं उणवण्णा होदि गच्छपरिमाणं । सव्वाणं पुढवीणं सेढीबद्धिंदयाणि दमं ।।६९।।

चयहदमिट्ठाधियपदमेक्काधियइट्ठगुणिदचयहीणं । दुगुणिदवदणेण जुदं पददलगुणिदम्मि होदि संकलिदं ।।७०।।

अट्ठत्तालं दलिदं गुणिदं अट्ठेहि पंचरूवजुदं । उणवण्णाए पहदं सव्वधणं होइ पुढवीणं ।।७१।।

इंदयसेढीबद्धा णवयसहस्साणि छस्सयाणं पि । तेवण्णं अधियाइं सव्वासु वि होंति खोणीसु ।।७२।।

९६५३ |

णियणियचरिमिंदयपणमेक्कोणं होदि आदिपरिमाणं । णियणियपदरा गच्छा पचया सव्वत्थ अट्ठेव ।।७३।।

बाणउदिजुत्तदुसया दुसयं चउ सयजुदाण बत्तीसं । छावत्तरि छत्तीसं बारस रयणप्पहादि आदीओ ।।७४।।

२९२ | २०४ | १३२ | ७६ | ३६ | १२ |

तेरसएक्कारसणवसगपंचतियाणि होंति गच्छाणि । सव्वत्थुत्तरमट्ठं सेढिधणं सव्व पुढवीणं ।।७५।।

पदवग्गं चयपहदं दुगुणिदगच्छेण गुणिदमुहजुत्तं । वड्ढिहदपदविहीणं दलिदं जाणिज्ज संकलिदं ।।७६।।

चत्तारि सहस्साणिं य चउस्सया वीस होंति पढमाए । सेढिगदा बिदियाए दुसहस्सा छस्सयाणि चुलसीदी ।।७७।।

४४२० | २६८४ |

चोद्दससयछाहत्तरि तदियाए तह य सत्त सया । तुरिमाए सट्ठि जुदं दुसयाणिं पंचमीए णायव्वं ।।७८।।

१४७६ | ७०० | २६० |

सट्ठी तमप्पहाए चरिमधरित्तीए होंति चत्तारि । एवं सेढीबद्धा पत्तेक्कं सत्तखोणीसु ।।७९।।

६० | ४ |

चउरूवाइं आदिं पचयपमाणं पि अट्ठरूवाइं । गच्छस्स य परिमाणं हवेदि एक्कोणपण्णासा ।।८०।।

४ | ८ | ४९ |

पदवग्गं पदरहिदं चयगुणिदं पदहदादिजुदमद्धं । मुहदलपहदपदेणं संजुत्तं होदि संकलिदं ।।८१।।

रयणप्पहपहुदीसुं पुढवीसुं सव्वसेढिबद्धाणं । चउरुत्तर छच्चसया णव य सहस्साणि परिमाणं ।।८२।।

९९०४ |

पददलहिदसंकलिदं इच्छाए गुणियपचयसंजुत्तं । रूऊणिच्छाधिय पदचयगुणिदं अवणियद्धिदे आदी ।।८३।।

पददलहदवेकपदावहरिदसंकलिदवित्तपरिमाणे । वेकपदद्धेण हिदं आदिं सोहेज्ज तत्थ सेस चयं ।।८४।।

९९०४|

अपवर्तिते ४९/६ | अस्मिन्वेकपदद्धेण ४९/२ | ४८ | हिदं आदि ४/२४ | सोहेज्जशोधितशेषमिदं | ४८/६| अपवर्तिते ८ |

चयदलहदसंकलिदं चयदलरहिदादि अद्धकदिजुत्तं । मूलं. परिमूलूणं पचयद्धहिदम्मि तं तु पदमथवा ।।८५।।

चयदलहदसंकलिदं ४४२०| ४ | चयदलरहिदादि २८८ | अद्ध १४४ | कदि २०७३६ |

जुत्तं ३८४१६ | मूलं ।१९६ | पुरिमूल १४४ | ऊणं ५२ | पचयद्ध ४ | हिदं १३ |

दुचयहदं संकलिदं चयदलवदणंतरस्स वग्गजुदं । मूलं पुरिमूलूणं चयभजिदं होदि तं तु पदं ।।८६।।

दुचय २ | ८ | दुचयहदं संकलिदं ४४२० | १६ | चयदल ४ | वदन २९२ | अंतरस्स २८८ |

वग्ग =/३९२ | मूलं ३९२ | पुरिमूल २८८ | ऊणं १०४ | चयभजिदं १०४/८ | पदं १३ |

पत्तेयं रयणादीसव्वबिलाणं ठवेज्ज परिसंखं । णियणियसेढिय इंदयरहिदा पइण्णया होतिं ।।८७।।

पणदालं लक्खाणिं पढमो चरिमिंदओ वि इगिलक्खं । उभयं सोहिय एक्कोणिंदयभजिदम्मि हाणिचयं ।।१०५।।

४५००००० | १००००० |

छावट्ठिछस्सयाणिं इगिणउदिसहस्सजोयणाणिं पि । दुकलाओ तिविहत्ता परिमाणं हाणिवड्ढीए ।।१०६।।

९१९९९ | २ |

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विदियादिसु इच्छंतो रूऊणिच्छाए गुणिद खयवड्ढी । सीमंतादो सोहिय मेलिज्ज सुअवधिठाणम्मि ।।१०७।।

एक्काधियखिदिसंखं तियचउसत्तेहिं गुणिय छब्भजिदे । कोसाइंदियसेढिपइण्णयाणं च बहलत्तं।। १५७।।

अथवा-

आदी छ अट्ठ चोद्दस तद्दलवड्ढिय जाव सत्तखिदि कोसं । छहिदे इंदयसेढीपइण्णयाणं च बहलत्तं ।।१५८।।

१ | ३ | २ | ५ | ३ | ७ | ४ | ४ | २ | ८ | १० | ४ | १४ | १९ | ७ | ७ | १४ | ३५ | ७ | ४९ | २८|

२ २ २ |३ ३ ३ ३ ३ |३ २ ३ ६ ६ ३|

रयणादिछट्ठमंतं णियणियपुढवीण बहलमज्झादो । जोयणसहस्सजुगलं अवणियसेसं करिज्जकोसाणि ।।१५९।।

णियणियइंदयसेढीबद्धाणं पइण्णयाण बहलाणि । णियणियपदरपविण्णदसंखागुणिदाण लद्धरासी य ।।१६०।।

पुव्विल्लयरासीणं मज्झे तं सोहिऊण पत्तेक्कं । एक्कोणणिय णियिंदय चउगुणिदेणं च भजिदव्वं ।।१६१।।

लद्धो जोयणसंखा णियणिय णेयंतरालमुट्ठेण । जाणेज्ज परट्ठाठे किंचूणय रज्जु परिमाणं ।।१६२।।

सत्तमखिदीयबहले इंदयसेढीण बहल परिमाणं । सोधिय दलिदे हेट्ठिमउवरिमभागा हवंति एदाणं ।।१६३।।

पढमबिदीयवणीणं रुंदं सोहेज्ज एक्क रज्जूए । जोयणतिसहस्सजुदे होदि परट्ठाण विच्चालं ।।१६४।।

दुसहस्सजोयणाधियरज्जू तदियादिपुढविरुंदूणं । छट्ठो त्ति परट्ठाणे विच्चाल पमाणमुद्दिट्ठं ।।१६५।।

सयकदिरूऊणद्धं रज्जुजुदं चरिमभूमिरुंदूणं । मघविस्स चरिमइंदय अवधिट्ठाणस्स विच्चालं ।।१६६।।
णवणवदिजुदचदुस्सयछसहस्सा जोयणाइं बे कोसा । एक्कारसकलबारसहिदा य धम्मिंदयाण विच्चालं ।।१६७।।

६४९६ | को २ | ११ |

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रयणप्पहचरमिंदयसक्करपुढविंदयाण विच्चालं । दोलक्खणवसहस्सा जोयणहीणेक्करज्जू य ।।१६८।।

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७ । रिण जो २०६००० |

एक्कविहीणा जोयणतिसहस्सा धणुसहस्सचत्तारि । सत्तसयावंसाए एक्कारस इंदयाण विच्चालं ।।१६९।।

२९९९ | दंड ४७०० |

एक्को हवेदि रज्जू छब्बीससहस्स जोयणविहीणा । थणलोलुगस्स तत्ता इंदयदो हादि विच्चाले ।।१७०।।

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७ | रिण २६००० |

तिण्णि सहस्सा दुसया जोयण उणवण्ण तदियपुढवीए । पणतीससयधणूणिं पत्तेकं इंदयाण विच्चालं ।।१७१।।

३२४९ | दंड ३५०० |

धम्माए णारइया संखठिदाऊ होंति एदाणं । सेढीए गुणगारा बिदंगुलबिदियमूलकिंचूणं ।।१९५।।

|- १२ (?)

१२

वंसाए णारइया सेढीए असंखभागमेत्ता वि । सो रासी सेढीए बारसमूलावहिदा सेढी ।।१९६।।

१२|

रोरुगए जेट्ठाऊ संखातीदा हु पुव्व कोडीओ । भंतस्सुक्कस्साऊ सायरउवमस्स दसमंसो ।।२०५।।

पुव्व | २ | सा | १

१०

दसमंस चउत्थमये जेट्ठाऊ सोहिऊण णवभजिदे । आउस्स पढमभूए णायव्वा हाणिवड्ढीओ ।।२०६।।

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१०

सत्ततिछदंडहत्थंगुलाणि कमसो हवंति धम्माए । चरिमिंदयम्मि उदओ दुगुणो दुगुणो य सेसपरिमाणं ।।२१६।।

दं ७, ह ३, अं ६ | दं १५, ह २, अं १२ | दं ३१, ह १, दं ६२ ह २ |

दं १२५ | दं २५० | दं ५०० |

रयणप्पहपुत्थीए उदओ सीमंतणामपडलम्मि । जीवाणं हत्थतियं सेसेसुं हाणिवड्ढीओ ।।२१७।।

ह ३ |

आदी अंते सोहिय रूऊणिंदाहिदम्मि हाणिचया । मुहसहिदे खिदिसुद्धे णियणियपदरेसु उच्छेहो ।।२१८।।
हाणिचयाण पमाणं धम्माए होंति दोण्णि हत्थाइं । अट्ठंगुलाणि अंगुलभागो दोहिं विहत्तो य ।।२१९।।

ह २ | अं ८ | भा १

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एक्कोणतीस दंडा दो हत्था अंगुलाणि चत्तारिं । तियभजिदाइं उदओ संजलिदे तदियपुढवीए ।।२५०।।

ध २९, ह २, अं ४

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विदुओ महाधियारो समत्तो

तिदिओ महाधियारो

सोलससहस्समेत्तो खरभागो पंकबहुलभागो वि । चउसीदिसहस्साणिं जोयणलक्ख दुवे मिलिदा ।।८।।

१६००० | ८४००० |

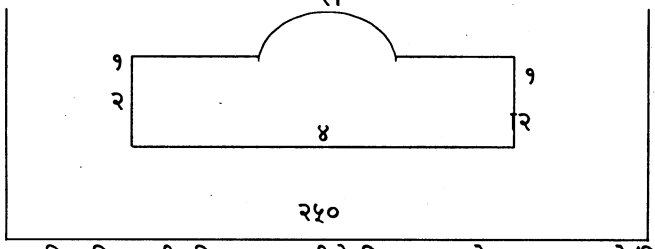
चउसट्ठी चउसीदी बावत्तरि होंति छस्सु ठाणेसु । छाहत्तरि छण्णउदी लक्खाणिं भवणवासिभवणाणिं ।।११।।

६४००००० । ८४००००० । ७२००००० । ७६००००० । ७६००००० । ७६००००० । ७६००००० । ७६००००० । ७६००००० । ६६००००

बहलत्ते त्ति सयाणि संखासंखेज्जजोयणा वासे । संखेज्जरुंदभवणेसु भवणदेवा वसंति संखेज्जा ।।२६।।

संखातीदा सेयं छत्तीससुरा य होदि संखेज्जा । भवणसरूवा एदे वित्थारा होई जाणिज्जो।।२७।।

चेत्तदुमत्थलरुंदं दोण्णि सया जोयणाणि पण्णासा। रा चत्तारो मज्झमि य अंते कोसद्धमुच्छेहो ।।३२।।



छद्दोभूमुहरुंदा चउजोयणउच्छिदाणि पीढाणि । पीढोवरि बहुमज्झे रम्मा चेट्ठंति चेत्तदुमा ।।३३।।

६ | २ | ४ |

पत्तेक्कं रुक्खाणं अवगाढं कोसमेक्कमुद्दिट्ठं । जोयण खंदुच्छेहो साहादीहत्तणं च चत्तारि ।।३४।।

को १ | जो १ | ४ |

बाहत्तरि लक्खाणिं कोडीओ सत्त जिण णिकेदाणिं । आदिणिहणुज्झिदाणिं भवणसमाइं विराजंति ।।५३।।

७७२००००० |

सत्ताणीयं होंति हु पत्तेक्कं सत्त सत्त कक्खजुदा । पढमं ससमाणसमा तद्दुगुणा चमरकक्खतं ।।७७।।

गच्छसमे गुणयारे परप्परं गुणिय रूवपरिहीणे । एक्कोणगुण विहत्ते गुणिदे वयणेण गुणगणिदं ।।८०।।

एक्कासीदी लक्खा भडवीससहस्ससंजुदा चमरे । होंति हु महिसाणीया पुह पुह तुरियादिया वि तम्मेत्ता ।।८१।।

८१२८००० |

तिट्ठाणे सुण्णाणिं छण्णवअडछक्कपंचअंककमे । चमरिंदस्स य मिलिदा सत्ताणीया हवंति इमे ।।८२।।

५६८६६००० |

संखातीदा सेढी भावणदेवाण दसविकप्पाणं । तीए पमाणं सेढी बिदंगुलपढममूलहदा ।।१४३।।

रयणाकरेक्कउवमा चमरदुगे होदि आउ परिमाणं । तिण्णि पलिदोवमाणिं भूदाणंदादिजुगलम्मि ।।१४४।।

वेणदुगे पंचदलं पुण्णवसिट्ठेसु दोण्णि पल्लाइं । जलपहुदि सेसयाणं दिवड्ढपल्लं तु पत्तेक्कं ।।१४५।।

सा १ | प ३ | प ५ | प २ | प ३ से १२ |

२ २

एक्कपलिदोवमाऊ सरीररक्खाण होंदि चमरस्स । वइरोयणस्स अधियं भूदाणंदस्स कोडि पुव्वाणि ।।१४७।।

प १ | प १ | पु को १ |

धरणिंदे अधियाणिं वच्छर कोडि हुवेदि वेणुस्स । तणुरक्खा उवमाणं अदिरित्तो वेणुधारिस्स ।।१४८।।

पु को १ । व को १ । व को १ ।

सेढीअसंखभागो विंदंगुलपढमवग्गमूलहदो। भवणेसु एक्कसमए जायंति मरंति तम्मेत्ता ।।१६४।।

चउत्थो महाधियारो

तसणालीबहुमज्झे चित्ताय खिदीय उवरिमे भागे । अइवट्टो मणुवजगो जोयणपणदाललक्खविक्खंभो ।।६।।

जोयणलक्ख ४५०००००।

जगमज्झादो उवरिं तब्बहलं जोयणाणि इगिलक्खं । णवचदुदुगखत्तियदुगचउक्केक्कंकम्हि तप्परिही ।।७।।

१००००० | १४२३०२४९ |

सुण्णणभगयणपणदुगएक्कखतियसुण्णणवणहासुण्णं । छक्केक्क जोयणा चिय अंककमे मणुवलोयखेत्तफलं ।।८।।

१९००९०३०१२५००० |

वासकदी दसगुणिदा करणी परिही च मंडले खेत्ते । विक्खंभचउब्भागप्पहदा सा होदि खेत्तफलं ।।९।।

अट्ठत्थाणं सुण्णं पंचदुरिगिगयणतिणहणवसुण्णा । अंबरछक्केक्केहिं अंककमे तस्स दिंदफलं ।।१०।।

१९००९०३०१२५००००००० |

माणुसजगबहुमज्झे विक्खादो होदि जंबुदीओ त्ति । एक्कज्जोयणलक्खव्विक्खंभजुदो सरिसवट्टो ।।११।

तस्सिं दीवे परिही लक्खाणिं तिण्णि सोलससहस्सा । जोयणसयाणि दोण्णि य सत्तावीसादिरित्ताणि ।।५०।।

३१६२२७ ।

पादूणं जोयणयं अट्ठावीसुत्तरं सयं दंडा । किंकूहत्था णत्थि हवेदि एक्को विहत्थीह ।।५१।।

३ | दं १२८ | ० | ० | १ |

४ |

पादट्ठाणे सुण्णं अंगुलमेक्कं तहा जवा पंच । एक्को जूवो एक्का लिक्खं कम्मक्खिदीण छब्बालं ।।५२।।

० | अं १ | ज ५ | जू १ | लि १ | क ६ |

सुण्णं जहण्णभोगक्खिदिए मज्झिल्लभोगभूमीए । सत्त च्चिय वालग्गा पंचुत्तमभोगछोणीए ।।५३।।

० | ७ | ५ |

एक्को तह रहरेणू तसरेणू तिण्णि णत्थि तुडरेणू । दो विय सण्णासण्णा ओसण्णासण्णया वि तिण्णि पुढं ।।५४।।

१ | ३ | ० | २ | ३ |

परमाणू य अणंताणंता संखा हुवेदि णियमेणं । वोच्छामि तप्पाणं णिस्संदि दिट्ठिवादादो ।।५५।।

तेवीस सहस्साणिं बेण्णि सयाणिं च तेरसं अंसा । हारो एक्कं लक्खं पंच सहस्साणि चउ सयाणि णवं ।।५६।।

२३२१३ ।

१०५४०९ ।

खखपदस्संसस्स पुढं गुणगारा होदि तस्स परिमाणं । जाण अणंताणंता परिभासकमेण उप्पण्णा ।।५७।।

अंबरपंचेक्कचऊणवछप्पणसुण्णणवयसत्तो व । अंककमे जोण्णया जंबूदीवस्स खेत्तफलं ।।५८।।

७ ९ ० ५ ६ ९ ४ १ ५ ० |

एक्को कोसो दंडा सहस्समेक्कं हुवेदि पंच सया । तेवण्णाए सहिदा किंकूहत्थेसु सुण्णाइं ।।५९।।

को १ | दण्ड १ ५ ५ ३ | ० | ० |

एक्को होदि विहत्थी सुण्णं पादम्मि अंगुलं एक्कं । छच्च जवा तिय जूवा लिक्खाओ तिण्णि णादव्वा ।।६०।।

१ | ० | १ | ६ | ३ | ३ |

कम्मक्खोणीए दुवे वालग्गा अवरभोगभूमीए । सत्त हुवंते मज्झिमभोगखिदीए वि तिण्णि पुढं ।।६१।।

२ | ७ | ३ |

सत्त य सण्णासण्णा ओसण्णासण्णया तहा एक्को । परमाणूण अणंताणंता संखा इमा होदि ।।६२।।

७ | १ |

अडतालसहस्साइं पणवण्णुत्तर चउस्सया अंसा । हारो एक्कं लक्खं पंच सहस्साणिं चउ सया णवयं ।।६३।।

४ ८ ४ ५ ५ |

१ ० ५ ४ ० ६ |

खखपदसंसस्स पुढं गुणगारा होदि तस्स परिमाणं । एत्थ अणंताणंता परिभासकमेण उप्पणणा ।।६४।।

सोलसजोयणहीणे जंबूदीवस्स परिधिमज्झम्मि । दारंतरपरिमाणं चउभजिदे होदि जं लद्धं ।।६५।।

जगदीबाहिरभागे दाराणं होदि अंतरपमाणं । उणसीदि सहस्साणं बावण्णा जोयणाणि अदिरेगो ।।६६।।

सत्त सहस्साणिं धणू पंचसयाणिं हवंति बत्तीसं । तिण्णि च्चिय पव्वाणिं तिण्णि जवा किंचिददिरित्ता ।।६७।।

७ ६ ० ५ २ | ध ७ ५ ३ २ | अं ३ | ज ३ |

जगदीअब्भंतरए परिही लक्खाणि तिण्णि जोयणया । सोलससहस्सइगिसयबावण्णा होंति किंचूणा ।।६८।।

३ १ ६ १ ५ २ |

जगदी अब्भंतरए दाराणं होदि अंतरपमाणं । उणसीदिसहस्साणं चउतीसं जोयणाणि किंचूणं ।।६९।।

७ ६ ० ३ ४ |

विक्खंभद्धकदीओ बिगुणा वट्टे दिसंतरे दीवे । वग्गोपणगुणचउभजिदो होदि धणुकरणी ।।७०।।

सत्तरिसहस्सजोयण सत्त सया दसजुदो य अदिरित्तो । जगदीअब्भंतरए दाराणं रिजुसमाणविच्चालं ।।७१।।

७ ० ७ १ ० |

उणसीदि सहस्साणिं छप्पण्णा जोयणाणि दंडाइं । सत्त सहस्सा पणसयबत्तीसा होंति किंचूणा ।। ७२।।

७ ६ ० ५ ६ | दं ७ ५ ३ २ |

हिमवंतमहाहिमवंतणिसधणीलद्दिरुम्मिसहिरिगिरी । मूलोवरिसमवासा पुव्वावरजलधीहिं संलग्गा ।।६४।।

एदे हेमज्जुणतवणिज्जयवेरुलियरजदहेममया । एक्कदुचदुचदुदुगइगिजोयणसयउदयसंजुदा कमसो ।।६५।।

१ ० ० | २ ० ० | ४ ० ० | ४ ० ० | २ ० ० | १ ० ० |

पुव्वावरदो दीहा सत्त वि खेत्ता अणादि विण्णासा । कुलगिरिकयमज्जादा वित्थिण्णा दक्खिणुत्तरदो ।।१०१।।

भरहम्मि होदि एक्का तत्तो दुगुणा य चुल्लहिमवंते । एवं दुगुणा दुगुणा होदि सलाया विदेहंतं ।।१०२।।

१ | २ | ४ | ८ | १६ | ३२ | ६४ |

अद्धं खु विदेहादो णीले णीलादु रम्मके होदि । एवं अद्धद्धाओ एरावदखेत्त परियंतं ।।१०३।।

३२ | १६ | ८ | ४ | २ | १ |

वरिसादीण सलाया मिलिदे णउदीयमधियमेक्कसयं । एसा जुत्ती हारस्स भासिदा आणुपुव्वीए ।।१०४।।

भागभजिदम्हि लद्धं पणसयछब्बीस जोयणाणिं पि । छच्चिय कला य कहिदो भरहक्खेत्तम्मि विक्खंभो ।।१०५।।

५२६ | ६ |

१६ |

वरिसा दुगुणो अद्दी अद्दीदो दुगुणिदो परो वरिसो । जाव विदेहं होदि हु तत्तो अद्धद्धहाणीए ।।१०६।।

१०५२ | १२ | २१०५ | ५ | ४२१० | १० | ८४२१ | १ | १६८४२ | २ | ३३६८४ | ४ |
१६ | १६ | १६ | १६ | १६ | १६

१६८४२ | २ | ८४२१ | १ | ४२१० | १० | २१०५ | ५ | १०५२ | १२ | ५२६ | ६ |
१६ | १६ | १६ | १६ | १६ | १६

पण्णासजोयणाणिं वेयड्ढणगस्स मूलवित्थारो । तं भरहादो सोधिय सेसद्धं दक्खिणच्छं तु ।।१७८।।
दुसया अट्ठत्तीसं तिण्णि कलाओ य दक्खिणद्धम्मि । तस्स सरिच्छपमाणो उत्तरभरहो हि णियमेण ।।१७६।।

२३८ । ३ |
१६

रुंदद्धं इसुहीणं वग्गिय अवणिज्ज रुंद दलवग्गे । सेसं चउगुणमूलं जीवाए होदि परिमाणं ।।१८०।।
वाणजुदरुंदवग्गे रुंदकदी सोधिदूण दुगुणकदो । जं लद्धं तं होदि हु करणीचावस्स परिमाणं ।।१८१।।
जीवकदितुरिमंसा वासद्धकदीय सोहिदूण पदं । रुंदद्धम्मि विहीणो लद्धं बाणस्स परिमाणं ।।१८२।।
जोयणयणव सहस्सा सत्तसया अट्ठताल संजुत्ता । बारस कलाओ अधिआ रजदाचल दक्खिणे जीवा ।।१८३।।

९७८४ । १२ |
१६

तज्जीवाए चावं णव य सहस्साणि जोयणा होंति । सत्त सया छासट्ठी एक्क कला किंचि अदिरेक्का ।।१८४।।

९७६६ । १ |
१६

वीसुत्तरसत्तसया दस य सहस्साणि जोयणा होंति । एक्कारसकलअहिया रजदाचल उत्तरे जीवा ।।१८५।।

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एदाए जीवाए धणुपुट्ठं दससहस्ससत्तसदा । तेदाल जोयणाइं पण्णरसकला य अदिरेओ ।।१८६।।

१०७४३ । १५ |
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जेट्ठाए जीवाए मज्झे सोहसु जहण्णजीवस्स । सेसदलं चूलीओ हुवेदि वस्से य सेले य ।।१८७।।
चत्तारि सयाणि तहा पणुसीदीजोयणेहिं जुत्ताइं । सत्तत्तीसद्धकला परिमाणं चूलियाए इमं ।।१८८।।

४८५ | ३७ |
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जेट्ठम्मि चावपट्ठे सोहेज्ज कणिट्ठ चावपट्ठं ति । सेसदलं पस्सभुजा हुवेदि वरिसम्मि सेले य ।।१८६।।
चत्तारि सयाणि तहा अडसीदीजोयणेहिं जुत्ताणिं । तेत्तीसद्धकलाओ गिरिस्स पुव्वावरम्मि पस्सभुजा ।।१६०।।

४८८ । ३३ |
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चोद्दससहस्सजोयणचउस्सया एक्कसत्तरीजुत्ता । पंचकलाओ एसा जीवा भरहस्स उत्तरे भाए ।।१६१।।

१४४७१ | ५ |

१६

भरहस्स चावपट्ठं पंचसयावहियचउदससहस्सा । अडवीस जोयणाइं हुवंति एक्कारस कलाओ ।।१६२।।

१४५२८ | ११ |

१६

जोयणसहस्समेक्कं अट्ठसया पंचहत्तरीजुत्ता । तेरसअद्धकलाओ भरहखिदीचूलिया एसा ।।१६३।।

१८७५ | १३ |

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१६ |

एक्कसहस्सट्ठसया बाणउदी जोयणाणि भागा वि । पण्णरसद्धं एसा भरहक्खेत्तस्स पस्सभुजा ।।१६४।।

१८९२ | १५ |

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१६ |

चुल्लहिमवंतरुंदे णइरुंदं सोधिदूण अद्धकदो । दक्खिणभागे पव्वदउवरिम्मि हवेदि णइदीहं ।।२११।।

पंचसया तेवीसं अट्ठहदा ऊणतीसभागा य । दक्खिणदो आगच्छिय गंगा गिरिजिब्भियं पत्ता ।।२१२।।

५२३ | २९ |

| १६ । ८ |

णिस्सरिदूणं एसा दक्खिणभरहम्मि रुप्पसेलादो । उणवीसं सहियसयं आगच्छदि जोयणा अधिया ।।२४३।।

११९ | ३ |

१६ |

समयावलिउस्सासा पाणा थोवा य आदिया भेदा । ववहारकालणामा णिद्दिट्ठा वीयरागेहिं ।।२८४।।

परमाणुस्स णियट्ठिदगयणपदेसस्सदिक्कमणमेत्तो । जो कालो अविभागी होदि पुढं समयणामा सो ।।२८५।।

होंति हु असंखसमया आवलिणामो तहेव उस्सासो । संखेज्जावलि णिवहो सो च्चिय पाणो त्ति विक्खादो ।।२८६।।

१ | १ | १ |

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सत्तुस्सासो थोवं सत्तत्थोवा लवित्ति णादव्वो । सत्तत्तरिदलिदलवा णाली बे णालिया मुहुत्तं च ।।२८७।।

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१ १ २

समऊणेक्कमुहुत्तं भिण्णमुहुत्तं मुहुत्तया तीसं । दिवसो पण्णरसेहिं दिवसेहिं एव पक्खो हु ।।२८८।।

दो पक्खेहिं मासो मासदुगेणं उडू उडुत्तिदयं । अयणं अयणदुगेणं वरिसो पंचेहिं वच्छरेहिं जुगं ।।२८९।।

माघादी होंति उडू सिसिरवसंता णिदाघपाउसया । सरओ हेमंता वि य णामाइं ताण जाणिज्जं ।।२९०।।

वेण्णि जुगा दस वरिसा ते दसगुणिदा हवेदि वाससदं । एदस्सिं दसगुणिदे वाससहस्सं वियाणेहि ।।२९१।।

दस वाससहस्साणिं वाससहस्सम्मि दसहदे होंति । तेहिं दसगुणिदेहिं लक्खं णामेण णादव्वं ।।२९२।।

चुलसीदिहदं लक्खं पुव्वंगं होदि तं पि गुणिदव्वं । चउसीदिलक्खेहिं णादव्वं पुव्वपरिमाणं ।।२९३।।
पुव्वं चउसीदिहदं णिउदगं होदि तं पि गुण्दिव्वं । चउसीदीलक्खेहिं णिउदस्स पमाणमुद्दिट्ठं ।।२९४।।
णिउदं चउसीदिहदं कुमुदंगं होदि तं पि णादव्वं । चउसीदिलक्खगुणिदं कुमुदं णामं समुद्दिट्ठं ।।२९५।।
कुमुदं चउसीदिहदं पउमंगं होदि तं पि गुणिदव्वं । चउसीदिलक्खवासे पउमं णामं समुद्दिट्ठं ।।२९६।।
पउमं चउसीदि हदं णलिणंगं होदि तं पि गुणिदव्वं । चउसीदिलक्खवासे णलिणं णामं वियाणाहि ।।२९७।।
णलिणं चउसीदिगुणं कमलंगं णाम तं पि गुणिदव्वं । चउसीदिलक्खेहिं कमलं णामेण णिद्दिट्ठं ।।२९८।।
कमलं चउसीदिगुणं तुडिदंगं होदि तं पि गुणिदव्वं । चउसीदिलक्खेहिं तुडिदं णामेण णादव्वं ।।२९९।।
तुडिदं चउसीदिहदं अडडंगं होदि तं पि गुणिदव्वं । चउसीदिलक्खेहिं अडडं णामेण णिद्दिट्ठं ।।३००।।
अडडं चउसीदिगुणं अममंगं होदि तं पि गुणिदव्वं । चउसीदीलक्खेहिं अममं णामेण णिद्दिट्ठं ।।३०१।।
अममं चउसीदिगुणं हाहंगं होदि तं पि गुणिदव्वं । चउसीदीलक्खेहिं हाहाणामं समुद्दिट्ठं ।।३०२।।
हाहाचउसीदिगुणं हूहंगं होदि तं पि गुणिदव्वं । चउसीदीलक्खेहिं हूहूणामस्स परिमाणं ।।३०३।।
हूहूचउसीदीगुणं एक्कलदंगं हुवेदि गुणिदं तं । चउसीदीलक्खेहिं परिमाणमिदं लदाणामे ।।३०४।।
चउसीदिहदलदाए महालदंगं हुवेदि गुणिदं तं । चउसीदीलक्खेहिं महालदाणाममुद्दिट्ठं ।।३०५।।
चउसीदिलक्खगुणिदा महालदादो हुवेदि सिरिकप्पं । चउसीदिलक्खगुणिदं तं हत्थपहेलिदं णाम ।।३०६।।
हत्थपहेलिदणामं गुणिदं चउसीदिलक्खवासेहिं । अचलप्पणाम चेओ कालं कालाणुवेदिणिद्दिट्ठं ।।३०७।।
एक्कत्तीसट्ठाणे चउसीदिं पुह पुह ट्ठवेदूणं । अण्णोण्णहदे लद्धं अचलप्पं होदि णउदिसुण्णंगं ।।३०८।।

८४ | ३१ | ९० |

एवं एसो कालो संखेज्जो वच्छराण गणणाए । उक्कस्सं संखेज्जं जावं ताव पवत्तेओ ।।३०९।।

वयण-

एत्थ उक्कस्ससंखेज्जयजाणणिमित्तं जंबूदीववित्थारं सहससजोयणउव्वेधपमाणचत्तारिसरावया कादव्वा। सलागा पडिसलागा महासलागा एदे तिण्णि वि अवट्ठिदा चउत्थो अणवट्ठिदो। एदे सव्वे पण्णाए ठविदा। एत्थ चउत्थसरावयअब्भंतरे दुवे सरिसवे त्थुदे तं जहण्णं संखेज्जयं जादं। एदं पढमवियप्पं तिण्णि सरिसवे च्छुद्धे अजहण्णमणुक्कस्ससंखेज्जयं। एवं सरावए पुण्णे एदमुवरि मज्झिमवियप्पं। पुणो भरिदसरावया देओ वा दाणओ वा हत्थे घेत्तूण दीवे समुद्दे एक्केक्कं सरिसवं देउ। सो णिट्ठिदो तक्काले सलायअब्भंतरे एगसरिसओ च्छुद्धो। जम्हि सलाया समत्ता तम्हि सरावओ वड्ढावेयव्वो। तं भरिदूण हत्थे घेत्तूण दीवे समुद्दे णिट्ठिदव्वा। जम्हि णिट्ठिदं तम्हि सरावयं वड्ढावेयव्वं। सलायसरावए सरिसवे च्छुद्धे एदा सलायसरावया पुण्णा, पडिसलायसरावया पुण्णा, महासलायसरावयो पुण्णो। जह दीवसमुद्दे तिण्णि सरावया पुण्णो तस्संखेज्जदीवसमुद्दवित्थरेण सहस्सजोयणगाधेण (सरावये वड्ढाविदे) सरिसवं भरिदे तं उक्कस्ससंखेज्जयं अदिच्छिदूण जहण्णपरित्तासंसखेज्जयं गंतूण पदिदं। तदो एगरूवमवणीदे जादमुक्कस्ससंखेज्जअं। जम्हि जम्हि संखेज्जयं मग्गिज्जदि तम्हि तम्हि यजहण्णमणुक्कस्संखेज्जयं गंतूण घेतव्वं। तं कस्स विसओ। चोद्दसपुव्विस्स।

उक्कस्ससंखमज्झे इगिसमयजुदे जहण्णयमसंखं । तत्तो असंखकालो उक्कस्सयसंखसमयंतं ।।३१०।।

जं तं असंखेज्जयं तं तिविधं, परित्तासंखेज्जयं, जुत्तासंखेज्जयं, असंखेज्जासंखेज्जयं चेदि। जं तं परित्तासंखेज्जयं तं तिविधं, जहण्णपरित्तासंखेज्जयं, अजहण्णमणुक्कस्सपरित्तासंखेज्जयं, उक्कस्सपरित्तासंखेज्जयं चेदि। जं तं जुत्तासंखेज्जयं, तं तिविधं, जहण्णजुत्तासंखेज्जयं, अजहण्णमणुक्कस्सजुत्तासंखेज्जयं, उक्कस्सजुत्तासंखेज्जयं चेदि। जं तं असंखेज्जासंखेज्जयं तं तिविधं, जहण्णअसंखेज्जासंखेज्जयं, अजहण्णमणुक्कस्सअसंखेज्जासंखेज्जअं, उक्कस्सअसंखेज्जासंखेज्जयं चेदि।

जं तं जहण्णपरित्तासंखेज्जयअं तं विरलेदूण एक्केक्कस्स रूवस्स जहण्णपरित्तासंखेज्जयं देदूण अण्णोण्णब्भत्थे कदे उक्कस्सपरित्तासंखेज्जयं अदिच्छेदूण जहण्णजुत्तासंखेज्जयं गंतूण पडिदं। तदो एगरूवे अवणीदे जादं उक्कस्सपरित्तासंखेज्जयं। (जम्हि

जम्हि अंसखेज्जयं) अधिकज्जं तम्हि तम्हि जहण्णजुत्तअसंखेज्जयं घेत्तव्वं। जं तं जहण्णजुत्तासंखेज्जयं तं सयं वग्गिदो उक्कस्सजुत्तासंखेज्जयं अदिच्छिदूण जहण्णमसंखेज्जासंखेज्जयं गंतूणं पडिदं। तदो एगरूवं अवणीदे जादं उक्कस्सजुत्तासंखेज्जयं। तदा जहण्णमसंखेज्जासंखेज्जयं दोप्पडिरासियं कादूण एगरासिं सलायपमाणं ठविय एगरासिं विरलेदूण एक्केक्कस्स रूवस्स एगपुंजपमाणं दादूण अण्णोण्णब्भत्थं करिय सलायरासिदो एगरूवं अवणेदव्वं। पुणो वि उप्पण्णरासिं विरलेदूण एक्केक्कस्स रूवस्सुप्पण्णरासिपमाणं दादूण अण्णोण्णब्भत्थं कादूण सलायरासिदो एयरूवं अवणेदव्वं। एदेण कमेण सलायरासी णिट्ठिदा। णिट्ठियतदणंतररासिं दुप्पडिरासिं कादूण एयपुंजं सलायं ठविय एयपुंजं विरलिदूण एक्केक्कस्स रूवस्स उप्पण्णरासिं दादूणअण्णोण्णब्भत्थं कादूण सलायरासिदो एयं रूवं अवणेदव्वं। एदेण सरूएण विदियसलायपुंजसमत्तं। सम्मत्तकाले उप्पण्णरासिं दुप्पडिरासिं कादूण एयपुंजं सलायं ठविय एयपुंजं विरलिदूण एक्केक्कस्स रूवस्स उण्णरासिपमाणं दादूण अण्णोणब्भत्थं कादूण सलायरासीदो एयरूवं अवणेदव्वं। एदेण कमेण तदियपुंजं णिट्ठिदं। एवंकदे उक्कस्सअसंखेज्जासंखेज्जयं ण पावदि। धम्माधम्मलोगागासएगजीवपदेसा चत्तारि वि लोगागासमेत्ता, पत्तेगसरीरबादरपदिट्ठिया एदे दो वि (कमसो असंखेज्जलोगमेत्ता), छप्पि एदे असंखेज्जरासीओ पुव्विल्ल रासिस्स उवरि पक्खिविदूण पुव्वं व तिण्णिवारवग्गिदे कदे उक्कस्सअसंखेज्जासंखेज्जयं ण उप्पज्जदि। तदा ठिदिबंधज्झवसाय-ठाणाणि अणुभागबंधज्झवसायठाणाणि योगपलिच्छेदाणि उस्सप्पिणिओसप्पिणीसमयाणि च एदाणि पक्खिविदूण पुव्वं व वग्गिदसंवग्गिदं कदे (उक्कस्सअसंखेज्जासंखेज्जयं अदिच्छिदूण जहण्णपरित्तांतयं गंतूण पडिदं।) तदो (एगरूवं अवणीदे जादं) उक्कस्सअसंखेज्जासंखेज्जयं। जम्हि जम्हि असंखेज्जासंखेज्जयं मग्गिज्जदि तम्हि तम्हि यजहण्णमणुक्कस्सअसंखेज्जासंखेज्जयं घेत्तव्वं। कस्स विसओ। ओधिणाणिस्स।

उक्कस्सअसंखेज्जे अवराणंतो हुवेदि रूवजुदे । तत्तो वड्ढदि कालो केवलणाणस्स परियंतं ।।३११।।

जं तं (अणंतं) तं तिविहं, परित्ताणंतयं, जुत्ताणंतयं, अणंताणंतयं चेदि। जं तं परित्ताणंतयं तं तिविहं, जहण्णपरित्ताणंतयं, अजहण्णमणुक्कस्सपरित्ताणंतयं, उक्कस्सपरित्ताणंतयं चेदि। जं तं जुत्ताणंतयं तं तिविहं, जहण्णजुत्ताणंतयं, अजहण्णमणुक्कस्सजुत्ताणंतयं, उक्कस्सजुत्ताणंतयं चेदि। जं तं अणंताणंतयं तं तिविधं, जहण्णमणंताणंतयं, अजहण्णमणुक्कस्सअणंताणंतयं उक्कस्सअणंताणंतय चेदि।

जं तं जहण्णपरित्ताणंतयं तं विरलेदूण एक्केक्कस्स रूवस्स जहण्णपरित्ताणंतयं दादूण अण्णोण्णब्भत्थे क्कदे उक्कस्सपरित्ताणंतयं अदिच्छिदूण जहण्णजुत्ताणंतयं गंतूण पडिदं। एवदिओ अभवसिद्धियरासी। तदो एगरूवे अवणीदे जादं उक्कस्सपरित्ताणंतयं। तदा जहण्णजुत्ताणंतयं सयं वग्गिदं उक्कस्सजुत्ताणंतयं अदिच्छिदूण जहण्णमणंताणतयं गंतूण पडिदं। तदो एगरूवे अवणीदे जादं उक्कस्सजुत्ताणंतयं। तदा जहण्णमणंताणंतयं पुव्वं व वग्गिदसंवग्गिदे कदे उक्कस्सअणंताणंतयं ण पावदि।

सिद्धा णिगोदजीवा वणप्फदि कालो य पोग्गला चेव । सव्वमलोगागासं छप्पेदे णंतपक्खेवा ।।३१२।।

ताणि पक्खिवदूण पुव्वं व तिण्णिवारे वग्गिदसंवग्गिदं कदे तदा उक्कस्सअणंताणंतयं ण पावदि। तदा धम्मट्ठियं अधम्मट्ठियं अगुरुलहुगुणं अणंतं पक्खिविदूण पुव्वं व तिण्णिवारे वग्गिदसंवग्गिदं कदे उक्कस्सअणंताणंतयं ण उप्पज्जदि। तदा केवलणाणकेवलणाणकेवलदंसणस्स वाणंता भागा तस्सुवरिं पक्खित्ते उक्कस्सअणंताणंतयं उप्पण्णं। अत्थि तं भायणं णत्थि तं दव्वं एवं भणिदो। एवं वग्गिय उप्पण्णसव्ववग्गरासीणं पुंजं केवलणाणकेवलदंसणस्स अणंतिमभागं होदि तेण कारणेण अत्थि तं भाजणं णत्थि तं दव्वं। जम्हि जम्हि अणंताणंतयं मग्गिज्जदि तम्हि तम्हि अजहण्णमणुक्कस्सअणंताणंतयं घेत्तव्वं। कस्स विसओ। केवलणाणिस्स।

भरहक्खेत्तम्मि इमे अज्जाखंडम्मि कालपरिभागा । अवसप्पिणिउवसप्पिणिपज्जाया दोण्णि होंति पुढं ।।३१३।।
णरतिरियाणं आऊ उच्छेहविभूदिपहुदियं सव्वं । अवसप्पिणिए हायदि उस्सप्पिणियासु वड्ढदि ।।३१४।।
अद्धारपल्लसायरउवमा दस होंति कोडकोडीओ । अवसप्पिणिपरिमाणं तेत्तियमुस्सप्पिणीकालो ।।३१५।।
दोण्णि वि मिलिदे कप्पं छब्भेदा होंति तत्थ पत्तेक्कं । सुसमसुसमं च सुसमं तइज्जयं सुसमदुस्समयं ।।३१६।।
दुस्समसुसमं दुस्सममदिदुस्समयं च तेसु पढमम्मि । चत्तारिसायरोवमकोडाकोडीओ परिमाणं ।।३१७।।
सुसमम्मि तिण्णि जलहीउवमाणं होंति कोडकोडीओ । दोण्णि तदियम्मि तुरिमे बादालसहस्सविरहिदो एक्को ।।३१८।।
इगिवीससहस्साणिं वासाणिं दुस्समम्मि परिमाणं । अतिदुस्समम्मि कालो तेत्तियमेत्तं मि णादव्वं ।।३१९।।

तम्मणुवे सग्गगदे असीदिलक्खावहरिदपल्लम्मि । वोलीणे उप्पण्णो सत्तमओ विमलवाहणो त्ति मणू ।।४५७।।

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८०००००

सत्तसयचावतुंगो इगिकोडीभजिदपल्लपरमाऊ । कंचणसरिच्छवण्णो सुमदीणामा महादेवी ।।४५८।।

१ |

दंड ७०० | प १०००००० |

तित्थयरचक्कबलहरिपडिसत्तू णाम विस्सुदा कमसो । बिउणियबारसबारसपयत्थणिधिरंधसंखाए ।।५११।।

२४ | १२ | ६ | ६ | ६ |

सुसमदुसमम्मि णामे सेसे चउसीदिलक्खपुव्वाणिं । वासतए अडमासे इगिपक्खे उसहउप्पत्ती ।।५५३।।

पुव्व ८४०००००, व ३, मा ८, दि १५ |

पण्णासकोडिलक्खा बारसहदपुव्वलक्खवासजुदा । जादम्हि उवहिउवमा उसहुप्पत्तीए अजियउप्पत्ती ।।५५४।।

सागरोवम ५०००००००००००००, पुव्व धण १२००००० |

अह तीसकोडिलक्खे बारसहदपुव्वलक्खवासजुदे । गलिदम्मि उवहिउवमे अजिउप्पत्तीए संभउप्पत्ती ।।५५५।।

सा ३०००००००००००००, धण पुव्व १२००००० |

इगिकोडिपण्णलक्खाछव्वीससहस्सवासमेत्ताए । अब्भहिएणं जलणिहिउवमसयेणं विहीणाए ।।५६३।।

वोलीणाए सायरकोडीए पुव्वलक्खजुत्ताए । सीयलसंभूदीदो सेयंसजिणस्स संभूदी ।।५६४।।

सा १०००००००, पुव्व १००००० रिण सागरोपम १०० व १५०२६००० |

उवहिउवमाणतिदए वोलीणे णवयलक्खवासजुदे । पादोणपल्लरहिदो संतिभवो धम्मभवदो य ।।५६६।।

सा ३ वस्स धण ६००००० रिण प ३ |

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उणतीससहस्साधियकोडिसहस्सम्मि वस्सतीदम्मि । अरजिणउप्पत्तीओ उप्पत्ती मल्लिणाहस्स ।।५७२।।

वा १०००००२६००० |

पंचसयधणुपमाणो उसहजिणिंदस्स होदि उच्छेहो । तत्तो पण्णासूणा णियमेण पुप्फदंतपेरंते ।।५८५।।

उ ५०० | अ ४५० | सं ४०० | अ ३५० | सु ३०० | प २५० | सु २०० | चंद १५० | पुप्फ १०० |

चउदालपमाणाइं संभवसामिस्स पुव्वलक्खाइं । चउपुव्वंगजुदाइं णिद्दिट्ठं सव्वदरिसीहिं ।।५६८।।

पुव्व ४४००००० अं ४ |

पण्णारसेहि अहियं कोसाण सयं च पासणाहम्मि । देवम्मि वड्ढमाणे बाणउदी अट्ठतालहिदा ।।७२७।।

११५ | ६२ |

४८ | ४८ |

तिसु सायरोवमेसुं तिचरणपल्लूणिएसु संतिजिणो । पलिदोवमस्स अद्धे तत्तो सिद्धिं गदो कुंथू ।।१२४६।।

सा ३ रिण प ३ | कुं प १ |

४ | २ |

पलिदोवमस्स पादे इगिकोडिसहस्सवस्सपरिहीणे । अरदेवो मल्लिजिणो कोडिसहस्सम्मि वासाणं ।।१२४७।।

अ प १ रिण वस्स १०००००००००० | मल्लि १०००००००००० |

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दस सुण्ण पंच केसव छस्सुण्णा केसि सुण्ण केसीओ । तियसुण्णमेक्कंकेसी दो सुण्णं एक्क केसि तिय सुण्णं ।।१४१७।।

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	1	0	0	1	0	0	1	0	1	0	1	1
2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	0	0	0	2	0	2	0	0	2	0	2	0	0
0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	0	0	0	0	0	0	3	0	3	0	0	0	3	0	0	3	0	0	0

दो रुद्द सुण्ण छक्का सग रुद्दा तह य दोण्णि सुण्णाइं । रुद्दो पण्णरसाइं सुण्णं रुद्दं च चरिमम्मि ।।१४४३।।

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	1	0	0	1	0	0	1	0	1	0	1	1
2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	0	0	0	2	0	2	0	0	2	0	2	0	0
0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	0	0	0	0	0	0	3	0	3	0	0	0	3	0	0	3	0	0	0
4	4	0	0	0	0	0	0	4	4	4	4	4	4	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4

णिव्वाणे वीरजिणे वासतये अट्ठमासपक्खेसुं । गलिदेसुं पंचमओ दुस्समकालो समल्लियदि ।।१४७४।।

तप्पढमपवेसम्मि य वीसाधियइगिसयं पि परमाऊ । सगहत्थो उस्सेहो णराण चउवीस पुट्ठट्ठी ।।१४७५।।

जादो सिद्धो वीरो तद्दिवसे गोदमो परमणाणी । जादो तस्सिं सिद्धे सुधम्मसामी तदो जादो ।।१४७६।।

तम्मि कदकम्मणासे जंबूसामि त्ति केवली जादो । तत्थ वि सिद्धिपवण्णे केवलिणो णत्थि अणुबद्धा ।।१४७७।।

बासट्ठी वासाणिं गोदमपहुदीण णाणवंताणं । धम्मपयट्टणकाले परिमाणं पिंडरूवेणं ।।१४७८।।

कुंडलगिरिम्मि चरिमो केवलणाणीसु सिरिधरो सिद्धो । चारणरिसीसु चरिमो सुपासचंदाभिधाणो य ।।१४७९।।

पण्णसमणेसु चरिमो वइरजसो णाम ओहिणाणीसुं । चरिमो सिरिणामो सुदविणयसुसीलादिसंपण्णो ।।१४८०।।

मउडधरेसुं चरिमो जिणदिक्खं धरदि चंदगुत्तो य । तत्तो मउडधरा दु प्पव्वज्जं णेव गेण्हंति ।।१४८१।।

णंदी य णंदिमित्तो बिदियो अवराजिदो तइज्जो य । गोवद्धणो चउत्थो पंचमओ भद्दबाहु त्ति ।।१४८२।।

पंच इमे पुरिसवरा चउदसपुव्वी जगम्मि विक्खादा । ते बारसअंगधरा तित्थे सिरिवड्ढमाणस्स ।।१४८३।।

पंचाण मेलिदाणं कालपमाणं हवेदि वाससदं । वीदम्मि य पंचमए भरहे सुदकेवली णत्थि ।।१४८४।।

| चोद्दसपुव्वी |

पढमो विसाहणामो पुट्ठिल्लो खत्तिओ जओ णागो । सिद्धत्थो धिदिसेणो विजओ बुद्धिल्लगंगदेवा य ।।१४८५।।

एक्करसो य सुधम्मो दसपुव्वधरा इमे सुविक्खादा । पारंपरिओवगदो तेसीदि सदं च ताण वासाणि ।।१४८६।।

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सव्वेसु वि कालवसा तेसु अदीदेसु भरहखेत्तम्मि । वियसंतभव्वकमला ण संति दसपुव्विदिवसयरा ।।१४८७।।

| दसपुव्वी |

णक्खत्तो जयपालो पंडुयधुवसेणकंसआइरिया । एक्कारसंगधारी पंच इमे वीरतित्थम्मि ।।१४८८।।

दोण्णि सया वीसजुदा वासाणं ताण पिंडपरिमाणं । तेसु अदीदे णत्थि हु भरहे एक्कारसंगधरा ।।१४८९।।

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| एक्कारसंगधरा |

पढमो सुभद्दणामो जसभद्दो तह य होदि जसबाहू । तुरिमो य लोहणामो एदे आयारअंगधरा ।।१४९०।।

सेसेक्करसंगाणं चोद्दसपुव्वाणमेक्कदेसधरा । एक्कसयं अट्ठारसवासजुदं ताण परिमाणं ।।१४९१।।

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| आचारांगधरा |

तेसु अदीदेसु तदा आचारधरा ण होंति भरहम्मि । गोदममुणिपहुदीणं वासाणं छस्सदाणि तेसीदी ।।१४६२।।

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वीससहस्सं तिसदा सत्तारस वच्छराणि सुदतित्थं । धम्मपयट्टणहेदू वोच्छिस्सदि कालदोसेणं ।।१४६३।।

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वीरजिणे सिद्धिगदे चउसदइगिसट्ठिवासपरिमाणे । कालम्मि अदिक्कंते उप्पण्णो एत्थ सकराओ ।।१४६६।।

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अहवा वीरे सिद्धे सहस्सणवकम्मि सगसयब्भहिए । पणसीदिम्मि यतीदे पणमासे सकणिओ जादो ।।१४६७।।

६७८५ मास ५ |

चोद्दससहस्ससगसयतेणउदीवासकालविच्छेदे । वीरेसरसिद्धीदो उप्पण्णो सगणिओ अहवा ।।१४६८।।

१४७६३ |

णिव्वाणे वीरजिणे छव्वाससदेसु पंचवरिसेसुं । पणमासेसु गदेसुं संजादो सगणिओ अहवा ।।१४६६।।

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वीसुत्तरवाससदे विसवो वासाणि सोहिऊण तदो । इगिवीससहस्सेहिं भजिदे आऊण खयवट्ठी ।।१५००।।

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सकणिववासजुदाणं चउसदइगिसट्ठिवासपहुदीणं । दसजुददोसयहरिदे लद्धं सोहेज्ज विउणसट्ठी ।।१५०१।।

तस्सि जं अवसेसं तस्सेय पवट्टमाणजेट्ठाऊ । रायंतरेसु एसा जुत्ती सव्वेसु पत्तेक्कं ।।१५०२।।

णिव्वाणगदे वीरे चउसदइगिसट्ठिवासविच्छेदे । जादो य सगणरिंदो रज्जं वंसस्स दुसयबादाला ।।१५०३।।

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दोण्णि सदा पणवण्णा गुत्ताणं चउमुहस्स बादालं । वस्सं होदि सहस्सं केई एवं परूवंति ।।१५०४।।

२५५ | ४२ |

जक्काले वीरजिणो णिस्सेयससंपयं समावण्णो । तक्काले अभिसित्तो पालयणामो अवंतिसुदो ।।१५०५।।

पालकरज्जं सट्ठीं इगिसयपणवण्ण विजयवंसभवा । चालं मुरुदयवंसा तीसं वस्सा सुपुस्समित्तम्मि ।।१५०६।।

६० | १५५ | ४० | ३० |

वसुमित्तअग्गिमित्ता सट्ठी गंधव्वया वि सयमेक्कं । णरवाहणा य चालं तत्तो भत्थट्ठणा जादा ।।१५०७।।

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भत्थट्ठणाण कालो दोण्णि सयाइं हवंति बादाला । तत्तो गुत्ता ताणं रज्जे दोण्णि य सयाणि इगितीसा ।।१५०८।।

२४२ | २३१ |

तत्तो कक्की जादो इंदसुदो तस्स चउमुहो णामो । सत्तरि वरिसा आऊ विगुणियइगिवीस रज्जंतो ।।१५०६।।

७० | ४२ |

आचारंगधरादो पणहत्तरिजुत्तदुसयवासेसुं । वोलीणेसुं बद्धो पट्टो कक्किस्स णरवइणो ।।१५१०।।

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अवसप्पिणिउस्सप्पिणिकाल च्चिय रहटघटियणाएणं । होंति अणंताणंता भरहेरावदखिदिम्मि पुढं ।।१६१४।।

तस्स य उत्तरजीवा चउवीससहस्सणवसयाइं पि । बत्तीसं एक्ककला सव्वसमासेण णिद्दिट्ठा ।।१६२५।।

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खुल्लहिमवंतसेले उत्तरभागम्मि होदि धणुपट्ठं । पणुवीससहस्साइं दोण्णिसया तीस चउकलब्भहिया ।।१६२६।।

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तस्स य चूलियमाणं पंचसहस्साणि जोयणाणं पि । तीसाधियदोण्णिसया सत्तकला अद्धअदिरित्ता ।।१६२७।।

५२३० | १५ |

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पंचसहस्सा तिसया पण्णासा जोयणाणि अद्धजुदा । पण्णारस य कलाओ पस्सभुजा खुल्लहिमवंते ।।१६२८।।

५३५० | ३१ |

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हेमवदस्स य रुंदा चालसहस्सा य ऊणवीसहिदा । तस्स य उत्तरबाणो भरहसलागादु सत्तगुणा ।।१६६८।।

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सत्ततीससहस्सा छच्च सया सत्तरी य चउअधिया । किंचूणसोलसकला हेमवदे उत्तरे जीवा ।।१६६६।।

३७६७४ | १६ |

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अट्ठत्तीससहस्सा सत्तसया जोयणाणि चालीसं । दसयकला णिद्दिट्ठं हेमवदस्सुत्तरं चावं ।।१७००।।

३८७४० | १० |

१६

इगिहत्तरिजुत्ताइं तेसट्ठिसयाइं जोयणाणं पि । सत्तकला दलअधिया णिद्दिट्ठा चूलिया तस्स ।।१७०१।।

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पस्सभुजा तस्स हवे छच्च सहस्साइं जोयणाणं पि । सत्तसया पणवण्णब्भहिया तिण्णि च्चिय कलाओ ।।१७०२।।

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भरहावणिरुंदादो अडगुणरुंदो य दुस्सय उच्छेहो । होदि महाहिमवंतो हिमवंतवियं वणेहिं कयसोहो ।।१७१७।।

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पण्णसयसहस्साणिं उणवीसहिदाणि जोयणाणिं पि । भरहाउ उत्तरंतं तग्गिरिबाणस्स परिमाणं ।।१७१८।।

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तेवण्णसहस्साणिं णवसया एक्कतीससंजुत्ता । छ च्चिय कलाओ जीवा उत्तरभागम्मि तग्गिरिणो ।।१७१९।।

५३९३१ | ६ |

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सत्तावण्णसहस्सा दुसया तेणउदि दसं कलाओ य । तत्थ महाहिमवंते जीवाए होदि धणुपुट्ठं ।।१७२०।।

५७२९३ | १० |

१६

णव य सहस्सा दुसया छाहत्तरि जोयणाणि भागा य । अडतीसहिदुणवीसा महहिमवंतम्मि पस्सभुजा ।।१७२१।।

९२७६ | १९ |

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जोयण अट्ठसहस्सा एक्कसयं अट्ठवीससंजुत्तं । पंचकलाओ एदं तग्गिरिणो चूलियामाणो ।।१७२२।।

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भरहावणीय बाणे इगितीसहदम्मि होदि जं लद्धं । हरिवरिसस्स य बाणं तं उवहितडादु णादव्वं ।।१७३८।।

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एक्कं जोयणलक्खं सट्ठिसहस्साणि भागहारो य । उणवीसेहिं एसो हरिवरिसखिदीए वित्थारो ।।१७३९।।

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तेहत्तरीसहस्सा एक्कोत्तरणवसयाणि जोयणया । सत्तारस य कलाओ हरिवरिसासुत्तरे जीवा ।।१७४०।।

७३९०१ | १७ |

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चुलसीदिसहस्साणिं तह सोलसजोयणाइं चउरंसा । एदस्सिं जीवाए धणुपट्ठं होदि हरिवरिसे ।।१७४१।।

८४०१६ | ४ |

१९

जोयण णवणउदिसया पणसीदी होंति अट्ठतीसहिदा । एक्कारसकलअधिया हरिवरिसे चूलियामाणं ।।१७४२।।

९९८५ | ११ |

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तेरस सहस्सयाणिं तिण्णि सया जोयणाइ इगिसट्ठी । अडतीसहरियतेरसकलाओ हरिवरिसपस्सभुजा ।।१७४३।।

१३३६१ | १३ |

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सोलससहस्सअडसयबादाला दो कला णिसहरुंदं । उणवीसहिदा सूई तीससहस्साणि छल्लक्खं ।।१७५०।।

१६८४२ | २ | ६३०००० |

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अथवा गिरिवरिसाणं बिगुणियवासम्मि भरहइसुमाणे । अवणीदे जं सेसं णियणियबाणाण तं माणं ।।१७५१।।
चउणउदिसहस्साणिं जोयण छप्पण्णअधियएक्कसया । दोण्णि कलाओ अधिया णिसहगिरिस्सुत्तरे जीवा ।।१७५२।।

९४१५६ | २ |

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एक्कं जोयणलक्खं चउवीससहस्सतिसयछादाला । णवभागा अदिरित्ता णिसहे जीवाए धणुपट्ठं ।।१७५३।।

१२४३४६ | ९ |

१९

सयवग्गं एक्कसयं सत्तावीसं च जोयणाणं पि । दोण्णि कला णिसहस्स य चूलियमाणं च णादव्वं ।।१७५४।।

जो १०१२७ | २ |

१६

जोयण वीससहस्सं एक्कसयं पंचसमधिया छट्ठी । अट्ठाइज्जकलाओ पस्सभुजा णिसहसेलस्स ।।१७५५।।

२०१६५ | ५ |

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णिसहस्सुत्तरभागे दक्खिणभागम्मि णीलवंतस्स । वरिसो महाविदेहो मंदरसेलेण पविहत्तो ।।१७७४।।

तेत्तीससहस्साइं छसया चउसीदिआ य चउअंसा । ता महविदेहरुंदं जोयणलक्खं च मज्झगदजीवा ।।१७७५।।

३३६८४ | ४ | १००००० |

१६

भरहस्स इसुपमाणे पंचाणउदीहिं ताडिदम्मि पुढं । रयणायरतीरादो विदेहअद्धो त्ति सो बाणो ।।१७७६।।

अट्ठावण्णसहस्सा इगिलक्खा तेरसुत्तरं च सयं । सगकोसाणं अद्धं महाविदेहस्स धणुपट्ठं ।।१७७७।।

१५८११३ | ७ |

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जोयण उणतीससया इगिवीसं अट्ठरस तहा भागा । एदं महाविदेहे णिद्दिट्ठं चूलियामाणं ।।१७७८।।

२६२१ | १८ |

१६

सोलससहस्सयाणिं अट्ठसया जोयणाणि तेसीदी । अद्धाधियअट्ठकला महाविदेहस्स पस्सभुजा ।।१७७६।।

१६८८३ | १७ |

३८

वरिसे महाविदेहे बहुमज्झे मंदरो महासेलो । जम्माभिसेयपीढो सव्वाणं तित्थकत्ताणं ।।१७८०।।

जोयणसहस्सगाढो णवणवदिसहस्समेत्तउच्छेहो । बहुविहवणसंडजुदो णाणावररयणरमणिज्जो ।।१७८१।।

१००० | ६६००० |

दस य सहस्सा णउदी जोयणया दसकलेक्करसभागा । पायालतले रुंदं समवट्टतणुस्स मेरुस्स ।।१७८२।।

१००६० | १० |

११

कमहाणीए उवरिं धरपट्ठम्मि दससहस्साणिं । जोयणसहस्समेक्कं वित्थारो सिहरभूमीए ।।१७८३।।

१०००० | १००० |

भूमीदो पंचसया कमहाणीए तदुवरि गंतूणं । तट्ठाणे संकुलिदो पंचसया सो गिरी जुगवं ।।१७८८।।

समवित्थारो उवरिं एक्कारससहस्सजोयणपमाणं । तत्तो कमहाणीए इगिवण्णसहस्सपणसया गंतुं ।।१७८६।।

११००० | ५१५०० |

जुगवं समंतदो सो संकुलिदो जोयणाणि पंचसया । समरुंदं उवरितले एक्कारससहस्सपरिमाणं ।।१७६०।।

५०० | ११००० |

उड्ढं कमहाणीए पणवीससहस्सजोयणा गंतुं । जुगवं संकुलिदो सो चत्तारि सयाणि चउणउदी ।।१७६१।।

२५००० | ४६४ |

एवं जोयणलक्खं उच्छेहो सयलपव्वदपहुस्स । णिलयस्स सुरवराणं अणाइणिहणस्स मेरुस्स ।।१७६२।।

मुहभूविसेसमद्धिय वग्गगदं उदयवग्गसंजुत्तं । जं तस्स वग्गमूलं पव्वदरायस्स तस्स पस्सभुजा ।।१७६३।।

णवणउदिसहस्साणिं एक्कसयं दोण्णि जोयणाणि तहा । सविसेसाइं एसा मंदरसेलस्स पस्सभुजा ।।१७६४।।

६६१०२ |

चालीसजोयणाइं मेरुगिरिंदस्स चूलियामाणं । बारह तब्भूवासं चत्तारि हवेदि मुहवासं ।।१७६५।।

४० | १२ | ४ |

मुहभूमीण विसेसे उच्छेहहिदम्मि भूमुहाहिंतो । हाणिचयं णिद्दिट्ठं तस्स पमाणं हु पंचसो ।।१७६६।।

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जत्थिच्छसि विक्खंभं चूलियसिहराउ समवदिण्णाणं । तं पंचेहि विहत्तं चउजुत्तं तत्थ तव्वासं ।।१७६७।।

तं मूले सगतीसं मज्झे पणुवीस जोयणाणं पि । उड्ढे बारस अधिया परिही वेरुलियमइयाए ।।१७६८।।

३७ | २५ | १२ |

जत्थिच्छसि विक्खंभं मंदरसिहराउ समवदिण्णाणं । तं एक्कारसभजिदं सहस्ससहिदं च तत्थ वित्थारं ।।१७६६।।

जस्सिं इच्छसि वासं उवरिं मूलाउ तेत्तियपदेसं । एक्कारसेहिं भजिदं भूवासे सोधिदम्मि तव्वासं ।।१८००।।

एक्कारसे पदेसे एक्कपदेसा दु मूलदो हाणी । एदं पादकरंगुलकोसप्पहुदीहिं णादव्वं ।।१८०१।।

हरिदालमई परिही वेरुलियाण रयणवज्जमई । उड्ढम्मि य पउममई तत्तो उवरिम्मि पउमरायमई ।।१८०२।।

सोलससहस्सयाणिं पंचसया जोयणाणि पत्तेक्कं । ताणं छप्परिहीणं मंदरसेलस्स परिमाणं ।।१८०३।।

१६५०० |

सो मूले वज्जमओ एक्कसहस्सं च जोयणपमाणो । मज्झे वररयणमओ इगिसट्ठिसहस्सपरिमाणं ।।१८०७।।

१००० | ६१००० |

उवरिम्मि कंचणमओ अडतीससहस्सजोयणाणं पि । मंदरसेलस्सीसे पंडुवणं णाम रमणिज्जं ।।१८०८।।

३८००० |

जोयणसहस्समेक्कं मेरुगिरिंदस्स सिहरवित्थारं । एक्कत्तीससयाणिं बासट्ठी समधिया य तप्परिही ।।१८१०।।

१००० | ३१६२ |

दुगुणम्मि भद्दसाले मेरुगिरिंदस्स खिवसु विक्खंभं । दोसेलमज्झजीवा तेवण्णसहस्सजोयणा होंति ।।२०२०।।

५३००० |

अद्धिय विदेहरुंदं पंचसहस्साणि तत्थ अवणिज्जं । दोवक्खारगिरीणं जीवाबाणस्स परिमाणं ।।२०२१।।

पणवीससहस्सेहिं अब्भहिया जोयणाणि दो लक्खा । उणवीसेहिं विहत्ता बाणस्स पमाणमुद्दिट्ठं ।।२०२२।।

२२५००० |

१६

जोयणसट्ठिसहस्सं चत्तारि सया य अट्ठरसजुत्ता । उणवीसहरिदबारसकलाओ वक्खारधणुपट्ठं ।।२०२३।।

६०४१८ | १२ |

१६

जोयणतीससहस्सा णवउत्तर दो सया य छब्भाया । उणवीसेहि विहत्ता ताणं सरिसायदाण दीहत्तं ।।२०२४।।

३०२०६ | ६ |

१६

जीवाए जं वग्गं चउगुणबाणप्पमाणपविहत्तं । इसुसंजुत्तं ताणं अंतरवट्टस्स विक्खंभं ।।२०२५।।
एक्कत्तरिं सहस्सा इगिसयतेदालजोयणा य कला । णवहणिदुणवीसहिदा सगतीसा वट्टविक्खंभा ।।२०२६।।

७११४३ | ३७ |

१७१

भूमिय मुहं विसोधिय उदयहिदं भूमुहादिखयवड्ढी । मुहसय पणघण भूमी उदओ इगिहाणकूडपरिसंखा ।।२०३३।।

१०० | १२५ | ६ |

खयवड्ढीण पमाणं पणुवीसं जोयणाणि छब्भजिदं । भूमिमुहेसुं हीणाधियम्मि कूडाण उच्छेहो ।।२०३४।।

२५ |

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अथवा इच्छागुणिदक्खयवड्ढी खिदिविसुद्धमुहजुत्ता । कूडाण होइ उदओ तेसुं पढमस्स पणविंदं ।।२०३५।।

१२५ |

दीहत्ते वि वियासे उवएसो ताण संपइ पणट्ठो । आदिमकूडस्सुदयो पणवीसजुदं च जोयणाण सयं ।।२०४७।।
एक्कं चिय होदि सयं अंतिमकूडस्स उदयपरिमाणं । उभयविसेसे अडहिदपंचकदी हाणिवड्ढीओ ।।२०४८।।
इच्छाए गुणिदाओ हाणिवड्ढीओ खिदिविसुद्धाओ । मुहजुत्ताओ कमसो कूडाणं होदि उच्छेहो ।।२०४९।।
पणवीसब्भहियसयं वियाणमुदओ पहिल्लए सेसे । उप्पण्णुप्पणेसुं पणवीसं समवणेज्ज अट्ठहिदं ।।२०५०।।

१२५ | १२१ | ७ | ११८ | ३ | ११५ | ५ | ११२ | ४ | १०९ | ३ | १०६ | १ | १०३ | १ | १०० |

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णिसहधराहरउवरिमतिगिंछदहस्स उत्तरदुवारे । णिगच्छेदि उव्वणदी सीदोदा भुवणविक्खादा ।।२०६५।।
एदाणं परिहीओ वासेणं तिगुणिदेण अधियाओ । ताण उवरिम्मि दिव्वा पासादा कणयरयणमया ।।२१०६।।
उवरिम्मि णीलगिरिणो दिव्वदहो केसरि त्ति विक्खादो । तस्स य दक्खिणदारेणं गच्छदि वरणई सीदा ।।२११६।।
रुंदावगाढपहुदिं तह वेदीउववणादिकं सव्वं । सीदोदासारिच्छं सीदणदीए वि णादव्वं ।।२१२२।।
गंगारोहिंहरिओ सीदाणारीसुवण्णकूलाओ । रत्त त्ति सत्त सरिया पुव्वाए दिसाए वच्चंति ।।२३७२।।
पच्छिमदिसाए गच्छंदि सिंधुणई रोहियासहरिकंता । सीदोदा णरकंता रुप्पतडा सत्तमी य रत्तोदा ।।२३७३।।
इसुपादगुणिदजीवा गुणिदव्वा दसपदेण जं वग्गं । मूलं चावायारे खेत्तेत्थं होदि सुहुमफलं ।।२३७४।।
पंचतितिएक्कदुगणभछक्का अंकक्कमेण जोयणया । एक्कछतिहरिदचउणवदुगभागो भरहखेत्तफलं ।।२३७५।।

६०२१३३५ | २९४ |

३६१

तियएक्कंबरणवदुगणवचउइगिपंचएक्क यंसा य । तिण्णिसयबारसायं खेत्तफलं णिसहसेलस्स ।।२३७६।।

१५१४९२९०१३ | ३१२ |

३६१

दुखणवणवचउतियणवछण्णवदुगजोयणेक्कपंतीए । भागा तिण्णि सया इगिछत्तियहरिदा विदेहखेत्तफलं ।।२३७७।।

२९६९३४९९०२ | ३०० |

३६१

भरहादी णिसहंता जेत्तियमेत्ता हवंति खेत्तफलं । तं सव्वं वत्तव्वं एरावदपहुदिणीलंतं ।।२३७८।।

अंबरपणएक्कचऊणवछप्पण्णसुण्णणवयसत्तं च । अंककमे परिमाणं जंबूदीवस्स खेत्तफलं ।।२३७६।।

७९०५६६४१५० |

सत्तरससयसहस्सा बाणउदिसहस्सया य णउदिजुदा । सव्वाओ वाहिणीओ जंबूदीवम्मि मिलिदाओ ।।२३८५।।

१७९२०९० |

णदीसंखा- विदे. सीतासीतोदा २, क्षेत्रनदी ६४, विभंगा १२, सीतासीतोदापरिवार १६८०००, क्षे. न. प. ८६६०००, वि. परि ३३६०००, एकत्र १४०००७८ । भरतादि ३९२०१२ । १७९२०१०

छक्कुलसेला सव्वे विजयद्धा होंति तीस चउजुत्ता । सोलस बक्खारगिरी बारणदंताइ चत्तारो ।।२३९४।।

६ | ३४ | १६ | ४ |

तह अट्ठ दिग्गइंद णाभिगिरिंदा हवंति चत्तारि । चोत्तीस वसहसेला कंचणसेला सयाण दुवे ।।२३९५।।

८ | ४ | ३४ | २०० |

एक्को य मेरु कूडा पंचसया अट्ठसट्ठिअब्भहिया । सत्त च्चिय महविजया चोत्तीस हवंति कम्मभूमीओ ।।२३९६।।

१ | ५६८ | ७ | ३४ |

सत्तरि अब्भहियसयं मेच्छखिदी छच्च भोगभूमीओ । चत्तारि जमलसेला जंबूदीवे समुद्दिट्ठा ।।२३९७।।

अत्थि लवणंबुरासी जंबूदीवस्स खाइयायारो । समवट्टो सो जोयणबेलक्खपमाणवित्थारो ।।२३९८।।

२००००० |

णावाए उवरि णावा अहोमुही जह ठिदा तह समुद्दो । गयणे समंतदो सो चेट्ठेदि हु चक्कबालेणं ।।२३९९।।

चित्तोवरिमतलादो कूडायारेण उवरि वारिणिही । सत्तसयजोयणाइं उदएण णहम्मि चेट्ठेदि ।।२४००।।

७०० |

उट्ठे भवेदि रुंदं जलणिहिणो जोायणा दससहस्सा । चित्तावणिपणिहीए विक्खंभो दोण्णि लक्खाइं ।।२४०१।।

१०००० | २००००० |

पत्तेक्कं दुतडादो पावेसिय पणणउदिजोयणसहस्सा । गाढे दोण्णि सहस्सा तलवासो दस सहस्साणिं ।।२४०२।।

९५००० | ९५००० |

भूमीए मुहं सोहिय उदयहिदं भूमुहाणिचया । मुहमजुदं बे लक्खा भूमी जोयणसहस्समुस्सेहो ।।२४०३।।

१०००० | २००००० | १००० |

खयवड्ढीण पमाणं एक्कसंय जोयणाणि णउदिजुदं । इच्छाहदहाणिचया खिदिहीणा मुहजुदा रुंदं ।।२४०४।।

१९० |

उवरिमजलस्स जोयण उणवीससयाणि सत्तहरिदाणिं । खयवड्ढीण पमाणं णादव्वं लवणजलणिहिम्मि ।।२४०५।।

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पत्तेक्कं दुतडादो पविसिय पणणउदिजोयणसहस्सा । गाढा तस्स सहस्सं एवं सोधिज्ज अंगुलादीणं ।।२४०६।।

९५००० | १००० | १ |

९५

दुतडादो जलमज्झे पविसिय पणणउदिजोयणसहस्सा । सत्तसयाइं उदओ एवं सोहेज्ज अंगुलादीणं ।।२४०७।।

९५००० | ७०० | ७ |

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लवणोवहिबहुमज्झे पादाला ते समंतदो होंति । अट्ठुत्तरं सहस्सं जेट्ठा मज्झा जहण्णा य ।।२४०८।।

१००८ |

चत्तारो पायाला जेट्ठा मज्झिल्लआ वि चत्तारो । होदि जहण्ण सहस्सं ते सव्वे रंजणायारा ।।२४०९।।

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उक्किट्ठा पायाला पुव्वादिदिसासु जलहिमज्झम्मि । पायालकडंबक्खा वडवामुहजोवकेसरिणो ।।२४१०।।

पुह पुह दुतडाहिंतो पविसिय पणणउदि जोयणसहस्सा । लवणजले चत्तारो जेट्ठा चेट्ठंति पायाला ।।२४११।।

९५००० | ९५००० |

पुह पुह मूलम्मि भुहे वित्थारो जोयणा दससहस्सा । उदओ वि एक्कलक्खं मज्झिमरुंदो वि तम्मेत्तं ।।२४१२।।

१०००० | १०००० | १००००० | १००००० |

जेट्ठा ते संलग्गा सीमंतबिलस्स उवरिमे भागे । पणसयजोयणबहला कुड्डा एदाण वज्जमया ।।२४१३।।

५०० |

जेट्ठाणं विच्चाले विदिसासुं मज्झिमा दु पादाला । ताणं रुंदप्पहुदी उक्किट्ठाणं दसंसेणं ।।२४१४।।

१००० | १००० | १०००० | १०००० | ५० |

णवणउदिसहस्साणिं पंचसया जोयणाणि दुतडेसुं । पुह पुह पविसिय सलिले पायाला मज्झिमा होंति ।।२४१५।।

९९५०० |

'जेट्ठाणमज्झिमाणं, विच्चालेसुं जहण्णपायाला । पुह पुह पणघणमाणा मज्झिमदसभागरुंदादी ।।२४४६।।

णवणउदिसहस्साणिं णवसयपण्णासजोयणाणि तहा । पुह पुह दुतडाहिंतो पविसिय चेट्ठंति अवरे वि ।।२४४७।।

जेट्ठाणं मुहरुंदं जलणिहिमज्झिल्लपरिहिमज्झम्मि । सोहियचउपविहत्तं हवेदि एक्केक्कविच्चालं ।।२४४८।।

णवलक्खजोयणाइं अडदालसहस्सछस्सयाणं पि । तेसीदी अधियाइं सायरमज्झिल्लपरिहिपरिमाणं ।।२४४९।।

सत्तावीससहस्सा सत्तरिजुत्तं सयं दु बेलक्खा । जोयणतिचउब्भागा जेट्ठाणं होदि विच्चालं ।।२४५०।।

छत्तीससहस्साणिं सत्तरिजुत्त सयं दु बे लक्खा । जोयणतिचउब्भागा मज्झिमयाणं च विच्चालं ।।२४५१।।'(विशुद्धमति)

जेट्ठंतरसंखादो एक्कसहस्सम्मि समवणीदम्मि । अद्धकदे जेट्ठाणं मज्झिमयाणं च विच्चालं ।।२४२६।।

जोयणलक्खं तेरससहस्सया पंचसीदिसंजुत्ता । तं विच्चालपमाणं दिवड्ढकोसेण अदिरित्तं ।।२४२७।।

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जेट्ठाण मज्झिमाणं विच्चम्मि जहण्णयाण मुहवासं । फेडिय सेसं विगुणियतेसट्ठीए कयविभागे ।।२४२८।।

जं लद्धं अवराणं पायालाणं तमंतरं होदि । तं माणं सय सत्तय अट्ठाणउदी य सविसेसा ।।२४२९।।

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पत्तेक्कं पायाला तिवियप्पा ते भवंति कमहीणं । हेट्ठाहिंतो वादं जलवादं सलिलमासेज्जं ।।२४३०।।

तेत्तीससहस्साणिं तिसया तेत्तीस जोयणतिभागो । पत्तेक्कं जेट्ठाणं पमाणमेदं तियंसस्स ।।२४३१।।

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तिण्णि सहस्सा तिसया तेत्तीसजुदाणि जोयणतिभागो । पत्तेक्कं णादव्वं मज्झिमयाणं तियंसपरिमाणं ।।२४३२।।

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तेत्तीसब्भहियाइं तिण्णि सयाणं च जोयणतिभागो । पत्तेक्कं दट्ठव्वं तियंसमाणं जहण्णाणं ।।२४३३।।

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हेट्ठिल्लम्मि तिभागे वसुमइविवराण केवलो वादो । मज्झिल्ले जलवादो उवरिल्ले सालिलप्पब्भारो ।।२४३४।।

पवणेण पुण्णियं तं चलाचलं मज्झिमं सलिलवादं । उवरिं चेट्ठदि सलिलं पवणाभावेण केवलं तेसुं ।।२४३५।।

पादालाणं मरुदा पक्खे सीदम्मि वड्ढंति । हीयंति किण्णपक्खे सहावदो सव्वकालेसुं ।।२४३६।।

वड्ढी बावीससया बावीसा जोयणाणि अदिरेगा । पवणे सिदपक्खे य प्पडिवासं पुण्णिमं जाव ।।२४३७।।

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पुण्णिमए हेट्ठादो णियणियदुतिभागमेत्तपायाले । चेट्ठदि वाऊ उवरिमतियभागे केवलं सलिलं ।।२४३८।।

अमवस्से उवरीदो णियणियदुतिभागमेत्त परिमाणे । कमसो सलिलं हेट्ठिमतियभागे केवलं वादं ।।२४३९।।

पेलिज्जंते उवही पवणेण तहेउ सीमंते । हिंडदि पायदि गयणे दंडसहस्साणि चत्तारि ।।२४४०।।

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दिवसं पडि अट्ठसयं तिहिदा दंडाणि सुक्ककिण्हे य । खयवड्ढी पुव्वुत्तयवड्ढिदवेलाए उवरि जलहिजलं ।।२४४१।।

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पुह पुह दुतडाहिंतो पविसिय पणणउदिजोयणसहस्सा । लवणजले बे कोसा उदओ सेसेसु हाणिचयं ।।२४४२।।

अमवस्साए उवही सरिसो भूमीए होदि सिदपक्खे । कमेण वड्ढोद णहे कोसाणिं दोण्णि पुण्णिमए ।।२४४३।।

हाएदि किण्हपक्खे तेण कमेणं च जाव वड्ढिगदं । एवं लोगाइणिए गंथप्पवरम्मि णिद्दिट्ठं ।।२४४४।।

एक्करससहस्साणिं जलणिहिणो जोयणाणि गयणम्मि । भूमीदो उच्छेहो होदि अवट्ठिदसरूवेणं ।।२४४५।।

११०००|

तस्सोवरि सिदपक्खे पंचसहस्साणि जोयणा कमसो । वड्ढेदि जलणिहिजलं बहुले हाएदि तम्मेत्तं ।।२४४६।।

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पायालंते णियणियमुहविक्खंभे हदम्मि पंचेहिं । णियणियपणिधीसु णहे सलिलकणा जंति तम्मेत्ता ।।२४४७।।

५००००|५०००|५००|

जलसिहरे विक्खंभो जलणिहिणो जोयणा दससहस्सा । एवं संगाइणिए लोयविभाए विणिद्दिट्ठं ।।२४४८।।

१००००|

लवणजलधिस्स जगदी सारिच्छा जंबुदीवजगदीए । अब्भंतर सिलवट्टं बाहिरभागम्मि होदि वणं ।।२५१९।।

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पण्णारसलक्खाइं इगिसीदिसहस्सजोयणाणि तहा । उणदालजुदेक्कसयं बाहिरपरिधी समुद्दजगदीए ।।२५२०।।

१५८११३९|

दुगुणिच्चिय सूजीए इच्छियवलयाण दुगुणवासाणिं । सोधिय अवसेसकदिं वासद्धकदीहि गुणिदूणं ।।२५२१।।
गुणिदूण दसेहिं तदो मूलेणंकं हवेदि जं लद्धं । इच्छियवलयायारे खेत्ते तं जाण सुहुमफलं ।।२५२२।।
गयणेक्कछणवपंचछछतियसत्तणवयअट्ठेक्का । जोयणया अंककमे खेत्तफलं लवणजलहिस्स ।।२५२३।।

१८६७३६६५६६१० |

अंबरछस्सत्तत्तियपणतिदुचउछस्सत्तणवयएक्काइं । खेत्तफलं मिलिदाणं जंबूदीवस्स लवणजलधिस्स ।।२५२४।।

१६७६४२३५३७६० |

बाहिरसूईवग्गो अब्भंतरसूइवग्गपरिहीणो । लक्खस्स कदीहि हिदो जंबूदीवप्पमाणया खंडा ।।२५२५।।
चउवीस जलहिखंडा जंबूदीवप्पमाणदो होंति । एवं लवणसमुद्दो वाससमासेण णिद्दिट्ठो ।।२५२६।।
दक्खिणउत्तरभाए उसुगारा दक्खिणुत्तरया । एक्केक्को होदि गिरी धादइसंडं पविभजंतो ।।२५३२।।
णिसहसमाणुच्छेहा संलग्गा लवणकालजलहीणं । अब्भंतरम्मि बाहिं अंकमुहा ते खुरप्पसंठाणा ।।२५३३।।
जोयणसहस्समेक्कं रुंदा सव्वत्थ ताण पत्तेक्कं । जोयणसयमवगाढा कणयमया ते विराजंति ।।२५३४।।
दोण्णं इसुगाराणं बारसकुलपव्वयाण विच्चाले । अरविवरेहिं सरिच्छा विजया सव्वे वि धादईसंडे ।।२५५३।।
अंकायारा विजया भागे अब्भंतरम्मि ते सव्वे । सत्तिमुहं पिव बाहिं सयडुद्धिसमा य पस्सभुजा ।।२५५४।।
अब्भंतरम्मि भागे मज्झिमभागम्मि बाहिरे भागे । विजयाणं विक्खंभं धादइसंडे णिरूवेमो ।।२५५५।।
दुसहस्सजोयणाणिं पंचुचरसयजुदाणि पंचंसा । उणवीसहिदा रुंदा हिमवंतगिरिस्स णादव्वं ।।२५५६।।

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महहिमवंतं रुंदं चउहदहिमवंतरुंदपरिमाणं । णिसहस्स होदि वासो महहिमवंतस्स चउगुणो वासो ।।२५५७।।

८४२१ | १ | ३३६८४ | ४ |

१६ १६

एदाणं सेलाणं विक्खंभो मेलिऊण चउगुणिदो । सव्वाण कुलगिरीणं रुंदसमासो पुढो होदि ।।२५५८।।
दोण्णं इसुगाराणं विक्खंभो होदि दो सहस्साणिं । तस्सिं मिलिदे धादइसंडे गिरिरुद्धखिदिमाणं ।।२५५९।।

२००० |

दुगचउअट्ठट्ठाइं सत्तेक्कं जोयणाणि अंककमे । उणवीसहिदा दुकला माणं गिरिरुद्धवसुहाए ।।२५६०।।

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लवणादीणं रुंदं दुगतिगचउसंगुणं तिलक्खूणं । कमसो आदिममज्झिमबाहिरसूई हवे ताणं ।।२५६१।।
आदिममज्झिमबाहिरसूईवग्गा दसेहि संगुणिदा । तस्स य मूला इच्छियसूईए होदि सा परिही ।।२५६२।।
पण्णारसलक्खाइं इगिसीदिसहस्सजोयणेक्कसयं । उणदालजुदा धादइसंडे अब्भंतरे परिही ।।२५६३।।

१५८११३६ |

अट्ठावीसं लक्खा छादालसहस्स जोयणा पण्णा । किंचूणा णादव्वा मज्झिमपरिही य धादईसंडे ।।२५६४।।

२८४६०५० |

एक्कछणवणभएक्का एक्कचउक्का कमेण अंकाणिं । जोयणया किंचूणा तद्दीवे बाहिरो परिही ।।२५६५।।

४११०६६१ |

जोयणसहस्सगाढा चुलसीदिसहस्सजोयणुच्छेहा । ते सेला पत्तेक्कं वररयणवियप्पपरिणामा ।।२५७७।।

१००० | ८४००० |

मेरुतलस्स य रुंदं दस य सहस्साणि जोयणा होंति । चउणउदिसयाइं पि य धरणीपट्ठम्मिए रुंदा ।।२५७८।।

१०००० | ९४०० |

जोयणसहस्समेक्कं विक्खंभो होदि तस्स सिहरम्मि । भूमीय मुहं सोहिय उदयहिदे भूमुहादु हाणिचयं ।।२५७९।।

तक्खयवड्ढिपमाणं छद्दसभागं सहस्सगाढम्मि । भूमीदो उवरिं पि य एक्कं दसरूवमवहरिदं ।।२५८०।।

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१० १०

मेरुतलस्स य रुंदं पंचसया णवसहस्स जोयणया । सव्वत्थं खयवड्ढी दसमंसं केइ इच्छंति ।।२५८१।।

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जत्थिच्छसि विक्खंभं खुल्लयमेरूण समवदिण्णाणं । दसभजिदे जं लद्धं एक्कसहस्सेण संमिलिदं ।।२५८२।।

णवजोयणलक्खाणिं पणुवीससहस्सचउसयाणिं पि । छासीदी धणुपट्ठं दो कुरवे धादईसंडे ।।२५८३।।

९२५४८६ |

दो जोयणलक्खाणिं तेवीससहस्सयाणि एक्कसयं । अट्ठावण्णा जीवा कुरवे तह धादईसंडे ।।२५८४।।

२२३१५८ |

तियलक्खा छासट्ठी सहस्सया छस्सयाणि सीदी य । जोयणया रिजुबाणो णादव्वो तम्मि दीवम्मि ।।२५८५।।

३६६६८० |

चउजोयणलक्खाणिं छस्सयजुत्ताणि होंति तेत्तीसं । दोमंदरकुरवाणं पत्तेक्कं वट्टविक्खंभो ।।२५८६।।

४००६३३ |

जीवाविक्खंभाणं वग्गविसेसस्स होदि जं मूलं । विक्खंभजुदं अद्धिय रिजुबाणो धादईसंडे ।।२५८७।।

इसुवग्गं चउगुणिदं जीवावग्गम्मि पक्खिवेज्ज तदो । चउगुणिदइसुविहत्तं जं लद्धं वट्टवासो सो ।।२५८८।।

सत्तणवअट्ठसगणवतियाणि अंसाणि होंति बाणवदी । वंकेणेसुपमाणं धादगिसंडम्मि दीवम्मि ।।२५८९।।

३९७८९७ | ९२ |

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दुगुणम्मिभद्दसाले मंदरसेलस्स खिवसु विक्खंभं । मज्झिमसूईसहिदं सस्सूई कच्छगंधमालिणिए ।।२६१५।।

एक्कारसलक्खाणिं पणुवीससहस्स इगिसयाणिं पि । अडवण्ण जोयणाणिं कच्छाए सा हवे सूई ।।२६१६।।

११२५१५८ |

विक्खंभस्स य वग्गो दसगुणिदो करणि वट्टए परिही । दुछणभअडपणपणतिययंककमे तीए परिमाणं ।।२६१७।।

३५५८०६२ |

अट्ठत्तरिं सहस्सा बादालजुदा य जोयणट्ठसया । एक्कं लक्खं चोद्दसगिरिरुद्धक्खेत्तपरिमाणं ।।२६१८।।

१७८८४२ |

सेलविसुद्धा परिही चउसट्ठीए गुणिज्ज अवसेसं । दोसयबारसभजिदे जं लद्धं तं विदेहदीहत्तं ।।२६१९।।

दसजोयणलक्खाणिं विंससहस्सं सयं पि इगिदालं । अडसीदिजुदसयंसा विदेहदीहत्तपरिमाणं ।।२६२०।।

१०२०१४१ | १८८ |

२१२

चत्तारि सहस्साणिं पणसयचउसीदि जोयणाणं पि । परिवड्ढी विजयाणं णादव्वा धादईसंडे ।।२६२५।।

४५८४ |

चत्तारि जोयणाणं सयाणि सत्तत्तरीय जुत्ताणिं । सट्ठि कलाओ तस्सिं वक्खारगिरीण परिवड्ढी ।।२६२६।।

४७७ | ६० |

२१२

एक्कोणवीससहिदं एक्कसयं जोयणाणि भागा य । बावण्णा ठाणेसुं विभगंसरियाण परिवड्ढी ।।२६२७।।

११६ | ५२ |

२१२

दुसहस्सं सत्तसयं उणणवदी जोयणाणि अंसा य । बाणवदी ठाणेसुं देवारण्णस्स संवड्ढी ।।२६२८।।

२७८६ | ६२ |

२१२

खेत्तादिवड्ढिमाणं आदीदो वाढिऊण मज्झिल्ले । तम्हा अंतिमदीहे वड्ढिपमाणं च जाणिज्जं ।।२६२६।।

वि ४५८४ | व ४७७ | ६० | विभं ११६ | ५२ | दे २७८६ | ६२ |

२१२ २१२ २१२

सोहसु मज्झिमसूई मेरुगिरिं दुगुणभद्दसालवणं । सा सूई पम्मादीपरियंतं मंगलावदिए ।।२६६५।।

दोचउअडचउसगछज्जोयणआणिं कमेण तं वग्गं । दसगुणमूलं परिही अडतियणभचउतिएक्कदुगं ।।२६६६।।

सूई ६७४८४२ | परि २१३४०३८ |

दुगअट्ठगयणणवयं छच्चउछदुछक्कदुगिगितियपंच । अंककमे जोयणया कालोदे होदि गणिदफलं ।।२७३७।।

५३१२६२६४६६०८२ |

जंबूदीवमहीए फलप्पमाणेण कालउवहिम्मि । खेत्तफलं किज्जंतं छस्सयबाहत्तरी होदि ।।२७३८।।

६७२ |

इगिणउदिं लक्खाणिं सदरिसहस्साणि छस्सयाणिं पि । पंचुत्तरो य परिही बाहिरया तस्स किंचूणा ।।२७३६।।

६१७०६०५ |

बिउणम्मि सेलवासे जोयणलक्खाणि खिवसु पणदालं । तप्परिमाणं सूई बाहिरभागे गिरिंदस्स ।।२७५७।।

४५०२०४४ |

एक्को जोयणकोडी लक्खा बादाल तीसछसहस्सा । तेरसजुदसत्तसया परिधीए बाहिरम्मि अदिरेओ ।।२७५८।।

१४२३६७१३ |

अदिरेयस्स पमाणं सहस्समेक्क तिसयब्भहियं । तीस धणू इगिहत्थो दहंगुलाइं जवा पंच ।।२७५६।।

दं १३३० | ह १ | अं १० | ज ५ |

पणदाललक्खसंखा सूई अब्भंतरम्मि भागम्मि । णवचउदुखतिदुचउइगिअंककमेणेव परिहिजोयणया ।।२७६०।।

४५००००० | १४२३०२४६ |

सूजीए कदिए कदि दहगुणमूलं च लद्ध चउभजिदं । समवट्टवसुमईए हवेदि तं सुहुमखेत्तफलं ।।२७६१।।
णभएक्कपंचदुगसगसगपंचतिदुखछक्केक्का । अंककमे खेत्तफलं मणुसजगे सेलफलजुत्तं ।।२७६२।।

१६०२३५७७२७२५१० |

दुगुणाए सूजीए दोसुं वासो विसोधिदस्स कदी । सोज्झस्स चउब्भागं वग्गिय गुणियं च दसगुणं मूलं ।।२७६३।।
सत्तखणवसत्तेक्का छच्छक्कचउक्कपंचचउएक्कं । अंककमे जोयणया गणियफलं माणुसुत्तरगिरिस्स ।।२७६४।।

१४५४६६१७६०७ |

चत्तारि सहस्साणिं दुसया दसजोयणाणि दसभागा । विक्खंभो हिमवंते णिसहंत चउग्गुणो कमसो ।।२७६८।।

४२१० | १० | १६८४२ | २ | ६७३६८ | ८ |

१६ १६ १६

एदाणं तिणगाणं विक्खंभं मेलिदूण चउगुणिदं । सव्वाणं णादव्वं रुंदसमाणं कुलगिरीणं ।।२७६९।।
दोण्णं इसुगाराणं विक्खंभं बेसहस्सजोयणया । तं पुव्वम्मि विमिस्सं दीवद्धे सेलरुद्धखिदी ।।२८००।।

२००० |

जोयणलक्खत्तिदयं पणवण्णसहस्स छस्सयाणिं पि । चउसीदि चउब्भागा गिरिरुद्धखिदीए परिमाणं ।।२८०१।।

३५५६८४ | ४ |

१६

चोद्दसजोयणलक्खा छासीदिसहस्सणवसयाइं इगितीसा । उत्तरदेवकुरूए पत्तेक्कं होदि रजुबाणो ।।२८१६।।

१४८६९३१ |

चउजोयणलक्खाणिं छत्तीससहस्स णवसयाइं पि । सोलसजुदाणि कुरवे जीवाए होदि परिमाणं ।।२८१७।।

४३६९१६ |

इसुवग्गं चउगुणिदं जीवावग्गम्मि खिवत तम्मि तदो । चउगुणबाणविहत्ते लद्धं वट्टस्स विक्खंभो ।।२८१८।।
मंदरगिरिपहुदीणं णियणियसंखाए ताडिदं तदिदं । णियणियरुद्धा वासा वासाणं होदि पिंडफलं ।।२८२९।।
तं पिंडमट्ठलक्खेसु सोधिदे जं हवे सेसं । णियसंखाए भजिदे णियणियवासा हवंति पत्तेक्कं ।।२८३०।।
दुगुणम्मि भद्दसाले मंदरसेलस्स खिदसु विक्खंभं । मज्झिमसुईजुत्तं सा सूजी कच्छगंधमालिणिए ।।२८३१।।
एक्कत्तालं लक्खा चालीससहस्स णवसया सोलं । दोमेरूणं बाहिर दुभद्दसालाण अंत्तो त्ति ।।२८३२।।

४१४०९१६ |

तस्सूजीए परिही एक्कं कोडी य तीसलक्खाणिं । चउणउदिसहस्साणिं सत्तसया जोयणाणि छब्बीसं ।।२८३३।।

१३०९४७२६ |

पव्वदविसुद्धपरिहीसेसं चउसट्टिरूपसंगुणिदं । बारसजुददुसएहिं भजिदम्हि विदेहदीहत्तं ।।२८३४।।
अट्ठचउसत्तपणचउअट्ठतिअंकक्कमेण जोयणया । बारसअधियसयंसा तट्ठाणविदेहदीहत्तं ।।२८३५।।

३८४५७४८ | ११२ |

२१२

विजयादीणं वासं तव्वग्गं दसगुणिज्ज तम्मूलं । गिण्हह तत्तो पुह पुह बत्तीसगुणं च करेमाणं ।।२८३८।।
बारसजुददुसएहिं भजिदूणं कच्छरुंदमेलविदं । णियणियठाणे वासो अद्धसरूवं विदेहस्स ।।२८३९।।

णवजोयणयसहस्सा चत्तारि सयाणि अट्ठतालं पि । छप्पणकलाओ तह विजयाणं होदि परिवड्ढी ।।२८४०।।

६४४८ | ५६ |

२१२

चउवण्णब्भहियाणिं सयाणि णव जोयणाणि तह भागा । वीसुत्तरसदमेत्ता वक्खारगिरीण परिवड्ढी ।।२८४१।।

६५४ | १२० |

२१२

जोयणसयाणि दोण्णिं अट्ठत्तीसाधियाणि तह भागा । छत्तीसउत्तरसयं विभंगसरियाण परिवड्ढी ।।२८४२।।

२३८ | १३६ |

२१२

पंचसहस्सा जोयण पंचसया अट्ठहत्तरीजुत्ता । चउसीदिजुदसदंसा देवारण्णाण परिवड्ढी ।।२८४३।।

५५७८ | १८४ |

२१२

विजयादीणं आदिमदीहे वड्ढिं खिवेज्ज तं होदि । मज्झिमदीहं मज्झिमदीहे तं खिवसु अंतदीहत्तं ।।२८४४।।

तियणवछस्सगअडणभदो च्चिय अंसा सयं च छप्पण्णं । मज्झिल्लयदीहत्तं पत्तेक्कं देवभूदरण्णाणं ।।२८७५।।

२०८७६६३ | १५६ |

२१२

सोहसु मज्झिमसुइए मेरुगिरिं दुगुणभद्दसालवणं । सा सूई पम्मादीपरियंतं मंगलावदिए ।।२८७६।।

तियपणणवखंणभपणएक्कं अंसा चउत्तरं दुसयं । अंककमे दीहत्तं आदिल्लो पउममंगलावदिए ।।२८८०।।

१५००६५३ | २०४ |

२१२

दोपंचंबरइगिदुगचउअडछत्तिण्णितिदय अंसा य । बारस उणवीसहिदा हिमवंतगिरिस्स खेत्तफलं ।।२६१४।।

३३६८४२१०५२ | १२ |

१६

एदं चउसीदिहदे बारसकुलपव्वयाण पिंडफलं । होदि हु उसुगारजुदे चोद्दसगिरिरुद्धखेत्तफलं ।।२६१५।।

इगिदुगचउअडछत्तियसगचउपणचउगअट्ठदो कमसो । जोयणया एक्कंसो चोद्दसगिरि रुद्धपरिमाणं ।।२६१६।।

२८४५४७३६८४२१ | १ |

१६

अट्ठणवणभचउक्का सत्तट्ठेक्का अ चउतिगयणाइं । छत्तियणवाइ अंककमेणयं अद्धखेत्तफलं ।।२६१७।।

६३६०३४१८७४०६८ |

सगसगछप्पणणभपणचउणवसगपंचसत्तणभणवयं । अंककमे जोयणया होदि फलं तस्स गिरिरहिदं ।।२६१८।।

६०७५७६४५०५६७७ |

एदस्सिं खेत्तफले बारसजुत्तेहिं दोसएहिं च । पविहत्ते जं लद्धं तं भरहखिदीए खेत्तफलं ।।२६१६।।

एक्कचउक्कचउक्केक्कपंचतियगयणएक्कअट्ठदुगा । चत्तारि य जोयणया पणसीदिसयकलाउ तम्माणं ।।२६२०।।

४२८१०३५१४४१ | १८५ |

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भरहखिदीए गणिदं पत्तेक्कं चउगुणं विदेहंतं । तत्तो कमेण चउगुणहाणी एरावदं जाव ।।२६२१।।
जंबूदीवखिदीए फलप्पमाणेण पोक्खरवरद्धे । खेत्तफलं किज्जंतं एक्करससयाणि चुलसीदी ।।२६२२।।

११८४ |

रूवेणोणा सेढी सूईअंगुलपहिल्लतदिएहिं । मूलेहिं पविहत्तो हवेदि सामण्णणररासी ।।२६२६।।

१ | ३ | १ |

चउअट्ठपंचसत्तट्ठणवयपंचट्ठतिदयअट्ठणवा । तिचउक्कट्ठणहाइं छक्कछपंचट्ठदुगच्छखचउक्का ।।२६२७।।
णभसत्तगयणअडणवएक्कं पज्जत्तरासिपरिमाणं । दोपणसगदुगछण्णवसगपणइगिपंचणवएक्कं ।।२६२८।।

१९८०७०४०६२८५६६०८४३६८३८५६८७५८४ |

तियपणदुगअडणवयं छप्पणअट्ठट्ठएक्कदुगमेक्कं । इगिदुगचउणवपंचय मणुसिणिरासिस्स परिमाणं ।।२६२९।।

५६४२११२१८८५६६८२५३१६५१५७६६२७५२ |

सामण्णरासिमज्झे पज्जत्तं मणुसिणी पि सोधिज्ज । अवसेणं परिमाणं होदि यपज्जत्तरासिस्स ।।२६३०।।

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अंतरदीवमणुस्सा थोवा ते कुरुसु दससु संखेज्जा । तत्तो संखेज्जगुणा हवंति हरिरम्मगेसु वस्सेसुं ।।२६३१।।
वरिसे संखेज्जगुणा हेरण्णवदम्मि हेमवदवरिसे । भरहेरावदवस्से संखेज्जगुणा विदेहे य ।।२६३२।।
होंति असंखेज्जगुणा लद्धिमणुस्साणि ते च सम्मुच्छा । तत्तो विसेसअधियं माणुससामण्णरासी य ।।२६३३।।
पज्जत्ता णिव्वत्तियपज्जत्ता लद्धिया यपज्जत्ता । सत्तरिजुत्तसदज्जाखंडे पुण्णिदरलद्धिणरा ।।२६३४।।
एक्कसमयं जहण्णं दुतिसमयप्पहुदि जाव छम्मासं । वरविरहं मणुवजगे उवरिं सिज्झंति अडसमए ।।२६५७।।
पत्तेक्कं अडसमए बत्तीसडदालसट्ठिदुयसदरिं । चुलसीदी छण्णउदी दुचरिमम्मि अट्ठअधियसयं ।।२६५८।।
सिज्झंति एक्कसमए उक्कस्से अवरयम्मि एक्केक्कं । मज्झिमपडिवट्ठीए चउहत्तरि सव्वसमएसुं ।।२६५९।।
तीदसमयाण संखं पणसयबाणउदिरूवसंगुणिदं । अडसमयाधियछम्मासयभजिदं णिव्वदा सव्वे ।।२६६०।।

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इस प्रकार आचार्य-परम्परागत त्रिलोकप्रज्ञप्तिमें मनुष्यलोक स्वरूप निरूपण करने वाला चतुर्थ महाधिकार समाप्त हुआ ।।

तिलोय पण्णत्ती

(पंचमो महाधियारो)

जा जीवपोग्गलाणं धम्माधम्मप्पबद्धआयासे । होंति हु गदागदाणिं ताव हवे थावरालोओ ।।५।।

मंदरगिरिमूलादो इगिलक्खं जोयणाणि बहलम्मि । रज्जूय पदरखेत्ते चिट्ठेदि तिरियतसलोओ ।।६।।

$\frac{=}{४६}$ | १००००० |

पणुवीसकोडकोडीपमाणउद्धारपल्लरोमसमा । दीओवहीण संखा तस्सद्धं दीवजलणिही कमसो ।।७।।

सव्वे दीवसमुद्दा संखादीदा भवंति समवट्टा । पढमो दीओ उवही चरिमो मज्झम्मि दीउवही ।।८।।

चित्तोवरि बहुमज्झे रज्जूपरिमाणदीहविक्खंभे । चेट्ठंति दीवउवही एक्केक्कं वेढिऊण हु प्परिदो ।।९।।

सव्वे वि वाहिणीसा चित्तखिदिं खंडिदूण चेट्ठंति । वज्जखिदीए उवरिं दीवा वि हु उवरि चित्ताए ।।१०।।

आदी जंबूदीओ हवेदि दीवाण ताण सयलाणं । अंते सयंभुरमणो णामेणं विस्सुदो दीओ ।।११।।

आदी लवणसमुद्दो सव्वाण हवेदि सलिलरासीणं । अंते सयंभुरमणो णामेणं विस्सुदो उवही ।।१२।।

चउसट्ठीपरिवज्जिअट्ठाइज्जंबुरासिरोमाणिं । सेसंभोणिहिदीवा सुभणामा एक्कणाम बहुवाणं ।।२७।।

जंबू जोयणलक्खप्पमाणवासो दु दुगुणदुगुणाणिं । विक्खंभपमाणाणिं लवणादिसयंभुरमणंतं ।।३२।।

१००००० | २००००० | ४००००० | ८००००० | १६००००० | ३२००००० |

एवं सयंभुरमणंसायरपरियंत होइ वित्थारं । तत्तो उवरिमजक्खंवरदीवे होदि वित्थारो ।।३३।।

३५$\overline{८४}$ धणजोयणाणि ६३७५। जक्खवरसमुद्दस्स वित्थारो १७$\overline{६२}$ धण ६३७५। देववरदीव ८$\overline{६६}$ धण
१६ ८

६३७५ देववरसमुद्द ४$\overline{४८}$ धण ६३७५ । अहिंदवरदीव २$\overline{२४}$ धण ६३७५। अहिंदवरसमुद्द ११$\overline{२}$ धण
४ २

१८७५० । सयंभुवरदीव $\overline{५६}$ धण ३७५०० । सयंभुवरसमुद्द $\overline{२८}$ धण ७५००० ।

लवणादीणं रुंदं दुतिचउगुणिदं कमा तिलक्खूणं । आदिममज्झिमबाहिरसूईणं होदि परिमाणं ।।३४।।

१००००० । ३००००० । ५००००० । धाद ५००००० । ६००००० । १३००००० । कालो १३००००० । २१००००० । २६००००० । एवं देवसमुद्दं त्ति दट्ठव्वं । तस्सुवरि महिंदवरदीवस्स $\overline{११}$२ रिण जोयणाणि २८१२५० । मज्झि $\overline{२२}^{३}$ रिण २७१८७५ । बाहिर $\overline{५६}$ रिण २६२५०० । अहिंदवरसमुद्दं $\overline{५६}$ रिण २६२५०० । मज्झिम $\overline{११}^{३}$ रिण २४३७५०, बाहिर $\overline{२८}$ रिण २२५००० । सयंभूरमणदीव $\overline{२८}$ रिण २२५०००, मज्झिम $\overline{५६}^{३}$ रिण १८७५०००, बाहिर $\overline{१४}$ रिण १५००००। सयंभूरमणसमुद्द $\overline{१४}$ रिण १५००००, मज्झिम $\overline{२८}^{३}$ रिण ७५००० बाहिर $\overline{७}$ ।

बाहिर जंबूपरिहीजुगलं इच्छियदीवंबुरासिसूइहदं । जंबूवासविहत्तं इच्छियदीवद्धिपरिहि त्ति ।।३५।।

बाहिरसूईवग्गो अब्भंतरसूइवग्गपरिहीणो । लक्खस्स कदिम्मि हिदे इच्छियदीवद्धिखंडपरिमाणं ।।३६।।

२४ | १४४ | ६७२ | एवं सयंभुरमणंतं दट्ठव्वं |

जंबूदीवाहिंतो अट्ठमओ होदि भुवणविक्खादो । णंदीसरो त्ति दीओ णंदीसरजलिहिपरिखित्तो ।।५२।।

एक्कसया तेसट्ठी कोडीओ जोयणाणि लक्खाणिं । चुलसीदी तद्दीवे विक्खंभो चक्कवालेणं ।।५३।।

| १६३८४००००० |

पणवण्णाधियछस्सयकोडीओ जोयणाणि तेत्तीसा । लक्खाणि तस्स बाहिरसूचीए होदि परिमाणं ।।५४।।

| ६५५३३००००० |

तदियपणसत्तदुखदोइगिछत्तियसुण्णएक्कअंककमे । जोयणया णंदीसरअब्भंतरपरिहिपरिमाणं ।।५५।।

| १०३६१२०२७५३ |

बाहत्तरिजुददुसहसकोडीतेत्तीसलक्खजोयणया । चउवण्णसहस्साइं इगिसयणउदी य बाहिरे परिही ।।५६।।

| २०७२३३५४१६० |

णंदीसरबहुमज्झे पुव्वदिसाए हुवेदि सेलवरो । अंजणगिरि त्ति खादो णिम्मलवरइंदणीलमओ ।।५७।।

जोयणसहस्सगाढो चुलसीदिसहस्समेत्तउच्छेहो । सव्वस्सिं चुलसीदीसहस्सरुंदो य समवट्टो ।।५८।।

| १००० | ८४००० | ८४००० |

मूलम्मि य उवरिम्मि य तडवेदीओ विचित्तवणसंडा । वणवेदीओ तस्स य पुव्वोदिदवण्णणा होंति ।।५९।।

चउसु दिसाभागेसुं चत्तारि दहा भवंति तग्गिरिणो । पत्तेक्कमेक्कजोयणलक्खपमाणा य चउरस्सा ।।६०।।

| १००००० |

जोयणसहस्सगाढा टंकुक्किण्णा य जलयरविमुक्का । फुल्लंतकमलकुवलयकुमुदवणोदरसोहिल्ला ।।६१।।

| १००० |

चत्तारि सिद्धकूडा चउजिणभवणेहि ते पभासंते । णिसहगिरिकूडवण्णिदजिणपुरसमवासपहुदीहिं ।।१२७।।

मणुसुत्तरसमवासो बादालसहस्सजोयणुच्छेहो । कुंडलगिरी सहस्संगाढो बहुरयणकयसोहो ।।१३०।।

लोयविणिच्छयकत्तां रुचकवरद्दिस्स वण्णणपयारं । अण्णेण सरूवेणं वक्खाणइ तं पयासेमि ।।१६७।।

तिगुणियवासा परिही तीए विक्खंभपादगुणिदाए । जं लद्धं तं बादरखेत्तफलं सरिसवट्टाणं ।।२४१।।

लवणसमुद्दमादिं कादूण उवरि वलय सरूवेण ठिददीवसमुद्दाणं खेत्तफलमाणयणट्ठं एदा वि सुत्तगाहाओ-

लक्खेणोणं रुंदं णवहि गुण इच्छियस्स आयामो । तं रुंदेण य गुणिदं खेत्तफलं दीवउवहीणं ।।२४२।।

अहवा आदिममज्झिमबाहिरसूईण मेलिदं माणं । विक्खंभहदो इच्छियवलयाणं होदि बादरं खेत्तं ।।२४३।।

अहवा तिगुणियमज्झिमसूई जाणिज्ज इट्ठवलयाणं । तह अ पमाणं तं चिय रुंदहदे वलयखेत्तफलं ।।२४४।।

जंबूदीवस्स बादरखेत्तफलं सत्तसयपण्णासकोडिजोयणपमाणं होदि- ७५००००००००० | लवणसमुद्दस्स खेत्तफलं अट्ठारसहस्सकोडिजोयणपमाणं- १८००००००००० | धादइसंडदीवस्स बादरखेत्तफलं अट्ठसहस्सकोडिअब्भहियएलक्खकोडि जोयणपमाणं- १०८००००००००० | कालोदसमुद्दस्स खेत्तफलं चत्तारिसहस्सकोडिअब्भहियपंचलक्खकोडिजोयणपमाणं- ५०४००००००००० | पोक्खरदीवस्स खेत्तपमाणं सट्ठिसहस्सकोडिअब्भहियएक्कवीसलक्खकोडिजोयणपमाणं- २१६००००००००० | पोक्खरवरसमुद्दस्स खेत्तफलं अट्ठावीससहस्सकोडिअब्भहियउणणउदिलक्खकोडिजोयणपमाणं- ८६२८००००००००० | एवं जंबूदीवप्पहुदिजहण्णपरित्तासंखेज्जयस्स रूवाहियछेदणयमेत्तट्ठाणं गंतूण ट्ठिददीवस्स खेत्तफलं जहण्णपरित्तासंखेज्जयं रूऊणजहण्णपरित्तासंखेज्जएण गुणिय पुणो णवसहस्सकोडिजोयणेहिं गुणिदमेत्तं खेत्तफलं होदि। तच्चेदं- १६ | १५ | ६०००००००००० | पुणो जंबूदीवप्पहुदिपलिदोवमस्स रूवाहिय (-छेदणय-) मेत्तं ठाणं गंतूण ट्ठिददीवस्स खेत्तफलं पलिदोवमं रूऊणपलिदोवमेण गुणिय पुणो णवसहस्सकोडिजोयणेहिं गुणिदमेत्तं होदि। तच्चेदं पमाणं- [प | प - १] ६०००००००००० | एवं गणिदूण णादव्वं जाव सयंभूरमणसमुद्दं ति। तत्थ अंतिमवियप्पं वत्तइस्सामो- सयंभूरमणसमुद्दस्स खेत्तफलं जगसेढीए वग्गं णवरूवेहिं गुणिय सत्तसदचउसीदिरूवेहिं भजिदमेत्तं पुणो एक्कलक्खं बारससहस्सपंचसयजोयणेहिं गुणिदरज्जूए अब्भहियं होदि। पुणो एक्कसहस्सछस्सयसत्तासीदिकोडीओ पण्णासलक्खजोयणेहिं पुव्विल्लदोण्णिरासीहिं परिहीणं होदि। तस्स ठवणा = ६ धण रज्जू १ | ११२५०० रिण जोयणाणि १६८७५०००००० एत्तो दीवरयणायराणं
७८४ ७

एऊणवीसवियप्पं अप्पाबहुअं वत्तइस्सामो।

तं जहा-

पढमपक्खे जंबूदीवसयलरुंदादो लवणणीररासिस्स एयदिसरुंदम्मि वड्ढी गवेसिज्जइ। जंबूदीवलवणसमुद्दादो धादइसंडस्स। एवं सव्वब्भंतरिमदीवरयणायराणं एयदिसरुंदादो तदणंतरबाहिरणिविट्ठदीवस्स वा तरंगिणीरमणस्स वा एयदिसरुंदवड्ढी गवेसिज्जइ।

विदियपक्खे जंबूदीवस्सद्धादो लवणणिण्णगाणाहस्स एयदिसरुंदम्मि वड्ढी गवेसिज्जइ। तदो जंबूदीवस्सद्धम्मि सम्मिलिदलवणसमुद्दादो धादइसंडस्स। एवं सव्वब्भंतरिमदीवउवहीणं एयदिसरुंदादो तदणंतरबाहिरणिविट्ठदीवस्स वा तरंगिणी-रमणस्स वा एयदिसरुंदम्मि वड्ढी गवेसिज्जइ।

तदियपक्खे इच्छियसलिलरासिस्स एयदिसरुंदादो तदणंतरतरंगिणीणाहस्स एयदिसरुंदम्मि वड्ढी गवेसिज्जइ। तुरिमपक्खे अब्भंतरिमणीररासीणं एयदिसविक्खंभादो तदणंतरतरंगिणीणाहस्स एयदिसविक्खंभम्मि वड्ढी गवेसिज्जइ। पंचमपक्खे इच्छियदीवस्स एयदिसरुंदादो तदणंतरोवरिमदीवस्स एयदिसरुंदम्मि वड्ढी गवेसिज्जइ। छट्ठमपक्खे अब्भंतरिमसव्वदीवाणं एयदिसरुंदादो तदणंतरोवरिमदीवस्स एयदिसरुंदम्मि वड्ढी गवेसिज्जइ। सत्तमपक्खे अब्भंतरिमस्स दीवस्स दोण्णिदिसरुंदादो तदणंतरोवरिमदीवस्स एयदिसरुंदम्मि वड्ढी गवेसिज्जइ। अट्ठमपक्खे हेट्ठिमसमयलमयरायराणं दोण्णिदिसरुंदादो तदणंतरवाहिणीरमणस्स एयदिसरुंदम्मि वड्ढी गवेसिज्जइ।

णवमपक्खे जंबूदीवबादरसुहुमखेत्तफलप्पमाणेण उवरिमापगाकंतदीवाणं खेत्तफलस्स खंडसलागं कादूणुवहीदो दीवस्स खंड-सलागाणं वड्ढी गवेसिज्जइ।

दसमपक्खे जंबूदीवादो लवणसमुद्दस्स लवणसमुद्दादो धादईसंडस्स एकदीवादो उवहिस्स उवहीदो दीवस्स वा खंडसलागाणं वड्ढी गवेसिज्जइ।

एक्कारसमपक्खे अब्भंतरकल्लोलिणीरमणदीवाणं खंडसलागाणं समूहादो बाहिरणिविट्ठणीररासिस्स वा दीवस्स वा खंड-सलागाणं वड्ढी गवेसिज्जइ।

बारसमपक्खे इच्छियसायरादो दीवस्स दीवादो णीररासिस्स खेत्तफलस्स वड्ढी गवेसिज्जइ।

तेरसमपक्खे अब्भंतररिमदीवपयोहीणं खेत्तफलादो तदणंतरोवरिमदीवस्स वा तरंगिणीणाहस्स वा खेत्तफलस्स वड्ढी गवेसिज्जइ।

चोद्दसमपक्खे लवणसमुद्दादिइच्छियसमुद्दादो तदंणतरतरंगिणीरासिस्स [खेत्तफलस्स] वड्ढी गवेसिज्जइ।

पण्णारसमपक्खे सव्वब्भंतरिममयरहराणं खेत्तफलादो तदणंतरोवरिमणिण्णगाणाहस्स वड्ढी गवेसिज्जइ।

सोलसमपक्खे धादइसंडादिइच्छियदीवादो तदणंतरोवरिमदीवस्स खेत्तफलस्स वड्ढी गवेसिज्जइ।

सत्तरसमपक्खे धादइसंडप्पहुदिअब्भंतरिमदीवाणं खेत्तफलादो तदणंतरबाहिरणिविट्ठदीवस्स खेत्तफलम्मि वड्ढी गवेसिज्जइ।

अट्ठारसमपक्खे इच्छियदीवस्स वा तरंगिणीणाहस्स वा आदिममज्झिमबाहिरसूईणं परिमाणादो तदणंतरबाहिरणिविट्ठदीवस्स वा तरंगिणीणाहस्स वा आदिमज्झिमबाहिरसूईणं पत्तेक्कं वड्ढी गवेसिज्जइ।

उणवीसदिमपक्खे इच्छियदीवणिण्णगाणाहाणं आयामादो तदणंतरबाहिरणिविट्ठदीवस्स वा णीररासिस्स वा आयामवड्ढी गवेसिज्जइ।

तत्थ पढमपक्खे अप्पाबहुगं वत्तइस्सामो। तं जहा- जंबूदीवस्स सयलविक्खंभादो लवणसमुद्दस्स एयदिसरुंदं एक्कलक्खेणब्भहियं होइ। जंबूदीवेणब्भहियलवणसमुद्दस्स एयदिसरुंदादो। धादइसंडस्स एयदिसरुंदं एक्कलक्खेणब्भहियं होऊण गच्छइ जाव सयंभूरमणसमुद्दो त्ति। तव्वड्ढीआणयणहेदुं इमा सुत्तगाहा-

इच्छियदीवुवहीणं चउगुणरुंदम्मि पढमसूइजुदं। तियभजिदं तं सोधसु दुगुणिदरुंदत्स सा हवे वड्ढी ।।२४५।।

इट्ठस्स दीवस्स वा सायरस्स वा आइमसूइस्सद्धं लक्खद्धसंजुदस्स आणयणहेदुमिमासुत्तगाहा-

इच्छियदीवुवहीणं रुंदं दोलक्खविरहिदं मिलिदं । बाहिरसूइम्मि तदो पंचहिदं तत्थ जं लद्धं ।।२४६।।

आदिमसूइस्सद्धं लक्खद्धजुदं हुवेदि इट्ठस्स । एवं लवणसमुद्दप्पहुदिं आणेज्ज अंतो त्ति ।।२४७।।

विदियपक्खे अप्पाबहुगं वत्तइस्सामो- जंबूदीवस्सद्धस्स विक्खंभदो लवणसमुद्दस्स एयदिसरुंदं दिवड्ढलक्खेणब्भहियं होइ। जंबूदीवस्सद्धसहितलवणसमुद्दस्स एयदिसरुंदादो धादइसंडदीवस्स एयदिसरुंदं दिवड्ढलक्खेणब्भियं होइ। एवं सव्वब्भंतरदीवसायराणं एयदिसरुंदादो तदणंतरउवरिमदीवस्स वा सायरस्स वा एयदिसरुंदवड्ढी दिवड्ढीलक्खेणब्भहियं होऊण गच्छइ जाव सयंभूरमणसमुद्दो त्ति। तव्वड्ढीआणयणहेदुमिमा सुत्तगाहा-

इच्छियदीवुदहीणं बाहिरसूइस्स अद्धमेत्तम्मि । आइमसूई सोधसु जं सेसं तं च परिवड्ढी ।।२४८।।

इच्छियदीवुवहीदो हेट्ठिमदीवोवहीण संपिंडं । सगसगआदिमसूइस्सद्धं लवणादिचरिमंतं ।।२४९।।

तदियपक्खे अप्पाबहुगं वत्तइस्सामो- लवणसमुद्दस्स एयदिसरुंदादो कालोदगसमुद्दस्स एयदिसरुंदवड्ढी छल्लक्खेणब्भहियं होदि। कालोदगसमुद्दस्स एयदिसरुंदादो पोक्खरवरसमुद्दस्स एयदिसरुंदवड्ढी चउवीसलक्खेणब्भहियं होदि। एवं कालोदगसमुद्दप्पहुदि विवक्खिदतरंगिणीरमणादो तदणंतरोवरिमणीररासिस्स एयदिसरुंदवड्ढी चउग्गुणं होदूण गच्छइ जाव सयंभूरमणसमुद्दं ति। तस्स अंतिमवियप्पं वत्तइस्सामो- अहिंदवरसायरस्स एयदिसरुंदादो सयंभूरमणसमुद्दस्स एयदिसरुंदवड्ढी बारसुत्तरसएण भजिदतिगुणसेढीओ पुण छप्पण्णसहस्सदुसदपण्णासजोयणेहिं अब्भहियं होदि तस्स ठवणा -३ | एदस्स धण जोयणाणि ५६२५०। तव्वड्ढीणं आणयणसुत्तगाहा-

इच्छियजलणिहिरुंदं तिगुणं दलिदूण तिण्णिलक्खूणं । तिलक्खूणतिगुणवासे सोहिय दलिदम्मि सा हवे वड्ढी ।।२५०।।

चउत्थपक्खे अप्पाबहुगं वत्तइस्सामो- लवणणीररासिस्स एयदिसरुंदादो कालोदगसमुद्दस्स एयदिसरुंदवड्ढी छल्लक्खेणब्भहियं होइ। लवणसमुद्दसंमिलिदकालोदगसमुद्दादो पोक्खरवरसमुद्दस्स एयदिसरुंदवड्ढी बावीसलक्खेण अब्भहियं होदि। एवं हेट्ठिमसायराणं समूहादो तदणंतरोवरिमणीररासिस्स एयदिसरुंदवड्ढी चदुगुणं दोलक्खेहिं रहियं होऊण गच्छइ जाव सयंभूरमणसमुद्दो त्ति। तस्स अंतिमवियप्पं वत्तइस्सामो- सयंभूरमणसमुद्दस्स हेट्ठिमसयलसायराणं एयदिसरुंदसमूहादो सयंभूरमणसमुद्दस्स एयदिसरुंदवड्ढी छरूवेहिं भजिदरज्जू पुणो तिदयहिदं तिण्णिलक्खपण्णाससहस्सजोयणाणि अब्भहियं होदि- ४२ धणजोयणाणि ३५००००। तव्वड्ढीआणयणहेदुमिमं गाहासुत्तं -

अडलक्खहीणइच्छियवासं बारसेहिं भजिदलद्धंसो । सोधसु तिचरणभागेण सोदवासम्मि तं हवे वड्ढी ।।२५१।।

इच्छियवड्ढीदो हेट्ठिमसयलसायराणं संबंधिएयदिसरुंदसमासाणं आणयणट्ठं गाहासुत्तं-

सगसगवड्ढिपमाणे दोलक्खं अवणिदूण अद्धकदे । इच्छियवड्ढीदु तदो हेट्ठिमउवहीणसंबंधं ।।२५२।।

पंचमपक्खे अप्पाबहुगं वत्तइस्सामो- सयलजंबूदीवस्स रुंदादो धादइसंडस्स एयदिसरुंदवड्ढी तियलक्खेणब्भहियं होदि। धादईसंडस्स एयदिसरुंदादो पोक्खरवरदीवस्स एयदिसरुंदवड्ढी बारासलक्खेणब्भहियं होदि। एवं तदणंतरहेट्ठिमदीवादो अणंतरोवरिमदीवस्स वासवड्ढी तिगुणं होऊण गच्छइ जाव सयंभूरमणदीओ त्ति। तस्स अंतिमवियप्पं वत्तइस्सामो- दुचरिमअहिंदवरदीवादो अंतिमसयंभूरमणदीवस्स वड्ढिपमाणं तियरज्जू बत्तीसरूवेहिं अवहरिदपमाणं पुणो अट्ठावीससहस्सएक्कसयपणुवीसजोयणेहिं अब्भहियं होइ। —। ३ धणजोयण २५१२५ । तव्ववड्ढीणं आणयणे गाहासुत्तं-

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इच्छियदीवे रुंदं तिगुणं दलिदूण तिण्णिलक्खूणं । तिलक्खूणतिगुणवासे सोहिय दलिदे हुवे वड्ढी ।।२५३।।

छट्ठमपक्खे अप्पाबहुगं वत्तइस्सामो। तं जहा- जंबूदीवस्स अद्धरुंदादो धादइसंडस्स एयदिसरुंदं आउट्ठलक्खेणब्भहियं होदि ३५०००० । जंबूदीवस्स अद्धेण मिलिदधादईसंडस्स एयदिसरुंदादो पोक्खरवरदीवस्स एयदिसरुंदवड्ढी एयारसलक्खपण्णाससहस्सजोयणेहिं अब्भहियं होइ ११५०००० । एवं धादईसंडप्पहुदिइच्छियदीवस्स एयदिसरुंदवड्ढीदो तदणंतरउवरिमदीवस्स वड्ढी चउगुणं अड्ढाइज्जलक्खेणूणं होदूण गच्छइ जाव सयंभूरमणदीओ त्ति। तत्थ अंतिमवियप्पं वत्तइस्सामो- [सयंभूरमणदीवस्स हेट्ठिमसयलदीवाणं एयदिसरुंदसमूहादो सयंभूरमणदीवस्स एयदिसरुंदवड्ढी] चउरासीदिरूवेहिं भजिदसेढी पूणो तियहिदतिण्णिलक्खपणुवीससहस्सजोयणेहिं अब्भहियं होइ। तस्स ठवणा ८४ धण जो ३२५००० । तव्वड्ढीणं आणयणट्ठं गाहासुत्तं-

अंतिमरुंदपमाणं लक्खाणं तीहि भाजिदं दुगुणं । दलिदतियलक्खजुत्तं परिवड्ढी होदि दीवाणं ।।२५४।।

इच्छियदीवादो हेट्ठिमदीवाणं रुंदसमासाणं आणयणट्ठं गाहासुत्त-

चउभजिदइट्ठरुंदं हेट्ठं च ट्ठाविदूणं तद्धेट्ठं । लक्खूणे तियभजिदे उवरिमरासिम्मि मेलविदे ।।२५५।।

लक्खद्धं हीणकदे जंबूदीवस्स अद्धपहुदि तदो । इट्ठस्स दुचरिमंतं दीवाणं मेलणं होदि ।।२५६।।

सत्तमपक्खे अप्पाबहुगं वत्तइस्सामो सयलजंबूदीवरुंदादो धादईसंडस्स एयदिसरुंदवड्ढी तिण्णिलक्खेणब्भहियं होदि ३००००० । जंबूदीवसंमिलिदधादईसंडदीवस्स दोण्णिदिसरुंदादो पोक्खरवरदीवस्स एयदिसरुंदवड्ढी सत्तलक्खेहिं अब्भहियं होदि ७००००० । एवं धादईसंडप्पहुदिइच्छियदीवाणं दोण्णिदिसरुंदादो तदणंतरोवरिमदीवस्स एयदिसरुंदवड्ढी चउग्गुणं पंचलक्खेणूणं होदूण गच्छदि जाव सयंभूरमणदीओ त्ति। तत्थ अंतिमवियप्पं वत्तइस्सामो- सयंभूरमणदीवस्स हेट्ठिमसयलदीवाणं दोण्णिदिसरुंदसमूहादो सयंभूरमणदीवस्स एयदिसरुंदवड्ढी चउवीसरूवेहिं भजिदरज्जू पुणो तियहिदपंचलक्खसत्ततीससहस्सपंचसयजोयणेहिं अब्भहियं होदि। तस्स ठवणा ७̄ | २४ धण जोयणाणि ५३७५०० | तव्वड्ढीणं आणयणट्ठं गाहासुत्तं -

सगसगवासपमाणं लक्खोणं तियहिदं दुलक्खजुदं । अहवा पणलक्खाहियवाससतिभगं तु परिवड्ढी ।।२५७।।

पुणो इच्छियदीवादो वा हेट्ठिमसयलदीवाणं दोण्णिदिसरुंदस्स समासो वि एक्कलक्खादिचउगुणं पंचलक्खेहिं अब्भहियं होऊण गच्छइ जाव अहिंदवरदीवो त्ति। तव्वड्ढीणं आणयणहेदुं इमं गाहासूत्तं-

दुगुणियसगसगवासे पणलक्खं अवणिदूण तियभजिदे । हेट्ठिमदीवाण पुढं दोदिसरुंदम्मि होदि पिंडफलं ।।२५८।।

अट्ठमपक्खे अप्पाबहुगं वत्तइस्सामो- लवणसमुद्दस्स दोण्णिदिसरुंदादो कालोदगसमुद्दस्स एयदिसरुंदवड्ढी चउलक्खेणब्भहियं होदि ४००००० । लवणकालोदगसमुद्दाणं दोण्णिदिसरुंदादो पोक्खरवरसमुद्दस्स एयदिसरुंदवड्ढी बारसलक्खेणब्भहियं होदि १२००००० । एवं कालोदगसमुद्दप्पहुदि तत्तो उवरिमतदणंतरइच्छियरयणायराणं एयदिसरुंदवड्ढी हेट्ठिमसव्वजलरासीणं दोण्णिदिसरुंदवड्ढीदो चउग्गुणं चउलक्खविहीणं होदूण गच्छइ जाव सयंभूरमणसमुद्दो त्ति। तत्थ अंतिमवियप्पं वत्तइस्सामो- सयंभूरमणस्स हेट्ठिमसयलसायराणं दोण्णिदिसरुंदादो सयंभूरमणसमुद्दस्स एयदिसरुंदवड्ढी रज्जूए बारसभागो पुणो तियहिदचउलक्खपंचहत्तरिसहस्सजोयणेहि अब्भहियं होदि। तस्स ट्ठवणा ७̄ | १२ धण जोयणाणि ४७५००० । तव्वड्ढीणं आणयणहेदुं इमं गाहासुत्तं-

इट्ठोबहिविक्खंभे चउलक्खं मेलिदूण तियभजिदे । तीदरयणायराणं दोदिसरुंदादु उवरिमेयदिसं ।।२५९।।

हेट्ठिमसमासो वि- इट्ठरस कालोदसमुद्दादो हेट्ठिमेक्कस्स समुद्दस्स दोण्णिदिसरुंदसमासं चउलक्खं होदि ४००००० । पोक्खरवरसमुद्दादो हेट्ठिमदोण्णिसमुद्दाणं दोण्णिदिसरुंदसमासं वीसलक्खजोयणपमाणं होदि २००००० । एवमब्भंतरिमणीररासिस्स दोण्णिदिसरुंदसमासादो तदणंतरोवरिमसमुद्दस्स एयदिसरुंदवड्ढी चउगुणं चउलक्खेणब्भहियं होऊण गच्छइ जाव अहिंदवरसमुद्दो त्ति। तव्वड्ढीणं आणयणहेदुं इमं गाहासुत्तं-

दुगुणियसगसगवासे चउलक्खे अवणिदूण तियभजिदे । तीदरयणायराणं दोदिसभायम्मि पिंडफलं ।।२६०।।

णवमपक्खे अप्पाबहुगं वत्तइस्सामो- जंबूदीवस्स बादरसुहुमखेत्तफलस्स पमाणेण लवणसमुद्दस्स खेत्तफलं किज्जंतं चउवीसगुणं होदि २४ । जंबूदीवस्स खेत्तफलादो धादईसंडस्स खेत्तफलं चउदालीसब्भहियं एक्कसयमेत्तं होदि १४४ । एवं जाणिदूण णेदव्वं जाव सयंभूरमणसमुद्दो त्ति। तत्थ अंतिमवियप्पं वत्तइस्सामो- जगसेढीए वग्गं तिगुणिय एक्कलक्खछण्णउदिसहस्सकोडिरूवेहिं भजिदमेत्तं पुणो तिगुणिदसेढिं चोद्दसलक्खरूवेहि भजियमेत्तेहिं अब्भहियं होदि पुणो णवकोसेहिं परिहीणं। तस्स ठवणा-

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१९६०००००००००० धण खेत्तं १४००००० रिण कोसाणि ९ । तव्वड्ढीणं आणयणहेदुं इमं गाहासुत्तं-

लक्खूणइट्ठरुंदं तिगुणं चउगुणिदइट्ठवाससगुणं । लक्खस्स कदिम्मि हिदे जंबूदीउप्पमा खंडा ।।२६१।।

दसमपक्खे अप्पाबहुगं वत्तइस्सामो। तं जहा- जंबूदीवस्स बादरसुहुमक्खेत्तपमाणेण लवणसमुद्दस्स खेत्तफलं किज्जंतं चउवीसगुणप्पमाणं होदि २४। लवणसमुद्दस्स खंडसलागाणं संखादो धादइसंडस्स खंडसलागा छगुणं होदि। धादइसंडस्स खंडसलागादो कालोदगसमुद्दस्स खंडसलागा चउगुणं होऊण छण्णवदिरूवेणब्भहियं होइ। तत्तो उवरि तदणंतरहेट्ठिमदीवउवहीदो अणंतरोवरिमदीवस्स उवहिस्स वा खंडसलागा चउग्गुणं, पक्खेवभूदछण्णवदी दुगुणदुगुणं होदूण गच्छइ जाव सयंभूरमणसमुद्दो त्ति। तत्थ अंतिमवियप्पं वत्तइस्सामो- [सयंभूरमणदीवखंडसलागादो सयंभूरमणसमुद्दस्स खंडसलागा] तिण्णि सेढीओ

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सत्तलक्खजोयणेहिं भजिदाओ पुणो णवजोयणेहिं अब्भहियाओ होंति। तस्स ठवणा- ७००००० धण जोयणाणि ९। तत्थ

अदिरेगस्स पमाणाणयणट्ठं इमा सुत्तगाहा-

लक्खेण भजिदसगसगवासं इगिरूवविरहिदं तेण । सगसगखंडसलागं भजिदे अदिरेगपरिमाणं ।।२६२।।

एक्कारसमपक्खे अप्पाबहुगं वत्तइस्सामो। तं जहा- लवणसमुद्दस्स खंडसलागाणं संखादो धादईसंडदीवस्स खंडसलागाणं वड्ढी वीसुत्तरएक्कसएणब्भहियं होदि १२०। लवणसमुद्दखंडसलागासंमिलिदधादईसंडदीवस्स खंडसलागाणं संखादो कालोदगसमुद्दस्स खंडसलागाणं वड्ढी चउरुत्तरपंचसएणब्भहियं होदि ५०४। एवं धादईसंडस्स वड्ढिप्पहुदि हेट्ठिमदीवउवहीणं समूहादो अणंतरोवरिमदीवस्स वा रयणायरस्स वा खंडसलागाणं वड्ढी चउगुणं चउवीसरूवेहिं अब्भहियं होऊण गच्छदि जाव सयंभूरमणसमुद्दोत्ति। तत्थ अंतिमवियप्पं वत्तइस्सामो- सयंभूरमणसमुद्दादो हेट्ठिमसव्वदीवरयणायराणं खंडसलागाण समूहं सयंभूरमणसमुद्दस्स खंडसलागम्मि अवणिदे वड्ढिपमाणं केत्तियमिदि भणिदे जगसेढीए वग्गं अट्ठाणवदिसहस्साकोडिजोयणेहिं भजिदं पुणो सत्तलक्खजोयणेहिं भजिदतिण्णिजगसेढीअब्भहियं पुणो चोद्दसकोसेहिं परिहीणं होदि। तस्स ठवणा ६८०००००००००००

धण रज्जू- ७००००० रिण कोस १४। तव्वड्ढिआणयणहेदुमिमं गाहासुत्तं-

लक्खेण भजिदअंतिमवासस्स कदीए एगरूऊणं । अट्ठगुणं हिट्ठाणं संकलणादो दु उवरिमे वड्ढी ।।२३३।।

पुणो इट्ठस्स दीवस्स वा समुद्दस्स वा हेट्ठिमदीवरयणायराणं मेलावणं भण्णमाणे लवणसमुद्दस्स खंडसलागादो लवणसमुद्दसंमिलिदधादईससंडदीवस्स खंडसलागाओ सत्तगुणं होदि। लवणणीररासिखंडसलागसंमिलिदधादईसंडखंडसलागादो कालोदगसमुद्दखंडसलागसंमिलिदहेट्ठिमखंडसलागादु पंचगुणं होदि। कालोदगसमुद्दस्स खंडसलागसंमिलिदहेट्ठिमदीउवहीणं खंडसलागादो पोक्खरवरदीवखंडसलागसंमिलिदहेट्ठिमदीवरयणायराणं खंडसलागा चउग्गुणं होदूण तिण्णिसयसट्ठिरूवेहि अब्भहियं होदि। पोक्खरवरदीवखंडसलागसंमिलिदहेट्ठिमदीवरयणायराणं खंडसलागादो पोक्खरवरसमुद्दसंमिलिदहेट्ठिमदीवोवहीणं खंडसलागा चउग्गुणं होदूण सत्तसयचउदालरूवेहिं अब्भहियं होदि। एत्तो उवरिं चउग्गुणं चउग्गुणं पक्खेवभूदसत्तसयचउदालं दुगुणदुगणं होऊण चउवीसरूवेहिं अब्भहियं होऊण गच्छइ जाव सयंभूरमणसमुद्दो त्ति। तव्वड्ढीआणयणहेदुमिमं गाहासुत्तं-

अंतिमविक्खंभद्धं लक्खूणं लक्खहीणवासगुणं पणघणकोडीहिं इट्ठादो हेट्ठिमाण पिंडफलं ।।२६४।।

सादिरेयपमाणाणयणट्ठं इमं गाहासुत्तं-

दोलक्खेहिं विभाजिदसगसगवासम्मि लद्धरूवेहिं । सगसगखंडसलागं भजिदे अदिरेगपरिमाणं ।।२६५।।

बारसमपक्खे अप्पाबहुगं वत्तइस्सामो। तं जहा- ताव जंबूदीवमवणिज्ज लवणसमुद्दस्स विक्खंभं वेण्णिलक्खं आयामं णवलक्खं, धादईसंडदीवस्स विक्खंभं चत्तारिलक्खं, आयामं सत्तावीसलक्खं, कालोदगसमुद्दस्सविक्खंभं अट्ठलक्खं, आयामं तेसट्ठिलक्खं, एवं समुद्दादो दीवस्स दीवादो समुद्दस्स विक्खंभादो विक्खंभं दुगुणं आयामादो आयामं दुगुणं णवलक्खेहिं अब्भहियं होऊण गच्छइ जाव सयंभूरमणसमुद्दो त्ति। लवणसमुद्दस्स खेत्तफलादो धादइसंडस्स खेत्तफलं छग्गुणं, धादईसंडदीवस्स खेत्तफलादो कालोदगसमुद्दस्स खेत्तफलं चउग्गुणं बाहत्तरिसहस्सकोडिजोयणेहिं अब्भहियं होदि। खेत्तफलं ७२०००००००००० । एवं हेट्ठिमदीवस्स वा णीररासिस्स वा खेत्तफलादो तदंणतरोवरिमदीवस्स वा रयणायरस्स वा खेत्तफलं चउगुणं पक्खेवभूदबाहत्तरिसहस्सकोडिजोयणाणि दुगुणदुगुणं होऊण गच्छइ जाव सयंभूरमणो त्ति। तत्थ अंतिमवियप्पं वत्तइस्सामो- सयंभूरमणदीवस्स विक्खंभं छप्पण्णरूवेहिं भजिदजगसेढी पुणो सत्तत्तीससहस्सपंचसयजोयणेहिं अब्भहियं होइ। तस्स ठवणा- ५६। धण जोयणाणि ३७५००। आयामं पुण छप्पण्णरूवेहिं हिदणवजगसेढीओ पुणो पंचलक्खबासट्ठिसहस्सपंचसयजोयणेहिं परिहीणं होदि। तस्स ठवणा-- ६ रिण जोयणाणि ५६२५००। पुणोविक्खंभायामं परोप्परगुणिदे खेत्तफलं रज्जूवे कदि ५६ णवरूवेहिं गुणिय चउसट्ठिरूवेहि भजिदमेत्तं। किंचूणं पमाणं रज्जू ठविय अट्ठावीससहस्सएक्कसयपंचवीसरूवेहिं गुणिदमेत्तं पुणो पण्णाससहस्स-सत्तत्तीसलक्ख-णवकोडिअब्भहियदोण्णिसहस्सएक्कसयकोडिजोयणमेत्तं होदि। तस्स ठवणा = | ६ रिण — |

४६ | ६४ ७ |

२८१२५ रिण जोयणाणि २१०६३७५०००० सयंभूरमणसमुद्दस्स विक्खंभं अट्ठावीसरूवेहिं भजिदजगसेढी पुणो पंचत्तरिसहस्स-जोयणेहिं अब्भहियं होदि। आयामं अट्ठवीसरूवेहिं भजिद खग्व, जगसेढी पुणो दोण्णिलक्खपंचवीससहस्सजोयणेहिं परिहीणं होदि। तस्सठवणा- — धण ७५०००। आयाम — ६ रिण २२५००० । खेत्तफलं रज्जूवे कदी णवरूवेहिं गुणिय सोलसरूवेहिं भजिदमेत्तं

२८ २८

पुणो रज्जू ठविय एक्कलक्ख-बारससहस्स-पंचसयजोयणेहि गुणिदकिंचूणकदिमेत्तेहिं अब्भहियं होदि। तं किंचूणपमाणं पण्णासलक्ख-सत्तासीदिकोडिअब्भहियछस्सय-एक्कसहस्सकोडिजोयणमेत्तं होदि। तस्स ठवणा- $\overline{\underset{४\,६}{=}\,\Big|\,\underset{१\,६}{६}}$ धण $\overline{\underset{७}{-}\,\Big|}$ ११२५००० रिण १६८७५०००००० । एवं दीवोदधीणं विक्खंभायामखेत्तफलं च परूवणहेदुमिमं गाहासुत्तं-

लक्खविहीणं रुंदं णवहि गुणं इच्छियस्स दीहत्तं । तं चेव य रुंदगुणं खेत्तफलं होदि वलयाणं ॥२६६॥

हेट्ठिमदीवस्स वा रयणायरस्स वा खेत्तफलादो उवरिमदीवस्स वा तंरगिणीणाहस्स वा खेत्तफलस्स सादिरेयत्तपरूवणहेदुमिमा गाहा-

कालोदगोदहीदो उवरिमदीवोवहीण पत्तेक्कं । रुंदं णवलक्खगुणं परिवड्ढी होदि उवरुवरिं ॥२६७॥

तेरसमपक्खे अप्पाबहुगं वत्तइस्सामो- जंबूदीवस्स खेत्तफलादो लवणणीरधित्स खेत्तफलं चउवीसगुणं। जंबूदीवसहियलवणसमुद्दस्स खेत्तफलादो धादईसंडदीवस्स खेत्तफलं पंचगुणं होऊण चोद्दससहस्स-बेसय-पण्णासकोडिजोयणेहिं अब्भहियं होदि। १४२५००००००००। जंबूदीवलवणसमुद्दसहियधादईसंडदीवस्स खेत्तफलादो कालोदगसमुद्दस्स खेत्तफलं तिगुणं होऊण एयलक्ख-तेवीससहस्स-सत्तसय-पण्णासकोडिजोयणेहिं अब्भहियं होइ। तस्स ठवणाा १२३७५००००००००। एवं कालोदगसमुद्दप्पहुदि हेट्ठिमदीवरयणायराणं पिंडफलादो उवरिमदीवस्स वा रयणायरस्स वा खेत्तफलं पत्तेयं तिगुणं पक्खेवभूद-एयलक्ख-तेवीससहस्स-सत्तसय-पण्णासकोडि जोयणाणि कमसो दुगुणं दुदुणं होऊण वीससहस्स दुसयपण्णासकोडिजोयणेहिं अब्भहियं- पमाणं २०२५००००००००० होऊण गच्छदि जाव सयंभूरमणसमुद्दो त्ति। तत्थ अंतिमवियप्पं वत्तइस्सामो- सयंभूरमणसमुद्दस्स हेट्ठिमदीवउवहीओ सव्वाओ जंवूदीवविरहिदाओ ताणं खेत्तफलं रज्जूवे कदी तिगुणिय सोलसेहिं भजिदमेत्तं, पुणो णवसय-सत्तत्तीसकोडि-पण्णासलक्खजोयणेहिं अब्भहियं होइ। पुणो एक्कलक्ख वारससहस्स पंचसयजोयणेहिं गुणिदरज्जूए हीणं होइ। तस्स ठवणा- $\overline{\underset{४\,६}{=}\,\Big|\,\underset{१\,६}{३}}$ धण जोयणाणि ६३७५०००००० रिण रज्जूओ ११२५०० । इट्ठादो हेट्ठिमदीवोवहीणं पिंडफलमाणयणट्ठं गाहासुत्तं-

इच्छियदीउवहीए विक्खंभायामयम्मि अवणिज्जं । इगिणवलक्खं सेसं तिहिदं इच्छादु हेट्ठिमाणफलं ॥२६८॥

सादिरेयस्स आणयणट्ठं गाहासुत्तं-

इच्छियवासं दुगुणं दोलक्खूणं तिलक्खसंगुणियं । जंबूदीवफलूणं सेसं तिगुणं हुवेदि अदिरेगं ॥२६९॥

चोद्दसमपक्खे अप्पाबहुगं वत्तइस्सामो- लवणसमुद्दस्सविक्खंभं वेण्णिलक्खं २००००, आयामं णवलक्खं ९००००० । कालोदगसमुद्दविक्खंभं अट्ठलक्खं ८००००, आयामं तेसट्ठिलक्खं ६३००००० । पोक्खरवरसमुद्दस्स विक्खंभं बत्तीसलक्खं ३२००००, आयामं एऊणसीदिलक्खेणब्भहियबेकोडीओ होइ २७९००००० । एवं हिट्ठिमसमुद्दस्स विक्खंभादो उवरिमसमुद्दस्स [विक्खंभं चउग्गुणं, हिट्ठिमसमुद्दस्स] आयामादो उवरिमसमुद्दस्स आयामं चउग्गुणं सत्तावीसलक्खेहिं अब्भहियं होऊण गच्छइ जाव सयंभूरमणसमुद्दो त्ति। लवणसमद्दस्स खेत्तफलादो कालोदगसमुद्दस्स खेत्तफलं अट्ठावीसगुणं, कालोदगसमुद्दस्स खेत्तफलादो पोक्खरवरसमुद्दस्स खेत्तफलं सत्तारसगुणं होऊण तिण्णिलक्ख-सट्ठिसहस्सकोडिजोयणेहिं अब्भहियं होदि ३६००००००००००० । पोक्खरवरसमुद्दस्स खेत्तफलादो वारुणिवरसमुद्दस्स खेत्तफलं सोलसगुणं होऊण पुणो चोत्तीसलक्ख-छप्पण्णसहस्सकोडिजोयणेहिं अब्भहियं होदि। पमाणं ३४५६००००००००००। एत्तो पहुदि हेट्ठिमणीररासिस्स खेत्तफलादो तदणंतरोवरिमणीररासिस्स खेत्तफलं सोलसगुणं पक्खेवभूदचोत्तीसलक्ख-छप्पण्णसहस्सकोडिजोयणाणि चउगुणं होऊण गच्छइ जाव सयंभूरमणसमुद्दं त्ति। तत्थ विक्खंभायामखेत्तफलाणं अंतिमवियप्पं वत्तइस्सामो- अहिंदवरसमुद्दस्स विक्खंभं रज्जूए सोलसमभागं पुण अट्ठारहसहस्स-सत्तसय-पण्णासजोयणेहिं अब्भहियं होदि। तस्स ठवणा- $\overline{\underset{७}{-}\,\Big|\,\underset{१\,६}{१}}$ धण जोयणाणि १८७५० । तस्स आयमं णव रज्जू ठविय सोलसरूवेहिं भजिदमेत्तं पुण सत्तलक्ख एक्कतीससहस्स बेण्णिसय पण्णासजोयणेहिं परिहीणं होदि। तस्स ठवणा- $\overline{\underset{१६}{६}\,\Big|}$ रिण जोयणाणि ७३१२५० । सयंभूरमणसमुद्दस्स विक्खंभं एक्कसेढिं ठविय अट्ठाबीसरूवेहिं भजिदमेत्तं पुण पंचहत्तरिसहस्सजोयणेहिं अब्भहियं होदि। तस्स ठवणा- $\frac{-१}{२८}$ धण जोयणाणि ७५००० । तस्सेव आयामं णवसेढि

ठविअट्ठाबीसेहिं भजिदमेत्तं, पुणो दोण्णिलक्ख-पंचवीससहस्सजोयणेहिं परिहीणं होदि। तस्स ठवणा सेढ़िं ६/२८ रिण जोयणाणि २२५०००। अहिंदवरसमुद्दस्स खेत्तफलं रज्जूवे कदी णवरूवेहिं गुणिय बेसदछप्पण्णरूवेहिं भजिदमेत्तं, पुणो एक्कलक्ख-चालीससहस्स-छस्सय-पंचवीसजोयणेहिं गुणिदमेत्त-रज्जूए चउब्भागं, पुणो एक्कसहस्स-तिण्णिसय-एक्कहत्तरिकोडीओ णवलक्ख-सत्ततीससहस्स-पंचसयजोयणेहिं परिहीणं होदि = ६/४६। २५६ | रिण रज्जू १/४ | १४०६२५ रिण जोयणाणि १३७१०६३७५०० | सयंभूरमणणिण्णगरमणस्स खेत्तफलं रज्जूवे कदी णवरूवेहिं गुणिय सोलसरूवेहिं भजिदमेत्तं, पुणो एक्कलक्ख-बारससहस्स-पंचसयजोयणेहिं [गुणिदरज्जूए] अब्भहियं, पुणो एक्कसहस्स-छस्सय-सत्तासीदिकोडि-पण्णास-लक्खजोयणेहिं परिहीणं होदि। तस्स ठवणा = ६/४६। १६ धण रज्जू १ | ११२५०० रिण जोयणाणि १६८७५०००००० |

अदिरेयस्स पमाणमाणयणहेदुं इमं गाहासुत्तं-

वारुणिवरादिउवरिमइच्छियरयणायरस्स रुंदत्तं । सत्तावीसं लक्खे गुणिदे अहियस्स परिमाणं ।।२७०।।

पण्णारसपक्खे अप्पाबहुगं वत्तइस्सामो। तं जहा- लवणसमुद्दस्स खेत्तफलादो कालोदगसमुद्दस्स खेत्तफलं अट्ठावीसगुणं। लवणसमुद्दसहिदकालोदसमुद्दस्स खेत्तफलादो पोक्खरवरसमुद्दस्स खेत्तफलं सत्तारसगुणं होऊण चउवण्णसहस्सकोडिजोयणेहिं अब्भहियं होदि। पमाणं ५४०००००८०००० । लवणकालोदगसहिदपोक्खरवरसमुद्दस्स खेत्तफलादो वारुणिवरणीररासिस्स खेत्तफलं पण्णारसगुणं होदूण पणदाललक्खचउवण्णसहस्सकोडिजोयणेहिं अब्भहियं होइ ४५५४०००००००००० । एवं वारुणिवरणीररासिप्पहुदि हेट्ठिमणीररासीणं खेत्तफलसमूहादो उवरिमणिण्णगणाहस्स खेत्तफलं पत्तेयं पण्णारसगुणं पक्खेवभू दपणदाललक्ख-चउवण्णसहस्स-कोडीओ चउग्गुणं होऊण पुणो एक्कलक्ख बासट्ठिसहस्सकोडिजोयणेहिं अब्भहियं होइ १६२०००००००००० । एवं णेदव्वं जाव सयंभूरमणसमुद्दो त्ति। तत्थ अंतिमवियप्पं वत्तइस्सामो- सयंभूरमणणिण्णगाणाहस्साधो हेट्ठिमसव्वाण णीररासीणं खेत्तफलपमाणं रज्जूवे वग्गं तिगुणिय असीदिरूवेहिं भजिदमेत्तं, पुणो एक्कसहस्स-छसय-सत्तासीदिकोडिपण्णासलक्खजोयणेहिं अब्भहियं होदि, पुणो वावण्ण-सहस्स-पंचसयजोयणेहिं गुणिदरज्जूहि परिहीणं होदि। तस्स ठवणा = ३/४६। ८० धण जोयणाणि १६८७५०००००० रिण रज्जू-७ ५२५०० सयंभूरमणसमुद्दस्स खेत्तफलं तप्पमाणं रज्जूवे वग्गं णवरूवेहिं गुणिय सोलसरूवेहिं भजिदमेत्तं, पुणो एक्कलक्ख बारससहस्स पंचसयजोयणेहिं गुणिदरज्जूअब्भहियं होइ, पुणो पण्णासलक्ख-सत्तासीदिकोडिअब्भहियछसयएक्कसहस्सकोडिजोयणेहिं परिहीणं होदि। तस्स ठवणा = ६/४६। १६ धण ७ । ११२५०० रिण १६८७५०००००० । तव्वड्ढीणं आणयणहेदु इमं गाहासुत्तं-

तियलक्खूणं अंतिमरुंदं णवलक्खरहिदआयामो । पण्णारससहिदेहिं संगुणं लद्धं हेट्ठिलसव्वउवहिफलं ।।२७१।।

सादिरेयपमाणाणयणणिमित्तं गाहासुत्तं-

तिविहं सूइसमूहं वारुणिवरउवहिपहुदिउवरिल्लं । चउलक्खगुणं अधियं अट्ठरससहस्सकोडिपरिहीणं ।।२७२।।

सोलसपक्खे अप्पाबहुगं वत्तइस्सामो। तं जहा- धादईसंडदीवस्स विक्खंभं चत्तारिलक्खं, आयामं सत्तावीसलक्खं। पुक्खरवरदीवविक्खंभं सोलसलक्खं, आयामं पणतीसलक्खसहियएयकोडि जोयणपमाणं। वारुणिवरदीवविक्खंभं चउसट्ठिलक्खं, आयामं सत्तसट्ठिलक्खसहियपंचकोडीओ। एवं हेट्ठिमविक्खंभादो उवरिमविक्खंभं चउगुणं, आयामादो आयामं चउग्गुणं सत्तावीसलक्खेहिं अब्भहियं होऊण गच्छइ जाव सयंभूरमणदीओ त्ति। धादईसंडदीवखेत्तफलादो पोक्खरवरदीवस्स खेत्तफलं वीसगुणं। पुक्खरवरदीवस्सखेत्तफलादो वारुणीवरदीवस्स खेत्तफलं सोलसगुणं होऊण सत्तारसलक्ख-अट्ठावीससहस्स कोडिजोयणेहिं अब्भहियं होइ १७२८०००००००००० । एवं हेट्ठिमदीवस्स खेत्तफलादो तदंणतरोवरिमदीवस्स खेत्तफलं सोलसगुणं पक्खेवभूदसत्तारसलक्ख-अट्ठावीससहस्सकोडीओ चउग्गुणं होऊण गच्छइ जाव सयंभूरमणदीओ त्ति । एत्थु विक्खंभायामखेत्तफलाणं अंतिमवियप्पं वत्तइस्सामो- अहिंदवरदीवस्स विक्खंभं रज्जूए बत्तीसमभागं, पुणो णवसहस्स तिण्णिसय पंचहत्तरिजोयणेहिं अब्भहियं होइ। आयामं णव रज्जू ठविय बत्तीसरूवेहिं भागं घेत्तूण पुणो अट्ठलक्ख-पण्णारस-सहस्स-छसयपणवीसजोयणेहिं परिहीणं होइ। तस्स ठवणा १/३२ धण जोयणाणि

६३७५ । आयामं $\frac{६}{३२}$ रिण जोयणाणि ८१५६२५ । अहिंदवरदीवस्स खेत्तफलं रज्जूवे वग्गं णवरूवेहिं गुणिय एक्कसहस्स-चउवीसरूवेहिं भजिदमेत्तं, पुणो रज्जूए सोलसमभागं ठविय तिण्णिलक्ख-पंचसट्ठिसहस्स-छसय-पणवीसजोयणेहिं गुणिदमेत्त परिहीणं होदि, पुणो सत्तसय चउसट्ठिकोडि-चउसट्ठिलक्ख-चउसीदिसहस्स-तिसय-पंचहत्तरिजोयणेहिं परिहीणं होइ। तस्स ठवणा- $\frac{=}{४६}$ । $\frac{६}{१०२४}$ रिण रज्जूओ $\frac{-}{७}$ $\frac{३६५६२५}{१६}$ रिण जोयणाणि ७६४६४८४३७५ । सयंभूरमणदीवस्स विक्खंभं रज्जूए अट्ठमभागं पुणो सत्ततीससहस्स-पंचसयजोयणेहिं अब्भहियं होदि, आयामं पुणो णवरज्जूए अट्ठमभागं पुणो पंचलक्ख बासट्ठिसहस्स-पंचसयजोयणेहिं परिहीणं होइ। तस्स ठवणा $\frac{-}{७}$ | $\frac{१}{८}$ धण जोयणाणि ३७५०० । आयामं $\frac{-}{७}$ | $\frac{६}{८}$ रिण जोयणाणि ५६२५०० । पुणो खेत्तफलं रज्जूवे कदी णवरूवेहिं गुणिय चउसट्ठिरूवेहिं भजिदमेत्तं, पुणो रज्जू ठविय अट्ठावीससहस्स-एक्कसय-पंचवीसरूवेहिं गुणिदमेत्तं, पुणो पण्णाससहस्स-सत्ततीसलक्ख-णवकोडिअब्भहियदोण्णिसहस्स-एक्कसय-कोडिजोयणं एदेहि दोहि रासीहिं परिहीणं पुव्विल्लरासी होदि। तस्स ठवणा- $\frac{=}{४६}$ । $\frac{६}{६४}$ रिण रज्जू $\frac{-}{७}$, २८१२५ रिण जोयणाणि २१०६३७५०००० । अदिरेयस्स पमाणायणहेदुमिमं गाहासुत्तं-

सगसगमज्झिमसूई णवलक्खगुणंपुणो वि मिलिदव्वं । सत्तावीससहस्सं कोडीओ तं हुवेदि अदिरेगं ।।२७३।।

सत्तारसमपक्खे अप्पाबहुगं वत्तइस्सामो। तं जहा- धादईसंडखेत्तफलादो पुक्खरवरदीवस्स खेत्तफलं वीसगुणं। धादईसहिद-पोक्खरवरदीवखेत्तफलादो वारुणिवरखेत्तफलं सोलसगुणं। धादइपोक्खरवरदीवसहियवारुणिवरदीवखेत्तफलादो खीरवरदीवखेत्तफलं पण्णारसगुणं होऊण सीदिसहस्ससहियएक्काणउदिलक्खकोडीओ अब्भहियं होइ ६१८०००००००००० । एवं खीरवरदीवप्पहुदि अब्भंतरिमसव्वदीवखेत्तफलादो तदणंतरबाहिरभागणिविट्ठदीवखेत्तफलं पण्णारसगुणं पक्खेवभूदसीदिसहस्सकोडिसहियएक्काणवदि लक्खकोडीओ चउग्गुणं होऊण एयलक्ख-अट्ठसहस्सकोडिजोयणेहिं अब्भहियं होइ १०८०००००००००० । एवं णेदव्वं जाव सयंभूरमणदीओ त्ति। तत्थ अंतिमवियप्पं वत्तइस्सामो- सयंभूरमणदीवस्स हेट्ठिमसव्वदीवाणं खेत्तफलपमाणं रज्जूवे वग्गं तिगुणिय वीसुत्तरतियसदाहि भजिदमेत्तं, पुणो एक्कसहस्सं तिण्णिसयउणसट्ठिकोडीओ सत्ततीसलक्खं पण्णाससहस्सजोयणेहिं अब्भहियं होइ। पुणो एक्कत्तीससहस्सं अट्ठसयपंचहत्तरिजोयणेहिं गुणिदरज्जूए परिहीणं होइ। तस्स ठवणा $\frac{=}{४६}$ । $\frac{३}{३२०}$ | धण जोयणाणि १३५६३७५०००० रिण रज्जू $\frac{-}{७}$ ३१८७५। सयंभूरमणदीवस्स खेत्तफलं रज्जूए कदी णवरूवेहिं गुणिय चउसट्ठिरूवेहिं भजिदमेत्तं, पुणो रज्जू ठविय अट्ठावीससहस्स एक्कसयपंचवीसरूवेहिं गुणिदमेत्तं, पुणो पण्णाससहस्स सत्तत्तीसलक्ख-णवकोडिअब्भहियदोण्णिसहस्स-एक्कसयकोडि जोयणं, एदेहिं दोहिं रासीहिं परिहीणं पुव्विल्लरासी होदि। तस्स ठवणा $\frac{=}{४६}$ । $\frac{६}{६४}$ रिण रज्जूओ $\frac{-}{७}$ | २८१२५ रिण जोयणाणि २१०६३७५०००० । अब्भंतरिमसव्वदीवखेत्तफलं मेलावेदूण आणयणहेदुमिमं गाहासुत्तं-

विक्खंभायामे इगि सगबीसं लक्खमवणमंतिमए । पण्णरसहिदे लद्धं इच्छादो हेट्ठिमाण संकलणं ।।२७४।।

अधियपमाणमाणयणहेदुमिमं गाहासुत्तं-

खीरवरदीवपहुदिं उवरिमदीवस्स दीहपरिमाणं । चउलक्खे संगुणिदे परिवड्ढी होइ उवरिं उवरिं ।।२७५।।

अट्ठारसमपक्खे अप्पाबहुगं वत्तइस्सामो- लवणणीरधीए आदिमसूई एक्कलक्खं, मज्झिमसूई तिण्णिलक्खं, बाहिरसुई पंचलक्खं, एदेसिं तिट्ठाणसूईणं मज्झे कमसो चउछक्कट्ठलक्खाणि मेलिदे धादईसंडदीवस्स आदिममज्झिमबाहिरसूईओ होंति। पुणो धादईसंडदीवस्स तिट्ठाणसूईणं मज्झे पुव्विल्लपक्खेवं दुगुणिय कमसो मेलिदे कालोदगसमुद्दस्स तिट्ठाणसूईओ होंति। एवं हेट्ठिमदीवस्स वा रयणायरस्स वा तिट्ठाणसूईणं मज्झे चउछक्कट्ठलक्खाणि अब्भहियं करिय उवरिमदुगुणदुगुणकमेण मेलावेदव्वं जाव सयंभूरमणसमुद्दो त्ति। तत्थ अंतिमवियप्पं वत्तइस्सामो। तं जहा- सयंभूरमणदीवस्स आदिमसूईमज्झे रज्जूए चाउब्भागं पुणो पंचहत्तरिसहस्सजोयणाणि संमिलिदे सयंभूरमणसमुद्दस्स आइमसूई होदि। तस्स ठवणा $\frac{-}{२८}$ धण जोयणाणि ७५००० । पुणो तद्दीवस्स मज्झिमसूइम्मि तियरज्जूण अट्ठमभागं पुणो एक्कलक्ख-बारससहस्स-पंचसयजोयणाणि संमिलिदे सयंभूरमणसमुद्दस्स मज्झिमसूई होइ $\frac{-}{७}$ $\frac{३}{}$ धण जोयणाणि

११२५०० । पुणो सयंभूरमणदीवस्स बाहिरसूईमज्झे रज्जूए अद्धं पुणो दिवड्ढलक्खजोयणेण मेलिदे चरिमसमुद्दअंतिमसूई होइ। तस्स ठवणा- $\overline{१४}$ धण जोयणाणि १५००००। एत्थ वड्ढीण आणयणहेदुमिमं गाहासुत्तं-

धादइसंडप्पहुदिं इच्छियदीओदहीण रुंदद्धं । दुतिचउरूवेहिं हदो तिट्ठाणे होंति परिवड्ढी ।।२७६।।

उणवीसदिमपक्खे अप्पाबहुगं वत्तइस्सामो। तं जहा- लवणसमुद्दस्सायामं णवलक्खं, तम्मि अट्ठारसलक्खं संमेलिदे धादईसंडस्स दीवस्स आयामं होदि। धादईसंडदीवस्स आयामम्मि पक्खेवभूद अट्ठारसलक्खं दुगुणिय मेलिदे कालोदगसमुद्दस्स आयामं होइ। एवं पक्खेवभूदअट्ठारसलक्खं दुगुणदुगुणं होऊण गच्छइ जाव सयंभूरमणसमुद्दो त्ति। तत्तो अंतिमवियप्पं वत्तइस्सामो- तत्थ सयंभूरमणदीवस्स आयामादो सयंभूरमणसमुद्दस्स आयामवड्ढी णवरज्जूणं अट्ठमभागं पुणो तिण्णिलक्ख सत्ततीससहस्स पंचसयजोयणेहिं अब्भहियं होइ। तस्स ठवणा- $\overline{७ । ८}^{६}$ धण जोयणाणि ३३७५०० । लवणसमुद्दादिइच्छियदीव-रयणायराणं आयामवड्ढिपमाणायणहेदुं इमं गाहासुत्तं-

धादइसंडप्पहुदिं इच्छियदीओवहीण वित्थारं । अद्धिय तं णवहि गुणं हेट्ठिमदो होदि उवरिमे वड्ढी ।।२७७।।

एवं दीउवहीणं णाणाविहखेत्तफलपरूवणं समत्तं ।

एत्तो चोत्तीसविहाणं तिरिक्खाणं परिमाणं उच्चदे।

[संपहि] सुत्ताविरुद्धेण आइरियपरंपरागदोवदेसेण तेउक्काइयरासिउप्पायणविहाणं वत्तइस्सामो। तं जहा- एगं घणलोगं सलागभूदं ठविय अवरेगं घणलोगं विरलिय एक्केक्कस्स रूवस्स घणलोगं दादूण वग्गिदसंवग्गिदं करिय सलागरासीदो एगरूवमवणेयव्वं। तावे एक्का अण्णोण्णगुणगारसलागा लब्भदि। तस्सुप्पण्णरासिस्स पलिदोवमस्स असंखेज्जदि भागमेत्ता वग्गसलागा भवंति। तस्सद्धच्छेदणयसलागा असंखेज्जा लोगा, रासी वि य संखेज्जलोगमेत्तो जादो। पुणो उट्ठिदमहारासिं विरलिदूण तत्थ एक्केक्कस्स रूवस्स उट्ठिदमहारासिपमाणं दादूण वग्गिदसंवग्गिदं करिय सलागरासीदो अवरेगरूवमवणेयव्वं। तावे अण्णोण्ण गुणगारसलागा दोण्णि, वग्गसलागा अद्धच्छेदणयसलागा रासी च असंखेज्जा लोगा। एवमेदेण कमेण णेदव्वं जाव लोगमेत्तसलागरासी समत्तो त्ति। तावे अण्णोण्णगुणगार-सलागपमाणं लोगो, सेसतिगमसंखेज्जा लोगा। पुणो उट्ठिदमहारासिं विरलिदूण तं चेव सलागभूदं ठविय विरलिय एक्केक्कस्स रूवस्स उप्पण्णमहारासिपमाणं दादूण वग्गिदसंवग्गिदं करिय सलागरासीदो एगरूवमवणेअव्वं। तावे अण्णोण्णगुणगारसलागा लोगो रूवाहिओ, सेसतिगमसंखेज्जा लोगा। पुणो उप्पण्णरासिं विरलिय रूवं पडि उप्पण्णरासिमेव दादूण वग्गिदसंवग्गिदं करिय सलागरासीदो अण्णेगरूवमवणेदव्वं। तावे अण्णोण्णगुणगारसलागा लोगो दुरूवाहिओ, सेसतिगमसंखेज्जा लोगा। एवमेदेण कमेण दुरूवूणुक्कस्ससंखेज्जलोगमेत्तसलागासु दुरूवाहियलोगम्मि पविट्ठासु चत्तारि वि यसंखेज्जा लोगा भवंति। एवं णेदव्वं जाव विदियवारट्ठविदसलागरासी समत्तो त्ति। तदो चत्तारि वि असंखेज्जा लोगा। पुणो उट्ठिदमहारासिं सलागभूदं ठविय अवरेगमुट्ठिदमहारासिं विरलिदूंण उट्ठिदमहारासिपमाणं दादूण वग्गिदसंवग्गिदं करिय सलागरासीदो एगरूवमवणिदव्वं। तावे चत्तारि वि असंखेज्जा लोगा। एवमेदेण कमेण णेदव्वं जाव तदियवारट्ठविदसलाग रासी समत्तो त्ति। तावे चत्तारि वि असंखेज्जा लोगा। पुणो उट्ठिदमहारासिं तिप्पडिरासिं कादूण तत्थेगं सलागभूदं ठविय अण्णेगरासिं विरलिदूण तत्थ एक्केक्कस्स रूवस्स एगरासिपमाणं दादूण वग्गिदसंवग्गिदं करिय सलागरासीदो एगरूवमवणेयव्वं। एवं पुणो पुणो करिय णेदव्वं जाव अदिक्कंतअण्णोण्णगुणगारसलागाहि ऊणचउत्थवारट्ठवियअण्णोण्ण-गुणगारसलागरासी समत्तो त्ति। तावे तेउकाइयरासी उट्ठिदा भवदि ≡ a । तस्स गुणगारसलागा चउत्थवारट्ठविदसलागरासिपमाणं होदि ।।९।। पुणो तेउकाइयरासिमसंखेज्जलोगेण भागे हिदे लद्धं तम्मि चेव पक्खित्ते पुढविकाइयरासी होदि $\equiv a \mid {}^{१०}_{९} \mid$ तम्मि असंखेज्जलोगेण भागे हिदे लद्धं तम्मि चेव पक्खित्ते आउकाइयरासी होदि $\equiv a \mid {}^{१०}_{९} \mid {}^{१०}_{९} \mid$ तम्मि असंखेज्जलोगेण भागे हिदे लद्धं तम्मि चेव पक्खित्ते वाउकाइयरासी होइ $\equiv a \mid {}^{१०}_{९} \mid {}^{१०}_{९} \mid {}^{१०}_{९}$ पुणो एदे चत्तारि सामण्णरासीओ पत्तेक्कं तप्पाउग्गअसंखेज्जलोगेण खंडिदे तत्थेगखंडं सगसगबादररासिपमाणं होदि। तेउ $\equiv {}^{a}_{९} \mid$ पुढवि $\equiv {}^{a}_{९} \mid {}^{१०}_{९} \mid$ आउ $\equiv {}^{a}_{९} \mid {}^{१०}_{९} \; {}^{१०}_{९} \mid$ वाउ $\equiv {}^{a}_{९} \mid {}^{१०}_{९} \; {}^{१०}_{९} \; {}^{१०}_{९} \mid$ सेसबहुभागा सगसगसुहुमजीवा होंति। तेउ $\equiv {}^{a}_{९} \; {}^{}_{८} \mid$ पुढवि $\equiv {}^{a}_{९} \mid {}^{१०}_{९} \; {}^{}_{८} \mid$ आउ $\equiv {}^{a}_{९} \; {}^{१०}_{९} \; {}^{१०}_{९} \; {}^{}_{८} \mid$ वाउ $\equiv {}^{a}_{९} \; {}^{१०}_{९} \; {}^{१०}_{९} \; {}^{१०}_{९} \; {}^{}_{८} \mid$ पुणो पलिदोवमस्स असंखेज्जदिभागमेत्तजगपदरं आवलियाए असंखेज्जदिभागेण गुणिदपदरंगुलेहि भागे हिदे पुढविकाइयबादरपज्जत्तरासिपमाणं

होदि $\overset{=}{\underset{a}{\text{प}}}{}^{४।९।}$ तम्मि आवलियाए असंखेज्जदिभागेण गुणिदे हि बादरआउपज्जत्तरासिपमाणं होदि $\overset{=}{\underset{a}{\text{प}}}{}^{४}$। पुणो आवलिस्स असंखेज्जदिभागो बादरतेउपज्जत्तजीवपरिमाणं होदि $\underset{a}{८}$। पुणो लोगस्स संखेज्जदिभागो बादरवाउपज्जत्तजीवपमाणं होदि। ≡ सगसगबादरपज्जत्तरासिस्स सगसगबादररासिदो सोधिदे सगसगबादरअपज्जत्तरासी होदि। पुढ ≡ $\underset{९\ ९}{a}$ १० रिण $\overset{=}{\underset{a}{\text{प}}}{}^{४।९।}$ आउ ≡a $\underset{९\ ९\ ९}{१०\ १०}$ रिण $\overset{=}{\underset{a}{\text{प}}}{}^{४}$ तेउ ≡$\underset{९}{a}$ रिण $\underset{a}{८}$ | वाउ ≡$\underset{९\ ९\ ९\ ९}{a\ १०\ १०\ १०}$| रिण ≡। पुणो पुढविकायादीणं सुहुमरासिपत्तेयं तप्पाउग्गस्स संखेज्जरूवेहिं खंडिदे बहुभागा सुहुमपज्जत्तजीवरासिपमाणं होदि। पुढवि ≡$\underset{९\ ९\ ९\ ५}{a\ १०\ ८\ ४}$| आउ ≡$\underset{९\ ९\ ९\ ५}{a\ १०\ १०\ ८\ ४}$| तेउ ≡$\underset{९\ ५}{a\ ८\ ४}$| वाउ ≡$\underset{९\ ९\ ९\ ९\ ५}{a\ १०\ १०\ १०\ ८\ ४}$ तत्थेगभागं सगसगसुहुमपज्जत्तरासिपरिमाणं $\underset{९}{}$होदि। पुढवि ≡$\underset{९\ ९\ ५}{a\ १०\ ८}$| आऊ ≡$\underset{९\ ९\ ९\ ५}{a\ १०\ १०\ ८}$| तेउ ≡$\underset{९\ ५}{a\ ८}$| वाउ ≡$\underset{९\ ९\ ९\ ९\ ५}{a\ १०\ १०\ १०\ ८}$| पुणो सव्वजीवरासीदो सव्वरासितसकाइय-पुढविकाइय-आउकाइय-तेउकाइय वाउकाइयजीवरासि पमाणमवणिदे अवसेसं सामण्णवणप्फदिकाइयजीवरासिपरिमाण होदि [सव्वजीवरासी रिण $\overset{=}{\underset{a}{\text{२}}}{}^{४}$ रिण ≡ a। $\overset{८}{४}$] तम्हि असंखेज्जलोगपरिमाणमवणिदे सेसं साधारणवणप्फदिकाइयजीवपरिमाणं होदि। १३ ≡ । तं तप्पाउग्गअसंखेज्जलोगेण खंडिदे तत्थ एगभागो साहारणबादरजीवपरिमाणं होदि। १३ $\underset{९}{\equiv}$ । सेसबहुभागा साधारणसुहुमरासिपरिमाणं होदि। १३ ≡ $\underset{९}{८}$ । पुणो साधारण-बादररासिं तप्पाउग्गअसंखेज्जलोगेण खंडिदे तत्थेगभागं साधारणबादरपज्जत्तपरिमाणं होदि १३ $\underset{९\ ७}{\equiv}$ १ । सेसबहुभागा साधारणबादर-अपज्जत्तरासिपरिमाणं होदि । १३ $\underset{९\ ७}{\equiv}$ ६ । पुणो साधारणसुहुमरासिं तप्पाओग्गसंखेज्जरूवेहि खंडिय तत्थ बहुभागं साधारण सुहुमपज्जत्त परिमाणं होदि १३ $\underset{९\ \ ५}{\equiv}$ ८ ४ । सेसेगभागं साधारणसुहुमअपज्जत्तरासिपमाणं होदि। १३ $\underset{९\ \ ५}{\equiv}$ ८। पुणो पुव्वमणिदअसंखेज्जलोगपरिमाणरासी पत्तेयसरीरवणप्फदिजीवपरिमाणं होदि ≡ a $\overset{८}{\equiv}$ $\bar{a}$ । तप्पत्तेयसरीरवणप्फई दुविहा बादरणिगोद पदिट्ठिद-अपदिट्ठिभेदेण। तत्थ अपदिट्ठिदपत्तेयसरीरवणप्फई असंखेज्जलोगपरिमाणं होइ ≡ a । तम्मि असंखेज्जलोगेण गुणिदे बादर-णिगोदपदिट्ठिदरासिपरिमाणं होदि ≡ a ≡ a। ते दो वि रासी पज्जत्त-अपज्जत्तभेदेण दुविहा होंति। पुणो पुव्वुत्तबादरपुढविपज्जत्त-रासिमावलियाए असंखेज्जदिभागेण खंडिदे बादरणिगोदपदिट्ठिदपज्जत्तरासिपरिमाणं होदि $\overset{=}{\underset{a}{\text{प}}}{}^{४\ ९\ ९}$ । तं आवलियाए असंखेज्जदिभागेण भागे हिदे बादरणिगोदअपदिट्ठिदपज्जत्तरासिपरिमाणं होदि $\overset{=}{\underset{a}{\text{प}}}{}^{४\ ९\ ९\ ९}$ । सगसगपज्जत्तरासिं सगसगसमण्णरासिम्मि अवणिदे

सगसगअपज्जत्तरासिपरिमाणं होदि। बादरणिगोदपदिट्ठिद ≡ a ≡ a रिण $\frac{=}{\text{प}}$ बादरणिगोदअपदिट्ठिद ≡ a रिण

$\frac{=}{\text{प}}$ । पुणो आवलियाए असंखेज्जदिभागेण पदरंगुलमवहारिय लद्धेण जगपंदरे भागं घेत्तूण लद्धं $\frac{४}{५}$ । तं आवलियाए असंखेज्जदिभागेण खंडियाणेगखंडं पुधं ठविय सेसबहुभागे घेत्तूण चत्तारि समपुंजं कादूण पुधं ठवेयव्वं। पुणो आवलियाए असंखेज्जदिभागे विरलिदूण अवणिदएगखंडं समखंडं करिय दिण्णे तत्थ बहुखंडे पढमपुंजे पक्खित्ते बेइंदिया होंति। पुणो आवलियाए असंखेज्जदिभागं विरलिदूण दिण्णसेससमखंडं करिय दादूण तत्थ बहुभागे विदियपुंजे पक्खित्ते तेइंदिया होंति। पुव्वविरलणादो संपहि विरलणा किं सरिसा किं साधया किं ऊणेत्ति पुच्छिदे णत्थि एत्थ उवएसो। पुणो तप्पाउग्ग आवलियाए असंखेज्जदिभागं विरलिदूण सेसखंडं समखंडं करिय दिण्णे तत्थ बहुखंडे तदियपुंजे पक्खित्ते चउरिंदिया होंति। सेसेगखंडं चउत्थपुंजे पक्खित्ते पंचेदियमिच्छाइट्ठी होंति। तस्स ट्ठवणा परिमाणा वि

बी =८४२४ । ४।४।६५६१ । २ a	ती =६१२० । ४।४।६५६१ । २ a	च =५८६४ । ४।४।६५६१ । २ a	प =५८३६ । ४।४।६५६१ १ २ a

पुणो पदरंगुलस्स संखेज्जदिभागेण जगपदरे भागं घेत्तूण जं लद्धं तं आवलियाए असंखेज्जदिभागेण खंडिऊणेगखंडं पुधं ठवेदूण सेसबहुभागं घेत्तूण चत्तारि सरिसपुंजुं कादूण ट्ठवेयव्वं। पुणो आवलियाए असंखेज्जदिभागं विरलिदूण अवणिदएयखंडं समखंडं करिय दिण्णे तत्थ बहुखंडे पढमपुंजे पक्खित्ते तेइंदियपजजत्ता होंति। पुणो आवलियाए असंखेज्जदिभागं विरलिदूण सेसएयखंडं समखंडं कादूण दिण्णे तत्थ बहुखंडा विदियपुंजे पक्खित्ते बेइंदियपज्जत्ता होंति। पुणो आवलियाए असंखेज्जदिभागं विरलिदूण सेसएयखंडं समखंडं कादूण दिण्णे तत्थ बहुभागं तदियपुंजे पक्खित्ते पंचेंदियपज्जत्ता होंति पुणो सेसेगभागं चउत्थपुंजे पक्खित्ते चउरिंदियपज्जत्ता होंति। तस्स ठवणा-

ती = ८४२४ ४।४।६५६१ ५	बि = ६१२० ४।४।६५६१ ५	पं = ५८६४ ४।४।६५६१ ५	च = ५८३६ ४।४।६५६१ ५

पुणो पुव्वुत्तबीइंदियादिसामण्णरासिम्मि सगसगपज्जत्तरासिमवणिदे सगसगअपज्जत्तरासिपमाणं हादि। तं चेदं

बि ५।६१२० । =८४२४। a । ४।४।६५६१ ।	ती ५ ।८४२४ । =६१२०। a । ४।४।६५६१ ।	च ५ । ५८३६ । =५८६४। a । ४।४।६५६१ ।	पं ५ । ५८६४ । =५८३६। a । ४।४।६५६१ ।

पुणो पंचेंदियपज्जत्तरासीणं मज्झे देव णेरइय मणुसरासि देवरासिसंखेज्जदिभागभूदतिरिक्ख सण्णिरासिमवणिदे अवसेसा तिरिक्खअसण्णिपज्जत्ता होंति। तं चेदं पज्जत्त $\frac{=५८६४ \text{ रिण} \text{ रा.}}{४ । ४ । ६५६१}$ $\frac{=}{४। ६५५३६}$ $\left|\begin{array}{c}\text{-२ मू.} \\ \hline \end{array}\right|$ $\frac{\text{१ । ३ मू.}}{}$ $\frac{=}{४ । ६५५३६ । ५}$

पुणो पुव्वं अवणिदतिरिक्खसण्णिरासीणं तप्पाउग्गसंखेज्जरूवेहिं खंडिदे तत्थ बहुभागा तिरिक्खसण्णिपंचेंदियपज्जत्तरासी होदि, सेसेगभागं सण्णिपंचेंदियअपज्जत्तरासिपमाणं होदि। तं चेदं $_{४}$ । ६५५३६ । ५ । ५ । $_{४}$ । ६५५३६ । ५ । ५ ।

। एवं संखापरूवणा सम्मत्ता ।

सुद्धखरभूजलाणं बारस बाबीस सत्त य सहस्सा । तेउतिए दिवसतियं वरिसं तिसहस्स दस य जेट्ठाऊ ॥२८१॥

१२००० । २२००० । ७००० । दि ३ । व ३००० । व १०००० ।

बासदिणमासबारसमुगुवण्णंछक्क वियलजेट्ठाऊ । णवपुव्वंगपमाणं उक्कस्साऊसरिसवाणं ॥२८२॥

व १२ । दि ४६ । मा ६ । पुव्वंग ६ ।

बाहत्तरि बादालं वाससहस्साणि पक्खिउरगाणं । अवसेसातिरियाणं उक्कस्सं पुव्वकोडीओ ॥२८३॥

७२००० । ४२००० । पुव्वकोडि १ ।

उस्सासस्सट्ठारसभागं एइंदिय जहण्णाऊ । वियलसयलिंदियाणं तत्तो संखेज्जसंगुणिदं ॥२८६॥

एत्तो चोत्तीसपदमप्पाबहुगं वत्तइस्सामो। तं जहा- सव्वत्थोवा तेउकाइयबादरपज्जत्ता $\frac{८}{a}$। पंचेंदियतिरिक्खसण्णिअपज्जत्तो असंखेज्जगुणा । $\frac{}{४}$ । ६५५३६ । ५ । ५ । सण्णिपज्जत्ता संखेज्जगुणा। $\frac{}{४}$ । ६५५३६ । ५ । $\frac{४}{५}$ । चउरिंदियपज्जत्ता संखेज्जगुणा $\frac{= ५८३६}{४। ४। ६५६१ । ५}$

पंचेंदियतिरिक्खा असण्णिपज्जत्ता विसेसाहिया $\frac{= ५८६४ \text{ रिण } \text{रा.}}{४ । ४ । ६५६१ । ५} = \frac{}{४ । ६५५३६} \left| \frac{\text{- २ मू.}}{\text{१ । ३ मू.}} \right| = \frac{}{४ । ६५५३६ । ५}$

बीइंदियपज्जत्ता विसेसाहिया $\frac{= ६१२०ं ।}{४ । ४ । ६५६१ । ५}$ तीइंदियपज्जत्ता विसेसाहिया $\frac{= ८४२४ ।}{४ । ४ । ६५६१ । ५}$ । असण्णिअपज्जत्ता

असंखेज्जगुणा $\frac{५ । ५८६४ ।}{४ । ४ । ६५६१ ।} = ५८३६ । a$ रिण $\frac{=}{४ । ६५५३६ । ५ । ५}$ चउरिंदिय- अपज्जत्ता विसेसाहिया $\frac{५ । ५८३६ ।}{४ । ४ । ६५६१ ।} = ५८६४ । a$ ।

तीइंदियअपज्जत्ता विसेसाहिया $\frac{५ । ८४२४}{४ । ४ । ६५६१ ।} = ६१२० । a$ । बीइंदियअपज्जत्ता विसेसाहिया $\frac{५ । ६१२० ।}{४ । ४ । ६५६१ ।} = ८४२४ । a$ । अपदिट्ठिदपज्जत्ता

असंखेज्जगुणा $\frac{=}{\text{प}} \frac{४ । ९ । ९ । ९ ।}{a}$ पदिट्ठिदपज्जत्ता असंखेज्जगुणा $\frac{=}{\text{प}} \frac{४ । ९ । ९ ।}{a}$ पुढविबादरपज्जत्ता असंखेज्जगुणा $\frac{=}{\text{प}} \frac{४ । ९ ।}{a}$

आउबादरपज्जत्ता असंखेज्जगुणा $\frac{=}{\text{प}} \frac{४ ।}{a}$ वाउबादरपज्जत्ता असंखेज्जगुणा ≡ अपदिट्ठिअपज्जत्ताअसंखेज्जगुणा ≡ a रिण

$\frac{=}{\text{प}} \frac{४ । ९ । ९ । ९ ।}{a}$ पदिट्ठिदअपज्जत्ता असंखेज्जगुणा ≡ a ≡ a रिण $\frac{=}{\text{प}} \frac{४ । ९ । ९ ।}{a}$ तेउबादरअपज्जत्ता असंखेज्जगुणा ≡ $\frac{a}{९}$

रिण $\frac{८ ।}{a}$ पुढविबादर अपजजत्ता विसेसाहिया रिण ≡ $\frac{a}{९}$ $\frac{१०}{९}$ रिण $\frac{=}{\text{प}} \frac{४ । ९ ।}{a}$ आउबादरअपज्जत्ता विसेसाहिया ≡ $\frac{a}{९}$ $\frac{१०}{९}$ $\frac{१०}{९}$

रिण $\overset{=}{\underset{a}{\overset{४।}{प}}}$ वाउबादरअपज्जत्ता विसेसाहिया $\equiv \frac{a\ १०\ १०\ १०}{९\ ९\ ९\ ९}$ रिण $\equiv$ तेउसुहुमअपज्जत्ता असंखेज्जगुणा $\equiv \frac{a\ \ ८}{९\ \ ५}$

पुढविसुहुमअपज्जत्ता विसेसाहिया $\equiv \frac{a\ १०\ ८}{९\ \ ९\ ५}$। आउसुहुमअपज्जत्ता विसेसाहिया $\equiv \frac{a\ १०\ १०\ ८}{९\ ९\ \ ९\ ५}$। वाउसुहुमअपज्जत्ता विसेसाहिया $\equiv \frac{a\ १०\ १०\ १०\ ८}{९\ ९\ \ ९\ \ ९\ ५}$। तेउकायसुहुमपज्जत्ता संखेज्जगुणा $\equiv \frac{८\ \ ४}{९\ \ ५}$। पुढविसुहुमपज्जत्ता विसेसाहिया $\equiv \frac{a\ १०\ ८\ ४}{९\ ९\ \ ९\ ५}$

आउसुहुमपज्जत्ता विसेसाहिया $\equiv \frac{a\ १०\ १०\ ८\ ४}{९\ ९\ \ ९\ ९\ ५}$ । वाउसुहुमपज्जत्ता विसेसाहिया $\equiv a \frac{१०\ १०\ १०\ ८\ ४}{९\ \ ९\ \ ९\ ९\ ५}$ साधारणबादरपज्जत्ता

असंखेज्जगुणा १३ $\equiv \frac{१}{९\ ७}$ साधारणबादरअपज्जत्ता असंखेज्जगुणा १३ $\equiv \frac{६}{९\ ७}$ साधारणसुहुमअपज्जत्ता अणंतगुणा $\frac{१३}{९} \equiv \frac{८}{५}$ साधारण-

सुहुमपज्जत्ता असंखेज्जगुणा $\frac{१३}{९} \equiv \frac{८}{५}$ ४ ।

। एवमप्पाबहुगं सम्मत्तं ।

ओगाहाणं तु अवरं सुहुमणिगोदस्स पुण्णलद्धिस्स । अंगुलअसंखभागं जादस्स य तदियसमयम्मि ।।३१५।।
तत्तो पदेसवड्ढी जाव य दीहं तु जोयणसहस्सं । तस्स दलं विक्खंभं तस्सद्धं बहलमुक्कस्सं ।।३१६।।
जोयणसहस्समधियं बारस कोसूणमेक्कमेक्कं च । दीहसहस्सं पम्मे वियले सम्मुच्छिमे महामच्छे ।।३१७।।

१०००। १२। $\frac{३}{४}$ । १। १०००।

वितिचपपुण्णजहण्णं अणुद्धरीकुंथुकाणमच्छीसु । सित्थयमच्छोगाहं विदंगुलसंखसंखगुणिदकमा ।।३१८।।

एत्थ ओगाहणवियप्पं वत्तइस्सामो। तं जहा- सुहुमणिगोदलद्धिअपज्जत्तयस्स तदिय समयत्तब्भवत्थस्स एगमुस्सेहघणंगुलं ठविय तप्पाउग्गपलिदोवमस्स असंखेज्जदिभागेण भागे हिदे वलद्धं एदिस्से सव्वजहण्णोगाहणापमाणं होदि। तं चेदं। एदस्स उवरि एगपदेसं वड्ढिदे सुहुमणिगोदलद्धिअपज्जत्तयस्स मज्झिमोगाहणवियप्पं होदि। तदो दुपदेसुत्तर-तिपदेसुत्तर-चदुपदेसुत्तरकमेण जाव सुहुमणिगोदलद्धिअपज्जत्तयस्स सव्वजहण्णोगाहणाणुवरि जहण्णोगाहणा रूऊणा वलियाए असंखेज्जदिभागेण गुणिदमेत्तं वड्ढिदा त्ति। ताधे सुहुमवाउकाइयलद्धिअपज्जत्तयस्स सव्वजहण्णोगाहणा दीसइ। एदमवि सुहुमणिगोदलद्धिअपज्जत्तयस्स मज्झिमोगाहियाण वियप्पं होदि। तदा इमा ओगाहणा पदेसुत्तरकमेण वड्ढावेदव्वा। तदणंतरोगाहणा रूवूणावलियाए असंखेज्जदिभागेण गुणिदमेत्तं वड्ढिदो त्ति। ताधे सुहुमतेउकाइयलद्धिअपज्जत्तस्स सव्वजहण्णोगाहणा दीसइ। एदमवि पुव्विल्लदोण्णं जीवाणं मज्झिमोगाहणवियप्पं होदि। पुणो एदस्सुवरिमपदेसुत्तरकमेण इमा ओगाहणा रूऊणावलियाए असंखेज्जदिभागेण गुणिदमेत्तं वड्ढिदो त्ति। ताधे सहुमआउक्काइयलद्धिअपज्जत्तयस्स सव्वजहण्णोगाहणा दीसइ। एदमवि पुव्विल्लतिण्हं जीवाणमज्झिमोगाहणावियप्पं होदि। तदो पदेसुत्तरकमेण चउण्हं जीवाण मज्झिमोगाहणवियप्पं वट्टदि जाव इमा ओगाहणा रूवूणावलियाए असंखेज्जदिभागेण गुणिदमेत्तं वड्ढिदो त्ति। ताधे सुहुमपुढविकाइयलद्धिअपज्जत्तयस्स सव्वजहण्णोगाहणा दीसइ। तदो पहुदि पदेसुत्तरकमेण पंचण्हं जीवाणं मज्झिमोगाहणवियप्पं वट्टदि। इमा ओगाहणा रूऊणपलिदोवमस्स असंखेज्जदिभागेण गुणिदमेत्तं वड्ढिदो त्ति। [ताधे बादरवाउकाइयलद्धिअपज्जत्तयस्स सव्वजहण्णोगाहणा दीसइ। तत्तो उवरि पदेसुत्तरकमेण छण्णं जीवाणं मज्झिममोगाहणवियप्पं वट्टदि जाव इमा ओगाइणा रूऊण पलिदोवमस्स असंखेज्जदिभागेण] गुणिदमेत्तं वड्ढिदो त्ति। ताधे बादरतेउकाइयअपज्जत्तस्स सव्वजहण्णोगाहणा दीसइ। तदो पदेसुत्तरकमेण सत्तण्हं जीवाणं मज्झिमोगाहणावियप्पं वट्टदि जाव इमा ओगाहणामुवरि रूऊणपलिदोवमस्स असंखेज्जदि भागेण गुणिद तदणंतरोगाहणपमाणं वड्ढिदो त्ति। ताधे बादरआउलद्धियपज्जत्तयस्स जहण्णोगाहाणं दीसइ। तदो पदेसुत्तरकमेण अट्ठण्हं जीवाणं मज्झिमोगाहणवियप्पं वट्टदि जाव तदणंतरोवगाहणा रूऊणपलिदोवमस्स असंखेज्जदिभागेण गुणिदमेत्तं तदुवरि वड्ढिदो त्ति। ताधे बादरपुढविलद्धिअपज्जत्तयस्स जहण्णोगाहणं दीसइ। तदो पदेसुत्तरकमेण णवण्हं जीवाण मज्झिमोगाहणवियप्पं वड्ढदि जाव तदणंतरोगाहणा रूऊणपलिदोवमस्स असंखेज्जदिभागेण गुणिदमेत्तं तदुवरि वड्ढिदो त्ति। ताधे बादरणिगोदजीवलद्धियपज्जत्तयस्स

सव्वजहण्णोगाहणा होदि। तदो पदेसुत्तरकमेण दसण्हं जीवाण मज्झिमोगाहणावियप्पं वड्ढदि एदिस्से ओगाहणाए उवरि इमा ओगाहणा रूऊणपलिदोवमस्स असंखेज्जदिभागेण गुणिदमेत्तं वड्ढिदो त्ति। ताधे णिगोदपदिट्ठिदलद्धियपज्जत्तयस्स जहण्णोगाहणा दीसइ। तदो पदेसुत्तरकमेण एक्कारसजीवाण मज्झिमोगाहणवियप्पं वड्ढदि जाव इमा ओगाहणामुवरि रूऊणपलिदोवमस्स असंखेज्जदिभागेण गुणिदतदणंतरोगाहणमेत्तं वड्ढिदो त्ति। ताधे बादरवणप्पदिकाइयपत्तेयसरीरलद्धिअपज्जत्तयस्स जहण्णोगाहणा दीसइ। तदो पदेसुत्तरकमेण बारसण्हं जीवाण मज्झिमोगाहणवियप्पं वड्ढदि तदणंतरोवगाहणा रूऊणपलिदोवमस्स असंखेज्जदिभागेण गुणिदमेत्तं तदुवरि वड्ढिदो त्ति। ताधे बीइंदियलद्धिअपज्जत्तयस्स सव्वजहण्णोगाहणा दीसइ। तदो पहुदि पदेसुत्तरकमेण तेरसण्हं जीवाणं मज्झिमोगाहणवियप्पं वड्ढदि जाव तदणंतरोगाहणवियप्पं रूऊणपलिदोवमस्स असंखेज्जदिभागेण गुणिदमेत्तं तदुवरि वड्ढिदो त्ति। तदो तीइंदियलद्धियपज्जत्तयस्स सव्वजहण्णोगाहणा दीसइ। तदो पदेसुत्तरकमेण चोद्दसण्हं जीवाण मज्झिमोगाहणवियप्पं वड्ढदि तदणंतरोगाहणं रूऊणपलिदोवमस्स असंखेज्जदिभागेण गुणिदमेत्तं तदुवरि वड्ढिदो त्ति। ताधे चउरिंदियलद्धिअपज्जत्तयस्स सव्वजहण्णोगाहणा दीसइ। तदो पदेसुत्तरकमेण पण्णारसण्हं जावाण मज्झिमोगाहणवियप्पं वड्ढदि तदंणतरोगाहणा रूऊणपलिदोवमस्स असंखेज्जदिभागेण गुणिदमेत्तं तदोवरि वड्ढिदो त्ति। ताधे पंचेंदियलद्धिअपज्जत्तयस्स जहण्णोगाहणा दीसइ। तदो पदेसुत्तरकमेण सोलसण्हं [जीवाण] मज्झिमोगाहणवियप्पं वड्ढदि तप्पाउग्गअसंखेज्जपदेसवड्ढिदो त्ति। तदो सुहुमणिगोदणिव्वत्तिअपज्जत्तयस्स सव्वजहण्णा ओगाहणा दीसइ। तदो पदेसुत्तर कमेण सत्तारसण्हं जीवाणं मज्झिमोगाहणवियप्पं होदि जाव तप्पाउग्गअसंखेज्जपदेसं वड्ढिदो त्ति। ताधे सुहुमणिगोदलद्धिअपज्जत्तयस्स उक्कस्सोगाहणा दीसइ। तदुवरि णत्थि सुहुमणिगोदलद्धिअपज्जत्तस्स य ओगाहणवियप्पं, सव्वुक्कस्सोगाहणंपत्तत्तादो।

तदो पदेसुत्तरकमेण छण्हं मज्झिमोगाहणवियप्पं वच्चदि तदंणतरोगाहणं संखेज्जगुणं पत्तो त्ति। ताधे पंचेंदियणिव्वत्ति अपज्जत्तयस्स उक्कस्सोगाहणं दीसइ। तदो पदेसुत्तरकमेण पंचण्हं मज्झिमोगाहणवियप्पं वच्चदि तदणंतरोगाहणं संखेज्जगुणं पत्तो त्ति। [ताधे तीइंदियणिव्वत्तिपज्जत्तयस्स उक्कस्सोगाहणं दीसइ।] तं कस्स होदि त्ति भणिदे तीइंदियस्स णिव्वत्तिपज्जत्तयस्स उक्कस्सोगाहणावट्टमाणस्स सयंपहाचलपरभागट्ठियखेत्ते उप्पण्णगोहीए उक्कस्सोगाहणं कस्सइ जीवस्स दीसइ। तं केत्तिया इदि उत्ते उस्सेहजोयणस्स तिण्णिचउब्भागो आयामो तदट्ठभागो विक्खंभो विक्खंभद्धबहलं। एदे तिण्णि विपरोप्परं गुणिय पमाणघणंगुले कदे एक्ककोडि-उणबीसलक्ख-तेदालसहस्स-णवसयछत्तीसरूवेहि गुणिदघणंगुला होंति। ६ । ११९४३९३६ ।

तदो पदेसुत्तरकमेण चदुण्हं मज्झिमोगाहणवियप्पं वच्चदि तदणंतरोगाहणं संखेज्जगुणं पत्तो त्ति। ताधे चउरिंदियणिव्वत्ति-पज्जत्तयस्स उक्कस्सोगाहणं दीसइ। तं कस्स होदि त्ति भणिदे सयंपहाचलपरभागट्ठियखेत्ते उप्पण्णभमरस्स उक्कस्सोगाहणं कस्सइ दीसइ। तं केत्तिया इदि उत्ते उस्सेहजोयणायामं अद्धजोयणुस्सेहं जोयणद्धपरिहिविक्खंभं ठविय विक्खंभद्धमुस्सेहगुणमायामेणगुणिदे उस्सेहजोयणस्स तिण्णिअट्ठभागा भवंति। तं चेदं। ३ ते पमाणघणंगुला कीरमाणे एक्कसयपंचत्तीसकोडीए उणणउदिलक्ख चउवण्णसहस्स-चउसय-छण्णउदिरूवेहिं गुणिदघणंगुलाणिं हवंति। तं चेदं। ६। १३५८६५४४६६।

तदो पदेसुत्तरकमेण तिण्हं मज्झिमोगाहणवियप्पं वच्चदि तदणंतरोगाहणं संखेज्जगुणं पत्तो त्ति। ताधे बीइंदियणिव्वत्तिपज्जत्तयस्स उक्कस्सोगाहणं होइ। तं कम्हि होइ त्ति भणिदे सयंपहाचलपरभागट्ठियखेत्ते उप्पण्णबीइंदियस्स उकस्सोगाहणा कस्सइ दीसइ। तं केत्तिया इदि उत्ते बारसजोयणायाम चउजोयणमुहस्स खेत्तफलं-

व्यासं तावत्कृत्वा वदनदलोनं मुखार्धवर्गयुतम् । द्विगुणं चतुर्विभक्तं सनाभिकेस्मिन् गणितमाहुः ।।३१९।।

एदेण सुत्तेण खेत्तफलमाणिदे तेहत्तरिउस्सेहजोयणाणि भवंति । ७३ ।

आयामे मुहसोहिय पुणरवि आयामसहिदमुहभजियं । बाहल्लं णायव्वं संखायारट्ठिए खेत्ते ।।३२०।।

एदेण सुत्तण बाहल्ले आणिदे पंचजोयणपमाणं होदि । ५ । पुव्वमाणीदत्तेहत्तरिभूदखेत्तफलं पंच जोयणबाहल्लेण गुणिदे घणजोयणाणि तिण्णिसयपण्णट्ठी होंति । ३६५ । एदं घणपमाणंगुलाणि कदे एक्कलक्ख बत्तीससहस्स-दोण्णिसय-एक्कहत्तररीकोडीओ सत्तावण्णलक्ख-णवसहस्स-चउसय-चालीसरूवेहिं गुणिदघणंगुलमेत्तं होदि। तं चेदं । ६ । १३२२७१५७०६४४० ।

तदो पदेसुत्तरकमेण दोण्हं मज्झिमोगाहणवियप्पं वच्चदि तदणंतरोगाहणं संखेज्जगुणं पत्तो त्ति। ताधे बादरवणप्फदिकाइयपत्तेयसरीरणिव्वत्तिपज्जत्तयस्स उक्कस्सोगाहणं दीसइ। कम्हि खेत्ते कस्स वि जीवस्स कम्मि ओगाहणे वड्ढमाणस्स होदि त्ति भणिदे सयंपहाचलपरभागट्ठियखेत्तउप्पण्ण-[पउमस्स] उक्कस्सोगाहणा कस्सइ दीसइ। तं केत्तिया इदि उत्ते उस्सेहजोयणेण कोसाहियएक्कसहस्सं उस्सेहं एक्कजोयणबहलं समवट्टं। तं पमाणं जोयणफल ७५० को १ । घणंगुले कदे दोण्णिलक्ख एक्कहत्तरिसहस्सअट्ठसयअट्ठावण्णकोडि-चउरासीदिलक्ख-ऊणहत्तरिसहस्स-दुसय-अट्ठतालरूवेहि गुणिदपमाणंगुलाणि होदि। तं चेदं-

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तदो पदेसुत्तरकमेण पंचेंदियणिव्वत्तिपज्जत्तयस्स मज्झिमोगाहणवियप्पं वच्चदि तदणंतरोगाहणं संखेज्जगुणं पत्तो त्ति। [ताधे पंचेंदियणिव्वत्तिपज्जत्तयस्स उक्कस्सोगाहणं दीसइ।] तं कम्मि खेत्ते कस्स जीवस्स होदि त्ति उत्ते सयंपहाचलपरभागट्ठिए खेत्ते उप्पण्णसंमुच्छिममहामच्छस्स सव्वोक्कस्सोगाहणं कस्सइ दीसइ। तं केत्तिया इदि उत्ते उस्सेहजोयणेण एक्कसहस्सायामं पंचसदविक्खंभं तदद्धउस्सेहं। तं पमाणंगुले कीरमाणे चउसहस्स-पंचसय-एऊणतीसकोडीओ चुलसीदिलक्ख-तेसीदिसहस्स-दुसयकोडिरूवेहि गुणिदपमाणघणंगुलाणि भवंति । तं चेदं । ६ । ४५२६८४८३२०००००००० ।

।। पंचमो महाधिसयारो सम्मत्तो ।।

✦✦✦✦✦

छट्ठो महाधियारो

रज्जुकदी गुणिदव्वा णवणउदिसहस्सअधियलक्खेणं । तम्मज्झे तिवियप्पावेंत्तरदेवाण होंति पुरा ।।५।।

= ४६ | १६६००० |

उक्कस्साऊपल्लं होदि असंखो य मज्झिमो आऊ । दस बाससहस्साणिं भोमसुराणं जहण्णाऊ ।।८३।।

प १ । a । १००० ।

दस वाससहस्साणिं आऊ णीचोपवाददेवाणं । तत्तो जाव यसीदिं तेत्तियमेत्ताए वड्ढीए ।।८५।।

अह चुलसीदी पल्लट्ठमंसपादं कमेण पल्लद्धं । दिव्वासिप्पहुदीणं भणिदं आउस्स परिमाणं ।।८६।।

१०००० । २०००० । ३०००० । ४०००० । ५०००० । ६०००० । ७०००० । ८०००० । ८४०००० | १/८ | १/४ | १/२ |

। आउपमाणा समत्ता ।

चउलक्खाधियतेवीसकोडिअंगुलयसूइवग्गेहिं । भजिदाए सेढीए वग्गे भोमाण परिमाणं ।।९६।।

= ४ । ५३०८४१६०००००००००० ।

। संखा सम्मत्ता ।

जोयणसदत्तियकदी भजिदे पदरस्स संखभागम्मि । जं लद्धं तं माणं वेंतरलोए जिणपुराणं ।।१०२।।

= ४ | ५३०८४१६०००००००००० |

।। छट्ठमो महाधियारो सम्मत्तो ।।

✦✦✦✦✦

सत्तमो महाधियारो

रज्जुकदी गुणिदव्वं एक्कसयदसुत्तरेहिं जोयणए । तस्सिं अगम्मदेसं सोधिय सेसम्मि जोदिसिया ।।५।।

= ४६ । ११० ।

तं पि य अगम्मखेत्तं समवट्टं जंबुदीवबहुमज्झे । पणएक्कखपणदुगणवदोतिखतियएक्कजोयणंकमे ।।६।।

। १३०३२६२५०१५ ।

। णिवासखेत्तं सम्मत्तं ।

चंदा दिवायरा गहणक्खत्ताणिं पइण्णताराओ । पंचविहा जोदिगणालोयंतघणोवहिं पुट्ठा ।।७।।
णवरि विसेसो पुव्वावरदक्खिणउत्तरेसु भागेसुं । अंतरमत्थि त्ति ण ते छिवंति जोइग्ग सो वाऊ ।।८।।
पुव्वावरविच्चालं एक्कसहस्सं विहत्तरी अधिया । जोयणया पत्तेक्कं रूवस्सासंखभागपरिहीणं ।।९।।

१०७२ । रिण $\frac{१}{a}$ |

तद्दक्खिणुत्तरेसुं रूवस्सासंखभागअधियाओ । बारसजोयणहीणा पत्तेक्कं तिण्णि रजजूओ ।।१०।।

$-\frac{३}{७}$ रिण जो १२ । $\frac{१}{a}$ |

। भेदो सम्मत्तो ।

भजिदम्मि सेढिवग्गे बेसयछप्पण्णअंगुलकदीए । जं लद्धं सो रासी जोदिसियसुराण सव्वाणं ।।११।।

$_{४}$ । ६५५३६ ।

अट्ठचउदुतितिसत्ता सत्त य ठाणेसु णवसु सुण्णाणिं । छत्तीससत्तदुणवअट्ठातिचउक्का होंति अंककमा ।।१२।।
एदेहि गुणिदसंखेज्जरूवपदरंगुलेहिं भजिदाए । सेढिकदीए लद्धं माणं चंदाण जोइसिंदाणं ।।१३।।

$_{४}$ । ७ । ४३८३८६२७३६०००००००००७७३३२४८ ।

तेत्तियमेत्ता रविणो हुवंति चंदाण ते पडिंद त्ति । अट्ठासीदिगहाणिं एक्केक्काणं मयंकाणं ।।१४।।

$_{४}$ । ७ । ४३८३८६२७३६०००००००००७७३३२४८ ।

छप्पण्ण छक्क छक्कं छण्णव सुण्णाणि होंति दसठाणा । दोणवपंचयछक्कं अट्ठचउपंचअंककमे ।।२३।।
एदेण गुणिदसंखेज्जरूवपदरंगुलेहि भजिदूणं । सेढिकदी एक्कारसहदम्मि सव्वग्गहाण परिसंखा ।।२४।।

$_{४}^{=११}$ । ७ । ५४८६५६२०००००००००६६६६५६।

एक्केक्कससंकाणं अट्ठावीसा हुवंति णक्खत्ता । एदाणं णामाइं कमजुत्तीए परूवेमो ।।२५।।
दुगइगितियतितिणवया एक्का ठाणेसु णवसु सुण्णाणिं । चउअट्ठएक्कतियसत्तणवयगयणेक्कअंककमे ।।२६।।
एदेहि गुणिदसंखेज्जरूवपदरंगुलेहिं भजिदूणं । सेढिकदी सत्तहदे परिसंखा सव्वरिक्खाणं ।।३०।।

$_{४}^{=७}$ । ७ । १०६७३१८४०००००००००१६३३३१२।

एक्केक्कमयंकाणं हुवंति ताराण कोडिकोडीओ । छावट्ठिसहस्साणं णवसया पंचहत्तरिजुदाणिं ।।३१।।

तारागणसंखा ६६६७५०००००००००० ।

दुगसत्तचउक्काइं एक्कारसठाणएसु सुण्णाइं । णवसत्तछद्दुगाइं अंकाण कमेण एदेणं ।।३३।।
संगुणिदेहिं संखेज्जरूवपदरंगुलेहिं भजिदव्वो । सेढीवग्गो तत्तो पणसत्तत्तियचउक्कट्ठा ।।३४।।
णवअट्ठपंचणवदुगअट्ठासत्तट्ठणवचउक्काणिं । अंककमे गुणिदव्वो परिसंखा सव्वताराणं ।।३५।।

=४६८७८२६५८६८४३७५
४ । ७ । २६७६०००००००००४७२ ।

। संखा सम्मत्ता ।

गंतूणं सीदिजुदं अट्ठसया जोयणाणि चित्ताए । उवरिम्मि मंडलाइं चंदाणं होंति गयणम्मि ।।३६।।

| ८८० |

उत्ताणावट्टिदगोलगद्धसरिसाणि ससिमणिमयाणिं । ताणं पुह पुह बारससहस्ससिसिरयरमंदकिरणाणिं ।।३७।।

एक्कट्ठियभागकदे जोयणए ताण होदि छप्पण्णा । उवरिमतलाण रुंदं दलिदद्धबहलं पि पत्तेक्कं ।।३८।।

| ५६/६१ | २८/६१ |

एदाणं परिहीओ पुह पुह बे जोयणाणि अदिरेको । ताणिं अकिट्टिमाणिं अणाइणिहणाणि बिंबाणिं ।।४०।।

चित्तोवरिमतलादो उवरिं गंतूण जोयणट्ठसए । दिणयरणयरतलाइं णिच्चं चेट्ठंति गयणम्मि ।।६५।।

| ८०० |

उत्ताणावट्टिदगोलयद्धसरिसाणि रविमणिमयाणिं । ताणं पुहु पुह बारससहस्सउण्हयरकिरणाणिं ।।६६।।

| १२००० |

इगिसट्ठियभागकदे जोयणए ताण होंति अडदालं । उवरिमतलाण रुंदं तलद्धबहलं पि पत्तेक्कं ।।६८।।

| ४८/६१ | २४/६१ |

एदाणं परिहीओ पुह पुह बे जोयणाणि अदिरेगा । ताणिं अकट्टिमाणिं अणाइणिहणाणि बिंबाणिं ।।६९।।

चित्तोवरिमतलादो गंतूणं जोयणाणि अट्ठसए । अडसीदिजुदे गहगणपुरीओ दोगुणिदछक्कबहलम्मि ।।८२।।

८८८ | १२ |

चित्तोवरिमतलादो पुव्वोदिदजोयणाणि गंतूणं । तासुं बुहणयरीओ णिच्चं चेट्ठंति गयणम्मि ।।८३।।

उवरिमतलाण रुंदं कोसस्सद्धं तदद्धबहलत्तं । परिही दिवड्ढकोसो सविसेसा ताण पत्तेक्कं ।।८५।।

चित्तोवरिमतलादो णवऊणियणवसयाणि जोयणए । गंतूण णहे उवरिं सुक्काण पुराणि चेट्ठंति ।।८६।।

| ८९१ |

ताणं णयरतलाणं पंणसयदुसहस्समेत्तकिरणाणिं । उत्ताणगोलयद्धोवमाणि वररुप्पमइयाणिं ।।६०।।

| २५०० |

उवरिमतलविक्खंभो कोसपमाणं तदद्धबहलत्तं । ताणं अकिट्टिमाणं खचिदाणं विविहरयणेहिं ।।६१।।

को १ | को १/२ |

पुह पुह ताणं परिही तिकोसमेत्ता हुवेदि सविसेसा । सेसाओ वण्णणाओ बुहणयराणं सरिच्छाओ ।।६२।।

चित्तोवरिमतलादो छक्कोणियणवसएण जोयणए । गंतूण णहे उवरिं चेट्ठंति गुरूण णयराणिं ।।६३।।

| ८९४ |

उवरिमतलविक्खंभा ताणं कोसस्स परिमभागा य । सेसा हि वण्णणाओ सुक्कपुराणं सरिच्छाओ ।।६५।।

चित्तोवरिमतलादो तियऊणियणवसयाणि जोयणए । गंतूण उवरि गयणे मंगलणयराणि चेट्ठंति ।।६६।।

| ८९७ |

ताणिं णयरतलाणिं रुहिरारुणपउमरायमइयाणिं । उत्ताणगोलगद्धोवमाणि सव्वाणि मंदकिरणाणिं ।।६७।।

उवरिमतलविक्खंभो कोसस्सद्धं तदद्धबहलत्तं । सेसाओ वण्णणाओ ताणं पुव्वुत्तसरिसाओ ।।६८।।

चित्तोवरिमतलादो गंतूणं णवसयाणि जोयणए । उवरि सुवण्णमयाइं सणिणयराणिं णहे होंति ।। ९९

| ९०० |

उवरिमतलविक्खंभा कोसद्धं होंति ताण पत्तेक्कं । सेसाओ वण्णणाओ पुव्वपुराणं सरिच्छाओ ।।१००।।

अवसेसाण गहाणं णयरीओ उवरि चित्तभूमीओ । गंतूण बुहसणीणं विच्चाले होंति णिच्चाओ ।।१०१।।

ताणिं णयरतलाणिं जहजोग्गुद्दिट्ठवासबहलाणिं । उत्ताणगोलगद्धोवमाणि बहुरयणमइयाणिं ।।१०२।।

सेसाओ वण्णणाओ पुव्विल्लपुराण होंति सरिसाओ । किं पारेमि भणेदुं जीहाए एक्कमेत्ताए ।।१०३।।

अट्ठसयजोयणाणिं चउसीदिजुदाणि उवरि चित्तादो । गंतूण गयणमग्गे हुवंति णक्खत्तणयराणिं ।।१०४।।

८८४ |

उवरिमतलवित्थारो ताणं कोसो तदद्धबहलाणिं । सेसाओ वण्णणाओ दिणयरणयराण सरिसाओ ।।१०६।।

णउदिजुदसत्तजोयणसदाणि गंतूण उवरि चित्तादो । गयणयले ताराणं पुराणि बहले दहुत्तरसदम्मि ।।१०८।।

ताणं पुराणि णाणावररयणमयाणि मंदकिरणाणिं । उत्ताणगोलगद्धोवमाणि पासाद दोसहसदंडा (?) ।।१०६।।

२००० | (?)

वरअवरमज्झिमाणिं तिवियप्पाणिं हुवंति एदाणिं । उवरिमतलविक्खंभा जेट्ठाणं दोसहस्सदंडाणिं ।।११०।।

२००० |

पंचसयाणि धणूणिं तव्विक्खंभो हुवेदि अवराणं । तिदुगुणिदावरमाणं मज्झिमयाणं दुठाणेसुं ।।१११।।

५०० | १००० | १५०० |

तेरिच्छमंतरालं जहण्णताराण कोससत्तंसो । जोयणया पंचासा मज्झिमए सहस्समुक्कस्से ।।११२।।

को $\frac{१}{७}$ जो ५० | १००० |

चरबिंबा मणुवाणं खेत्ते तस्सिं च जंबुदीवम्मि । दोण्णि मियंका ताणं एक्कं चिय होदि चारमही ।।११६।।

पंचसयजोयणाणिं दसुत्तराइं हुवेदि विक्खंभो । ससहरचारमहीए दिणयरबिंबादिरित्ताणिं ।।११७।।

५१० | $\frac{४८}{६१}$ |

बीसूणबेसयाणिं जंबूदीवे चरंति सीदकरा । रविमंडलाधियाणिं तीसुत्तरतियसयाणि लवणम्मि ।।११८।।

पण्णरससससहराणं वीथीओ होंति चारखेत्तम्मि । मंडलसमरुंदाओ तदद्धबहलाओ पत्तेक्कं ।।११९।।

| $\frac{५६}{६१}$ | $\frac{२८}{६१}$ |

सट्ठिजुदं तिसयाणिं मंदररुंदं च जंबुविक्खंभे । सोधिय दलिते लद्धं चंदादिमहीहिं मंदरंतरयं ।।१२०।।

चउदालसहस्साणिं वीसुत्तरअडसयाणि मंदरदो । गच्छिय सव्वब्भंतरवीही इंदूण परिमाणं ।।१२१।।

४४८२० |

एक्कसट्ठीए गुणिदा पंचसया जोयणाणि दसजुत्ता । ते अडदालविमिस्सा धुवरासी णाम चारमही ।।१२२।।

एक्कत्तीससहस्सा अट्ठावण्णुत्तरं सदं तह य । इगिसट्ठीए भजिदे धुवरासिपमाणमुद्दिट्ठं ।।१२३।।

३११५८ |
$\frac{}{६१}$

पण्णरसेहिं गुणिदं हिमकरबिंबप्पमाणमवणिज्जं । धुवरासीदो सेसं विच्चालं सयलवीहीणं ।।१२४।।

$$\frac{३०३१८}{६१}$$

तं चोद्दसपविहत्तं हुवेदि एक्केक्कवीहिविच्चालं । पणुत्तीसजोयणाणिं अदिरेकं तस्स परिमाणं ।।१२५।।

अदिरेकस्स पमाणं चोद्दसमदिरित्तबिण्णिसदमंसा । सत्ताबीसब्भहिया चत्तारि सया हवे हारो ।।१२६।।

$$३५ \mid \frac{२१४}{४२७}$$

पढमपहादो चंदा बाहिरमग्गस्स गमणकालम्मि । वीहिं पडि मेलिज्जं विच्चालं बिंबसंजुत्तं ।।१२७।।

$$३६ \mid \frac{१७९}{४२७}$$

चउदालसहस्सा अडसयाणि छप्पण्णजोयणा अधिया । उणसीदिजुदसदंसा बिदियद्धगदेंदुमेरुविच्चालं ।।१२८।।

$$४४८५६ \mid \frac{१७९}{४२७}$$

चउदालसहस्सा अडसयाणि बाणउदि जोयणा भागा । अडवण्णुत्तरतिसया तदियद्धगदेंदुमंदरपमाणं ।।१२९।।

$$४४८९२ \mid \frac{३५८}{४२७}$$

चउदालसहस्सा णवसयाणि उणतीस जोयणा भागा । दसजुत्तसदं विच्चं चउत्थपहगदहिमंसुमेरूणं ।।१३०।

$$४४९२९ \mid \frac{११०}{४२७}$$

चउदालसहस्सा णवसयाणि पण्णट्ठि जोयणा भागा । दोण्णि सया उणणउदी पंचमपहइंदुमंदरपमाणं ।।१३१।।

$$४४९६५ \mid \frac{२८९}{४२७}$$

पणदालसहस्सा बेजोयणजुत्ता कलाओ इगिदालं । छट्ठपहट्ठिदहिमकरचामीयरसेलविच्चालं ।।१३२।।

$$४५००२ \mid \frac{४१}{४२७}$$

पणदालसहस्सा जोयणाणि अडतीस दुसयवीसंसा । सत्तमवीहिगदं सीदमयूखमेरूण विच्चालं ।।१३३।।

$$४५०३८ \mid \frac{२२०}{४२७}$$

पणदालसहस्सा चउहत्तरिअधिया कलाओ तिण्णिसया । णवणवदी विच्चालं अट्ठमवीहीगदिंदुमेरूणं ।।१३४।।

$$४५०७४ \mid \frac{३९९}{४२७}$$

पणदालसहस्सा सयमेक्कारसजोयणणि कलाण सयं । इगिवण्णा विच्चालं णवमपहे चंदमेरूणं ।।१३५।।

$$४५१११ \mid \frac{१५१}{४२७}$$

पणदालसहस्सा सय सत्ततालं कलाण तिण्णि सया । तीसजुदा दसमपहे विच्चं हिमकिरणमेरूणं ।।१३६।।

$$४५१४७ \mid \frac{३३०}{४२७}$$

पणदालसहस्साणिं चुलसीदी जोयणाणि एक्कसयं । बासीदिककला विच्चं, एक्करस पहम्मि एदाणं ।।१३७।।

४५१८४ | ८२/४२७ |

पणदालसहस्साणिं वीसुत्तरदोसयाणि जोयणया । इगिसट्ठिदुसयभागा बारसमपहम्मि तं विच्चं ।।१३८।।

४५२२० | २६१/४२७ |

पणदाल सहस्साणिं दोण्णि सया जोयणाणिं सगवण्णा । तेरसकलाओ तेरसपहम्मि एदाण विच्चालं ।।१३९।।

४५२५७ | १३/४२७ |

पणदालसहस्सा बे सयाणि तेणउदि जोयणा अधिया । अट्ठोणदुसयभागा चोद्दसमपहम्मि तं विच्चं ।।१४०।।

४५२९३ | १९२/४२७ |

पणदालसहस्साणिं तिण्णि सया जोयणाणि उणतीसं । इगिहत्तरितिसयकला पण्णरसपहम्मि तं विच्चं ।।१४१।।

४५३२९ | ३७१/४२७ |

बाहिरपहादु ससिणो आदिमवीहीए आगमणकाले । पुव्वपमेलिदखेदं फेलसु जा चोद्दसादिपढमपहं ।।१४२।।

सट्ठिजुदं तिसयाणिं सोहेज्जसु जंबुदीववासम्मि । जं सेसं आबाहं अब्भंतरमंडलिंदूणं ।।१४३।।

णवणउदिसहस्साणिं छस्सयचालीसजोयणाणिं पि । चंदाणं विच्चालं अब्भंतरमंडलठिदाणं ।।१४४।।

९९६४० |

गिरिससहरपहवड्ढी दोहिं गुणिदाए होदि जं लद्धं । सा याबाधावड्ढी पडिमग्गं चंदचंदाणं ।।१४५।।

७२ | ३५८/४२७ |

बारसजुदसत्तसया णवणउदि सहस्स जोयणाणिं पि । अडवण्णा तिसयकला बिदियपहे चंदचंदस्स ।।१४६।।

९९७१२ | ३५८/४२७ |

णवणउदिसहस्साणिं सत्तसया जोयणाणि पणसीदी । उणणउदीदुसयकला तदिए विच्चं सिदंसूणं ।।१४७।।

९९७८५ | २८९/४२७ |

णवणवदिसहस्साणिं अट्ठसया जोयणाणि अडवण्णा । बीसुत्तरदुसयकला ससीण विच्चं तुरिममग्गे ।।१४८।।

९९८५८ | २२०/४२७ |

णवणउदिसहस्सा णवसयाणि इगितीस जोयणाणं पि । इगिसदइगिवण्णकला विच्चालं पंचमपहम्मि ।।१४९।।

९९९३१ | १५१/४२७ |

एक्कं जोयणलक्खं चउअब्भहियं हुवेदि सविसेसं । बासीदिकला छट्ठे पहम्मि चंदाण विच्चालं ।।१५०।।

$$१००००४ \mid \frac{८२}{४२७} \mid$$

सत्तत्तरिसंजुत्तं जोयणलक्खं च तेरस कलाओ । सत्तममग्गे दोण्हं तुसारकिरणाण विच्चालं ।।१५१।।

$$१०००७७ \mid \frac{१३}{४२७} \mid$$

उणवण्णजुदेक्कसयं जोयणलक्खं कलाओ तिण्णिसया । एक्कत्तरी ससीणं अट्ठममग्गम्मि विच्चालं ।।१५२।।

$$१००१४९ \mid \frac{३७१}{४२७} \mid$$

एक्कं जोयणलक्खं बावीसजुदा बियसयाणिं । दोउत्तरतिसयकला णवमपहे ताण विच्चालं ।।१५३।।

$$१००६५९ \mid \frac{३१५}{४२७} \mid$$

एक्कं जोयणलक्खं पणणउदिजुदाणि दोण्णि य सयाणिं । बेसयतेत्तीसकला विच्चं दससम्मि इंदूणं ।।१५४।।

$$१००२९५ \mid \frac{२३३}{४२७} \mid$$

एक्कं जोयणलक्खं अट्ठासट्ठीजुदा य तिण्णि सया । चउसट्ठिसदकलाओ एक्करसपहम्मि तं विच्चं ।।१५५।।

$$१००३६८ \mid \frac{१६४}{४२७} \mid$$

एक्कं लक्खं चउसय इगिदाला जोयणाणि अदिरेगे । पणणउदिकला मग्गे बारसमे अंतरं ताणं ।।१५६।।

$$१००४४१ \mid \frac{९५}{४२७} \mid$$

चउदसजुदपंचसया जोयणलक्खं कलाओ छब्बीसं । तेरसपहम्मि दोण्हं विच्चालं सिसिरकिरणाणं ।।१५७।।

$$१००५१४ \mid \frac{२६}{४२७} \mid$$

लक्खं पंचसयाणिं छासीदी जोयणा कला तिसया । चउसीदी चोद्दसमे पहम्मि विच्चं सिदकराणं ।।१५८।।

$$१००५८६ \mid \frac{३८४}{४२७} \mid$$

लक्खं छच्च सयाणिं उणसट्ठी जोयणा कला तिसया । पण्णरसजुदा मग्गे पण्णरसं अंतरं ताणं ।।१५९।।

$$१००६५९ \mid \frac{३१५}{४२७} \mid$$

बाहिरपहादु ससिणो आदिममग्गम्मि आगमणकाले । पुव्वपमेलिदखेत्तं सोहसु जा चोद्दसादिपढमपहं ।।१६०।।
तियजोयणलक्खाणिं पण्णरससहस्सयाणिं उणणउदी । अब्भंतरवीधीए परिरयरासिस्स परिसंखा ।।१६१।।

। ३१५०८९ ।

सेसाणं वीहीणं परिहीपरिमाणजाणणणिमित्तं । परिहिक्खेवं भणिमो गुरूवदेसाणुसारेणं ।।१६२।।
चंदपहसूइवड्ढीदुगुणं कादूण वग्गिदूणं च । दसगुणिदे जं मूलं परिहिक्खेओ स णादव्वो ।।१६३।।

$$७२ \mid \frac{३५८}{४२७} \mid$$

तीसुत्तरेबसयजोयणाणि तेदालजुत्तसयमंसा । हारो चत्तारि सया सत्तावीसेहिं अब्भहिया ।।१६४।।

२३० | $\frac{१४३}{४२७}$ |

तियजोयणलक्खाणिं पण्णरससहस्सतिसयउणवीसा । तेदालजुदसदंसा बिदियपहे परिहिपरिमाणं ।।१६५।।

३१५३१९ | $\frac{१४३}{४२७}$ |

उणवण्णा पंचसया पण्णरससहस्स जोयण तिलक्खा । छासीदी दुसदकला सा परिही तदियवीहीए ।।१६६।।

२१५५४६ | $\frac{२८६}{४२७}$ |

सीदी सत्तसयाणिं पण्णरससहस्स जोयण तिलक्खा । दोण्णि कलाओ परिही चंदस्स चउत्थवीहीए ।।१६७।।

३१५७८० | $\frac{२}{४२७}$ |

तियजोयणलक्खाणिं दहुत्तरा तह य सोलससहस्सा । पणदालजुदसदंसा सा परिही पंचमपहम्मि ।।१६८।।

३१६०१० | $\frac{१४५}{४२७}$ |

चालीस दुसय सोलससहस्स तियलक्ख जोयणा अंसा । अट्ठासीदी दुसया छट्ठपहे होदि सा परिही ।।१६९।।

३१६२४६ | $\frac{२८८}{४२७}$ |

सोलससहस्स चउसय एक्कत्तरिअधियजोयण तिलक्खा । चत्तारि कला सत्तमपहम्मि परिही ससंकस्स ।।१७०।।

३१६४७१ | $\frac{४}{४२७}$ |

सत्तसया इक्कहिया लक्खा तिण्णेव सोलससहस्सा । इक्कसयं सगतंाला भागा अट्ठमपहे परिही ।।१७१।।

३१६७०१ | $\frac{१४७}{४२७}$ |

सोलससहस्सणवसयइक्कत्तीसादिरित्ततियलक्खा । णउदीजुददुसयकला ससिस्स परिही णवममग्गे ।।१७२।।

३१६९३१ | $\frac{२९०}{४२७}$ |

बासट्ठिजुत्तइगिसयसत्तरससहस्स जोयण तिलक्खा । छ च्चिय कलाओ परिही हिमंसुणो दसमवीहीए ।।१७३।।

३१७१६२ | $\frac{६}{४२७}$ |

तियजोयणलक्खाणिं सत्तरससहस्सतिसयबाणउदी । उणवण्णजुदसदंसा परिही एक्कारसपहम्मि ।।१७४।।

३१७३९२ | $\frac{१४९}{४२७}$ |

बावीसुत्तरछस्सय सत्तरससहस्सजोयण तिलक्खा । अट्ठोणियतिसयकला बारसमपहम्मि सा परिही ।।१७५।।

३१७६२२ | $\frac{२९२}{४२७}$ |

तेवण्णुत्तरअडसयसत्तरससहस्सजोयण तिलक्खा । अट्ठकलाओ परिही तेरसमपहम्मि सीदरुचिकिरणो ।।१७६।।

३१७८५३ | ८/४२७ |

तियजोयणलक्खाणिं अट्ठारससहस्सयाणि तेसीदी । इगिवण्णजुदसदंसा चोद्दसमपहे इमा परिही ।।१७७।।

३१८०८३ | १५१/४२७ |

तियजोयणलक्खाइं अट्ठरससहस्सतिसयतेरसया । बेसयचउणउदिकला बाहिरमग्गम्मि सा परिही ।।१७८।।

३१८१३१ | २६४/४२७ |

चंदसुरा सिद्धगदी णिग्गच्छंता हुवंति पविसंता । मंदगदी यसमाणा परिहीओ भमंति सरिसकालेणं ।।१७६।।

एक्कं जोयणलक्खं णव य सहस्साणि अडसयाणिं पि । परिहीणं पत्तेक्कं तें कादव्वा गयणखंडा ।।१८०।।

| १०६८०० |

गच्छदि मुहुत्तमेक्के अडसट्ठि जुत्तसत्तरससयाणिं । णभखंडाणिं ससिणो तम्मि हिदे सव्व गयण खंडाणि ।।१८१।।

| १७६८ |

बासट्ठिमुहुत्ताणिं भागा तेवीस सत्तहाराइं । इगिवीसाधिय बिसदं लद्धं तं गयणखंडादो ।।१८२।।

६२ | २३/२२१ |

अब्भंतरवीहीदो बाहिरपेरंत दोण्णि ससि बिंबा । कमसो परिब्भमंते बासट्ठिमुहुत्तएहिं अधिएहिं ।।१८३।।

| ६२ |

अदिरेयस्स पमाणं अंसा तेवीसया मुहुत्तस्स । हारो दोण्णि सयाणिं जुत्ताणिं एक्कवीसेणं ।।१८४।।

| २३/२२१ |

सम्मेलिय बासट्ठिं इच्छिय परिहीए भागमवहरिदं । तस्सिं तस्सिं ससिणो एक्कमुहुत्तम्मि गदिमाणं ।।१८५।।

| १३७२५/२२१ | ३१५०८६ | १ |

पंचसहस्सं अधिया तेहत्तरिजोयणाणि तियकोसा । लद्धं मुहुत्तगमणं पढमपहे सीदकिरणस्स ।।१८६।।

| ५०७३ | को ३ |

सत्ततरि सविसेसा पंचसहस्साणि कोसअधियाणिं । लद्धं मुहुत्तगमणं चंदस्स दुइज्जवीहीए।। १८७।।

| ५०७७ | को १ |

जोयणपंचसहस्सा सीदीजुत्ता य तिण्णि कोसाणिं । लद्धं मुहुत्तगमणं चंदस्स तइज्जबीहीए ।।१८८।।

| ५०८० | को ३ |

पंचसहस्सा जोयण चुलसीदी तह दुवे कोसा । लद्धं मुहुत्तगमणं चंदस्स चउत्थ मग्गम्मि ।।१८६।।

| ५०८४ | को २ |

अट्ठासीदी अधिया पंच सहस्सा य जोयणा कोसो । लद्धं मुहुत्तगमणं पंचममग्गे मियंकस्स ।।१६०।।

| ५०८८ को १ |

बाणउदिउत्तराणिं पंचसहस्साणि जोयणाणिं च । लद्धं मुहुत्तगमणं हिमंसुणो छट्ठमग्गम्मि ।।१६१।।

| ५०६२ |

पंचेव सहस्साइं पणणउदी जोयणा तिकोसा य । लद्धं मुहुत्तगमणं सीदंसुणो सत्तमपहम्मि ।।१६२।।

५०६५ | को ३ |

पणसंखसहस्साणिं णवणउदी जोयणा दुवे कोसा । लद्धं मुहुत्तगमणं अट्ठममग्गे हिमरसिस्स ।।१६३।।

५०६६ | को २ |

पंचेव सहस्साणिं तिउत्तरं जोयणाणि एक्कसयं । लद्धं मुहुत्तगमणं णवमपहे तुहिणरासिस्स ।।१६४।।

| ५१०३ |

पंचसहस्सा छाधियमेक्कसयं जोयणा तिकोसा य । लद्धं मुहुत्तगमणं दसमपहे हिममयूखाणं ।।१६५।।

| ५१०६ | को ३ |

पंचसहस्सा दसजुदएक्कसया जोयणा दुवे कोसा । लद्धं मुहुत्तगमणं एक्करसपहे ससंकस्स ।।१६६।।

| ५११० | को २ |

जोयणपंचसहस्सा एक्कसयं चोद्दसुत्तरं कोसो । लद्धं मुहुत्तगमणं बारसमपहे सिदंसुस्स ।।१६७।।

| ५११४ | को १ |

अट्ठारसुत्तरसयं पंचसहस्साणि जोयणाणिं च । लद्धं मुहुत्तगमणं तेरसमग्गे हिमंसुस्स ।।१६८।।

| ५११८ |

पंचसहस्सा इगिसयमिगिवीसजुदं सजोयण तिकोसा । लद्धं मुहुत्तगमणं चोद्दसमपहम्मि चंदस्स ।।१६९।।

| ५१२१ | को ३ |

पंचसहस्सेक्कसया पणुवीसं जोयणा दुवे कोसा । लद्धं मुहुत्तगमणं सीदंसुणो बाहिरपहम्मि ।।२००।।

| ५१२५ | को २ |

ससहरणयरतलादो चत्तारि पमाणअंगुलाणं पि । हेट्ठा गच्छिय होंति हु राहुविमाणस्स धयदंडा ।।२०१।।

ते राहुस्स विमाणा अंजणवण्णा अरिट्ठरयणमया । किंचूणं जोयणयं विक्खंभजुदा तदद्धबहलत्तं ।।२०२।।

पण्णासाधियदुसया कोदंडा राहुणयरबहलत्तं । एवं लोयविणिच्छयकत्तायरिओ परूवेदि ।।२०३।।

पाठान्तर ।

राहूण पुरतलाणं दुविहप्पाणिं हुवंति गमणाणिं । दिणपव्वियप्पेहिं दिणराहू ससिसरिच्छगदि ।।२०५।।

जस्सिं मग्गे ससहरबिंबं दिसेदि य तेसु परिपुण्णं । सो होदि पुण्णिमक्खो दिवसो इह माणुसे लोए ।।२०६।।

तव्वीहीदो लंघिय दीवस्स हुदासमारुददिसादो । तदणंतरवीहीए एंति हु दिणराहुससिबिंबा ।।२०७।।

आदे ससहरमंडलसोलसभागेसु एक्कभागंसो । आवरमाणो दीसइ राहूलंघणविसेसेणं ।।२०८।।

अणलदिसाए लंघिय ससिबिंबं एदि वीहिअद्धंसो । सेसद्धं खु ण गच्छदि अवरससिभमिदहेदूदो ।।२०९।।

तदणंतरमग्गाइं णिच्चं लंघंति राहुससिबिंबा । पवणग्गिदिसाहिंतो एवं सेसासु वीहीसुं ।।२१०।।

ससिबिंबस्स दिणं पंड एक्केक्कपहम्मि भागमेक्केक्कं । पच्छादेदि हु राहू पण्णरसकलाओ परियंतं ।।२११।।

इय एक्केक्ककलाए आवरिदाए खु राहुबिंबेणं । चंदेक्ककला मग्गे जस्सिं दिस्सेदि सो य अमवासो ।।२१२।।

एक्कत्तीसमुहुत्ता अदिरेगो चंदवासरपमाणं । तेवीसंसा हारो चउसयबादालमेत्ता य ।।२१३।।

| ३१ | २३ / ४४२ |

पडिवाए वासरादो वीहिं पडि ससहरस्स सो राहू । एक्केक्ककलं मुंचदि पुण्णिमयं जाव लंघणदो ।।२१४।।
अहवा ससहरबिंबं पण्णरसदिणाइं तस्सहावेणं । कसणाभं सुकिलाभं तेत्तियमेत्ताणि परिणमदि ।।२१५।।
पुह पुह ससिबिंबाणिं छम्मासेसु च पुण्णिमंतम्मि । छादंति पव्वराहू णियमेण गदि विसेसेहिं ।।२१६।।
जंबूदीवम्मि दुवे दिवायरा ताण एक्कचारमही । रविबिंबाधियपणसयदहुत्तरा जोयणाणि तव्वासो ।।२१७।।

$$\left|\ ५१० \left|\ \frac{४८}{६१}\ \right|\right.$$

सीदीजुदमेक्कसयं जंबूदीवे चरंति मत्तंडा । तीसुत्तर तिसयाणिं दिणयरबिंबाधियाणि लवणम्मि ।।२१८।।

$$\left|\ १८० \left|\ ३३० \left|\ \frac{४८}{६१}\ \right|\right.\right.$$

चउसीदीअधियसयं दिणयरवीहीओ होंति एदाणं । बिंबसमाणं वासो एक्केक्काणं तदद्धबहलत्तं ।।२१९।।

$$\left|\ १८४ \left|\ \frac{४८}{६१}\ \right| \frac{२४}{६१}\ \right|$$

तेसीदीअधियसयं दिणेसवीहीण होदि विच्चालं । एक्कपहम्मि चरंते दोण्णिं च्चिय भाणुबिंबाणिं ।।२२०।।
सट्ठिजुदं तिसयाणिं मंदररुंदं च जंबुदीवस्स । वासे सोधिय दलिदे सूरादिमपहसुररद्दिविच्चालं ।।२२१।।

$$\left|\ ३६० \left|\ ४४८२०\ \right|\right.$$

एक्कत्तीससहस्सा एक्कसयं जोयणाणि अडवण्णा । इगिसट्ठीए भजिदे धुवरासी होदि दुमणीणं ।।२२२।।

$$\left|\ \frac{३११५८}{६१}\ \right|$$

दिवसयरबिंबरुंदं चउसीदीसमधियसएणं । धुवरासिस्स य मज्झे सोहेज्जसु तत्थ अवसेसं ।।२२३।।
तेसीदिजुदसदेणं भजिदव्वं तम्मि होदि जं लद्धं । वीहिं पडि णादव्वं तरणीणं लंघणपमाणं ।।२२४।।
तम्मेत्तं पहविच्चं तं माणं दोण्णि जोयणा होंति । तस्सिं रविबिंबजुदे पहसूचिवओ दिणिंदस्स ।२२५।।

$$\left|\ \frac{१७०}{६१}\ \right|$$

पढमपहादो रविणो बाहिरमग्गम्मि गमणकालम्मि । पडिमग्गमेत्तियं बिंबविच्चालं मंदरक्काणं ।।२२६।।
अह-
रूऊणं इट्ठपहं पहसूचिचएण गुणिय मेलिज्जं । तवणादिमपहमंदरविच्चाले होदि इट्ठविच्चालं ।।२२७।।
चउदालसहस्साणिं अट्ठसया जोयणाणि वीसं पि । एदं पढमपहट्ठिददिणयरकणयद्दिविच्चालं ।।२२८।।

$$\left|\ ४४८२०\ \right|$$

चउदालसहस्सा अडसयाणि बावीस भाणुबिंबजुदा । जोयणया बिदियपहे तिव्वंसुसुमेरुविच्चालं ।।२२९।।

$$\left|\ ४४८२२ \left|\ \frac{४८}{६१}\ \right|\right.$$

चउदालसहस्सा अडसयाणि पणुवीस जोयणाणि कला । पणुतीस तइज्जपहे पतंगहेमद्दिविच्चालं ।।२३०।।

$$\left|\ ४४८२५ \left|\ \frac{३५}{६१}\ \right|\right.$$

एवमादिमज्झिमपहपरियंतं णेदव्वं ।

पंचत्तालसहस्सा पणहत्तरि जोयणाणि अदिरेके । मज्झिमपहथिददिवमणिचामीयरसेलविच्चालं ।।२३१।।

| ४५०७५ |

एवं दुचरिममग्गंतं णेदव्वं ।

पणदालसहस्साणिं तिण्णिसया तीसजोयणा अधिया । बाहिरपहठिदवासरकरकंचणसेलविच्चालं ।।२३२।।

| ४५३३० |

बाहिरपहादु आदिममग्गे तवणस्स आगमणकाले । पुव्वक्खेवं सोहसु दुचरिमपहपहुदि जाव पढमपहं ।।२३३।।

सट्ठिजुदा तिसयाणिं सोहज्जसु जंबुदीवरुंदम्मि । जं सेसं पढमपहे दोण्हं दुमणीण विच्चालं ।।२३४।।

णवणउदिसहस्सा छस्सयाणि चालीसजोयणाणं पि । तवणाणं आबाहा अब्भंतरमंडलठिदाणं ।।२३५।।

| ९९६४० |

दिणवइ पहसूचिचए दोसुं गुणिदे हुवेदि भाणूणं । आबाहाए वड्ढी जोयणया पंच पंचतीसकला ।।२३६।।

| ५ | ३५/६१ |

रूऊणं इट्ठपहं गुणिदूणं मग्गसूइवड्ढीए । पढमाबाहामिलिदं वासरणाहाण इट्ठविच्चालं ।।२३७।।

णवणउदिसहस्सा छस्सयाणि पणदाल जोयणाणि कला । पणतीस दुइज्जपहे दोण्हं भाणूण विच्चालं ।।२३८।।

| ९९६४५ | ३५/६१ |

एवं मज्झिममग्गंतं णेदव्वं।

एक्कं लक्खं पण्णासहियसयजोयणाणि अदिरेगो । मज्झिमपहम्मि दोण्हं विच्चालं कमलबंधूणं ।।२३९।।

| १००१५० |

एवं दुचरिममग्गंतं णेदव्वं।

एक्कं जोयणलक्खं सट्ठीजुत्ताणि छस्सयाणिं पि । बाहिरपहम्मि दोण्हं सहस्सकिरणाण विच्चालं ।।२४०।।

| १००६६० |

इच्छंतो रविबिंबं सोहेज्जसु तस्स सयलविच्चालं । धुवरासिस्स य मज्झे चुलसीदीजुदसदेण भजिदव्वं ।।२४१।।

| ४८/६१ | ३११५८/६१ | २२३१६/६१ |

अथवा-

दिणवइपहंतराणिं सोहिय धुवरासियम्मि भजिदूणं । रविबिंबेणं आणसु रविमग्गे विउणबाणउदी ।।२४२।।

| ४८/६१ | ८८३२/६१ | १८४ |

दिणवइपहसूचिचए तियसीदीजुदसदेण संगुणिदे । होदि हु चारक्खेत्तं बिंबूणं तज्जुदं सयलं ।।२४३।।

| १ | १७०/६१ | १८३ । लद्ध ५१० |

दिणरयणिजाणणट्ठं आदवतिमिराण कालपरिमाणं । मंदरपरिहिप्पहुदिं चउणवदिसयं परूवेमो ।।२४४।।

| १९४ |

एक्कत्तीससहस्सा जोयणया छस्सयाणि बाबीसं । मंदरगिरिंदपरिरयरासिस्स हुवेदि परिमाणं ।।२४५।।

| ३१६२२ |

णभछक्कसत्तसत्ता सत्तेक्कंकक्कमेण जोयणया । अट्ठहिदपंचभागा खेमावज्झाण पणिधिपरिहि त्ति ।।२४६।।

| १७७७६० | $\frac{५}{८}$ |

अट्ठेक्कणवचउक्का णवेक्कअंकक्कमेण जोयणया । तिकलाओ परिहिसंखा खेमपुरीयउज्झाण मज्झपणिधीए ।।२४७।।

| १९४९१८ | $\frac{३}{८}$ |

चउगयणसत्तणवणहदुगाण अंकक्कमेण जोयणया । तिकलाओ खग्गरिट्ठापुराण पणिधीए परिमाणं ।।२४८।।

| २०९७०४ | $\frac{३}{८}$ |

दुगछक्कअट्ठछक्का दुगदुगअंकक्कमेण जोयणया । एक्ककला परिमाणं चक्कारिट्ठाण पणिधिपरिहीए ।।२४९।।

| २२६८६२ | $\frac{१}{८}$ |

अट्ठचउछक्कएक्का चउदुगअंकक्कमेण जोयणया । एक्ककला खग्गापरजिदाण णयरीण मज्झि परिही सा ।।२५०।।

| २४१६४८ | $\frac{१}{८}$ |

पंचगयणट्ठअट्ठा पंचदुगंकक्कमेण जोयणया । सत्तकलाओ मंजुसंजयंतपुरमज्झपरिही सा ।।२५१।।

| २५८८०५ | $\frac{७}{८}$ |

एक्कणवपंचतियसत्तदुगा अंकक्कमेण जोयणया । सत्तकलाओ परिही ओसहिपुरवइजयंताणं ।।२५२।।

| २७३५९१ | $\frac{७}{८}$ |

णवचउसत्तणहाइं णवयदुगा जोयणाइं अंककमे । पंचकलाओ परिही विजयपुरीपुंडरीगिणीणं पि ।।२५३।।

| २९०७४९ | $\frac{५}{८}$ |

तियजोयणलक्खाइं पण्णरससहस्सआणि उणणउदी । सव्वब्भंतरमग्गे परिरयरासिस्स परिमाणं ।।२५४।।

| ३१५०८९ |

सेसाणं मग्गाणं परिहीपरिमाणजाणणणिमित्तं । परिहिक्खेवं वोच्छं गुरूवदेसाणुसारेणं ।।२५५।।

सूरपहसूइवड्ढी दुगुणं कादूण वग्गिदूणं च । दसगुणिदे जं मूलं परिहिक्खेवो इमो होइ ।।२५६।।

सत्तरसजोयणाणिं अदिरेगा तस्स होई परिमाणं । अट्ठत्तीसं अंसा हारो तह एक्कसट्ठी य ।।२५७।।

| १७ | ३८/६१ |

तियजोयणलक्खाणं पण्णरससहस्स एक्कसय छक्का । अट्ठत्तीस कलाओ सा परिही बिदियमग्गम्मि ।।२५८।।

| ३१५१०६ | ३८/६१ |

चउवीसजुदेक्कसयं पण्णरससहस्स जोयण तिलक्खा । पण्णरसकला परिही परिमाणं तदियवीहीए ।।२५९।।

| ३१५१२४ | १५/६१ |

एक्कत्तालेक्कसयं पण्णरससहस्स जोयण तिलक्खा । तेवण्णकला तुरिमे पहम्मि परिहीए परिमाणं ।।२६०।।

| ३१५१४१ | ५३/६१ |

उणसट्ठिजुदेक्कसयं पण्णरससहस्स जोयण तिलक्खा । इगिसट्ठीपविहत्ता तीसकला पंचमपहे सा ।।२६१।।

| ३१५१५६ | ३०/६१ |

एवं पुव्वप्पण्णे परिहिक्खेवं मेलवि माणमुवरुवरिं । परिहिपमाणं जाव दुचरिमप्परिहिं ति णेदव्वं ।।२६२।।

चोद्दसजुदतिसयाणिं अट्ठरससहस्स जोयण तिलक्खा । सूरस्स बाहिरपहे हुवेदि परिहीए परिमाणं ।।२६३।।

| ३१८३१४ |

सत्तावीससहस्सा छादालं जोयणाणि पणलक्खा । परिही लवणमहण्णवविक्खंभच्छट्ठभागम्मि ।।२६४।।

| ५२७०४६ |

रविबिंबा सिग्घगदी णिग्गच्छंता हुवंति पविसंता । मंदगदी असमाणा परिही साहंति समकाले ।।२६५।।

एक्कं जोयणलक्खं णव य सहस्सयाणि अडसयाणिं पि । परिहीणं पत्तेक्कं कादव्वा गयणखंडाणिं ।।२६६।।

| १०९८०० |

गच्छदि मुहुत्तमेक्के तीसब्भहियाणि अट्ठरसयाणिं । णभखंडाणिं रविणो तम्मि हिदे सव्वगयणखंडाणिं ।।२६७।।

| १८३० |

अब्भंतरवीहीदो दुतिचदुपहुदीसु सव्ववीहीसुं । कमसो बे रविबिंबा भमंति सट्ठीमुहुत्तेहिं ।।२६८।।

इच्छियपरिहिपमाणं सट्ठिमुहुत्तेहिं भाजिदे लद्धं । णेयं दिवसकराणं मुहुत्तगमणस्स परिमाणं ।।२६९।।

पंचसहस्साणि दुवे सयाणि इगिवण्ण जोयणा अधिया । उणतीसकला पढमप्पहम्मि दिणयरमुहुत्तगदिमाणं ।।२७०।।

| ५२५१ | २९/६० |

एवं दुचरिममग्गंतं णेदव्वं।

पंचसहस्सा तिसया पंच च्चिय जोयणाणि अदिरेगो । चोद्दसकलाओ बाहिरपहम्मि दिणवइमुहुत्तगदिमाणं ।।२७१।।

| ५३०५ | १४/६० |

दिणयरणयरतलादो चत्तारि पमाणअंगुलाणिं च । हेट्ठा गच्छिय होंति अरिट्ठविमाणाण धयदंडा ।।२७२।।

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रिट्ठाणं णयरतला अंजणवण्णा अरिट्ठरयणमया । किंचूणं जोयणयं पत्तेक्कं वाससंजुत्तं ।।२७३।।

पण्णाधियदुसयाणिं कोदंडाणं हुवंति पत्तेक्कं । बहुलत्तणपरिमाणं तण्णयराणं सुरम्माणं ।।२७४।।

२५०

चउगोउरजुत्तेसुं जिणभवणभूसिदेसु रम्मेसुं । चेट्ठंते रिट्ठसुरा बहुपरिवारेहिं परियरिया ।।२७५।।

मत्तंडमंडलाणं गमणविसेसेण मणुवलोयम्मि । जे दिणरत्ति य भजिदा जादा तेसिं परूवेमो ।।२७६।।

पढमपहे दिणवइणो संठिदकालम्मि सव्वपरिहीसुं । अट्ठरसमुहुत्ताणिं दिवसो बारस णिसा होदि ।।२७७।।

१८ | १२

बाहिरमग्गे रविणो संठिदकालम्मि सव्वपरिहीसुं । अट्ठरसमुहुत्ताणिं रत्ती बारस दिणं होदि ।।२७८।।

१८ | १२

भूमीय मुहं सोधिय रूऊणेणं पहेण भजिदव्वं । सा रत्तीए दिणादो वड्ढी दिवसस्स रत्तीदो ।।२७९।।

तस्स पमाणं दोण्णि य मुहुत्तया एक्कसट्ठिपविहत्ता । दोण्हं दिणरत्तीणं पडिदिवसं हाणिवड्ढीओ ।।२८०।।

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६१

बिदियपहट्ठिदसूरे सत्तरसमुहुत्तयाणि होदि दिणं । उणसट्ठिकलब्भहियं छक्कोणियदुसयपरिहीसुं ।।२८१।।

५६
१० | ६१

बारसमुहुत्तयाणिं दोण्णि कलाओ णिसाए परिमाणं । बिदियपहट्ठिदसूरे तेत्तियमेत्तासु परिहीसुं ।।२८२।।

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१२ | ६१

तदियपहट्ठिदतवणे सत्तरसमुहुत्तयाणि होदि दिणं । सत्तावण्ण कलाओ तेत्तियमेत्तासु परिहीसुं ।।२८३।।

५७
१७ | ६१

बारस मुहुत्तयाणिं चत्तारि कलाओ रत्तिपरिमाणं । तप्परिहीसुं सूरे अवट्ठिदे तिदियमग्गम्मि ।।२८४।।

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१२ | ६१

सत्तरसमुहुत्ताइं पंचावण्णा कलाओ परिमाणं । दिवसस्स तुरिममग्गट्ठिदम्मि तिव्वंसुबिंबम्मि ।।२८५।।

५५
१७ | ६१

बारस मुहुत्तयाणिं छक्ककलाओ वि रत्तिपरिमाणं । तुरिमपहट्ठिदपंकयबंधवबिंबम्मि परिहीसुं ।।२८६।।

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१२ | ६१

एवं मज्झिमपहंतं णेदव्वं ।

पण्णरसमुहुत्ताइं पत्तेयं होंति दिवसरत्तीओ । पुव्वोदिदपरिहीसुं मज्झिममग्गट्ठिदे तवणे ।।२८७।।

१५ |

एवं दुचरिममग्गंतं णेदव्वं ।

अट्ठरसमुहुत्ताणिं रत्ती बारस दिणो वि दिणणाहे । बाहिरमग्गपवण्णे पुव्वोदिदसव्वपरिहीसुं ।।२८८।।

१८ | १२ |

बाहिरपह्यदु पत्ते मग्गं अब्भंतरं सहस्सकरे । पुव्वावण्णिदमेदं पक्खेवसु दिणप्पमाणम्मि ।।२८९।।

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६१ |

इय बासररत्तीओ एक्कस्स रविस्स गदिविसेसेणं । एदाओ दुगुणाओ हुवंति दोण्हं दिणिंदाणं ।।२९०।।

। दिण-रत्तीणं भेदं सम्मत्तं ।

एत्तो बासरपहुणो मग्गविसेसेण मणुवलोयम्मि । जे यादवतमखेत्ता जादा ताणिं परूवेमो ।।२९१।।

मंदरगिरिमज्झादो लवणोदधिछट्ठभागपरियंतं । णियदायामा आदवतमखेतं सकटउद्धिणिहा ।।२९२।।

तेसीदिसहस्साणिं तिण्णिसया जोयणाणि तेत्तीसं । सतिभागा पत्तेक्कं आदवतिमिराण आयामो ।।२९३।।

१
८३३३३ | ३ |

इच्छं परिरयरासिं तिगुणिय दसभाजिदम्मि जं लद्धं । सा घम्मखेत्तपरिही पढमपहावट्ठिदे सूरे ।।२९४।।

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| १० |

णव य सहस्सा चउसय छासीदी जोयणाणि तिण्णि कला । पंचहिदा तावखिदी मेरुणगे पढमपहट्ठिदंकम्मि ।।२९५।।

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९४८६ | ५ |

खेमक्खापणिधीए तेवण्णसहस्स तिसयअडवीसा । सोलसहिदा तियंसा तावखिदी पढमपहट्ठिदंकम्मि ।।२९६।।

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५३३२८ | १६ |

खेमपुरीपणिधीए अडवण्णसहस्स चउसयाणिं पि । पंचत्तरि जोयणया इगिदालकलाओ सीदिहिदा ।।२९७।।

४१
५८४७५ | ८० |

रिट्ठाए पणिधीए बासट्ठिसहस्स णवसयाणिं पि । एक्कारस जोयणया सोलसहिदपणकलाओ तावखिदी ।।२९८।।

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६२९११ | १६ |

अट्ठासट्ठिसहस्सा अट्ठावण्णा य जायणा होंति । एक्कावण्ण कलाओ रिट्ठपुरीपणिधितावखिदी ।।२९९।।

$$६८०५८\left|\begin{matrix}५१\\८०\end{matrix}\right|$$

बाहत्तरी सहस्सा चउसया जोयणाणि चउणवदी । सोलसहिदसत्तकला खग्गपुरीपणिधितावमही ।।३००।।

$$७२४६४\left|\begin{matrix}७\\१६\end{matrix}\right|$$

सत्तत्तरी सहस्सा छच्च सया जोयणाणि इगिदालं । सीदिहिदा इगिसट्ठी कलाओ मंजुसपुरम्मि तावमही ।।३०१।।

$$७७६४१\left|\begin{matrix}६१\\८०\end{matrix}\right|$$

बासीदिसहस्साणिं सत्तत्तरि जोयणाणि णव अंसा । सोलसभजिदा ताओ ओसहिणयरस्स पणिधीए ।।३०२।।

$$८२०७७\left|\begin{matrix}९\\१६\end{matrix}\right|$$

सत्तासीदिसहस्सा दुसया चउवीस जोयणा अंसा । एक्कत्तरि सीदिहिदा तावखिदी पुंडरीगिणीणयरे ।।३०३।।

$$८७२२४\left|\begin{matrix}७१\\८०\end{matrix}\right|$$

चउणउदिसहस्सा पणुसयाणि छव्वीस जोयणा सत्ता । अंसा दसेहिं भजिदा पढमपहे तावखिदिपरिही ।।३०४।।

$$९४५२६\left|\begin{matrix}७\\१०\end{matrix}\right|$$

चउणउदिसहस्सा पणुसयाणि इगितीस जोयणा अंसा । चत्तारो पंचहिदा बिदियपहे तावखिदिपरिही ।।३०५।।

$$९४५३१\left|\begin{matrix}४\\५\end{matrix}\right|$$

एवं मज्झिममग्गंतं णेदव्वं ।

पंचाणउदिसहस्सा दसुत्तरा जोयणाणि तिण्णि कला । पंचविहत्ता मज्झिमपहम्मि तावस्स परिमाणं ।।३०६।।

$$९५०१०\left|\begin{matrix}३\\५\end{matrix}\right|$$

एवं दुचरिममग्गंतं णेदव्वं ।

पणणउदिसहस्सा चउसयाणि चउणउदि जोयणा अंसा पंचहिदा बाहिरए पढमपहे संठिदे सूरे ।।३०७।।

$$९५४९४\left|\begin{matrix}१\\५\end{matrix}\right|$$

अट्ठावण्ण सहस्सा एक्कसयं तेरसुत्तरं लक्खं । जोयणया चउअंसा पविहत्ता पंचभेहिं ।।३०८।।

$$१५८११३\left|\begin{matrix}४\\५\end{matrix}\right|$$

एदं होदि पमाणं लवणोदहिवासछट्ठभागस्स । परिधीए तावखेत्तं दिवसयरे पढममग्गठिदे ।।३०९।।

इट्ठं परिरयरासिं चउहत्तरि दोसएहिं गुणिदव्वं । णवसयपण्णरसहिदे तावखिदी बिदियपहट्ठिदक्कस्स ।।३१०।।

२७४
| ६१५ |

णवयसहस्सा चउसय उणहत्तरि जोयणा दुसयअंसा । तेणवदीहि जुदा तह मेरुणगबिदियपहठिदे तवणे ।।३११।।

२६३
९४६६ | ६१५ |

इगितिदुतिपंचकमसो जोयणया तह कलाओ सगतीसं । सगसयबत्तीसहिदा खेमापणिधीए तावखिदी ।।३१२।।

३७
५३२३१ | ७३२ |

अट्ठं छक्कतिअट्ठं पंचा अंककमे णवपणछतिय अंसा । णभछच्छत्तियभजिदा खेमपुरीपणिधितावखिदी ।।३१३।।

३६५६
५८३६८ | ३६६० |

छण्णवसगदुगछक्का अंककमे पंचतियछदोण्णि कमे । णभछच्छत्तियहरिदा रिट्ठापणिधीए तावखिदी ।।३१४।।

२६३५
६२७६६ | ३६६० |

चउतियणवसगछक्का अंककमे जोयणाणि अंसा य । णवचउचउक्कदुगया रिट्ठपुरीपणिधितावखिदी ।।३१५।।

२४४६
६७६३४ | ३६६० |

दुगछक्कतिदुगसत्ता अंककमे जोयणाणि अंसा य । पंचदुचउक्कएक्का खग्गपुरीपणिधितावखिदी ।।३१६।।

१४२५
७२३६२ | ३६६० |

णभगयणपंचसत्ता सत्तंककमेण जोयणा अंसा । णवतियदुगेक्कमेत्ता मंजुसपुरपणिधितावखिदी ।।३१७।।

१२३६
७७५०० | ३६६० |

अट्ठदुणवेक्कअट्ठा अंककमे जोयणाणि अंसा य । पंचेक्कदुगपमाणा ओसहिपुरपणिधितावखिदी ।।३१८।।

२१५
८१६२८ | ३६६० |

छच्छक्कगयणसत्ता अट्ठंककमेण जोयणणि कला । एक्कोणतीसमेत्ता तावखिदी पुंडरंगिणिए ।।३१९।।

२९
८७०६६ | ३६६० |

चउपंचतिचउणवया अंककमे छक्कसत्तचउअंसा । पंचेक्कणवहिदाओ बिदियपहक्कस्स पढमपहताओ ।।३२०।।

४७६
९४३५४ | ६१५ |

चउणउदिसहस्सा तियसयाणि उणसट्ठि जोयणा अंसा । उणसट्ठी पंचसया बिदियपहक्कम्मि बिदियपहताओ ।।३२१।।

$$९४३५९ \left| \begin{matrix} ५५९ \\ ९१५ \end{matrix} \right|$$

चउणउदिसहस्सा तियसयाणि पण्णट्ठि जोयणा अंसा । इगिरूवं होंति तदो बिदियपहक्कम्मि तदियपहताओ ।।३२२।।

$$९४३६५ \left| \begin{matrix} १ \\ ९१५ \end{matrix} \right|$$

एवं मज्झिमपहस्स याइल्लपहपरियंतं णेदव्वं ।

सत्ततियअट्ठचउणवअंकक्कमेण जोयणाणि अंसा । तेणउदी चारिसया बिदियपहक्कम्मि मज्झपहताओ ।।३२३।।

$$९४८३७ \left| \begin{matrix} ४९३ \\ ९१५ \end{matrix} \right|$$

एवं बाहिरपहहेट्ठिमपहंतं णेदव्वं ।

पणणउदिसहस्सा तियसयाणि बीसुत्तराणि जोयणया । छत्तीस दुसयअंसा बिदियपहक्कम्मि अंतपहताओ ।।३२४।।

$$९५३२० \left| \begin{matrix} २३६ \\ ९१५ \end{matrix} \right|$$

पंचदुगअट्ठसत्ता पंचेक्कंकक्कमेण जोयणया । अंसा णवदुगसत्ता बिदियपहक्कम्मि लवणछट्ठंसे ।।३२५।।

$$१५७८२५ \left| \begin{matrix} ७२९ \\ ९१५ \end{matrix} \right|$$

इट्ठं परिरयरासिं सगदालब्भहियपंचसयगुणिदं । णभतियअट्ठेक्कहिदे ताओ तवणम्मि तदियमग्गठिदे ।।३२६।।

$$\left| \begin{matrix} ५४७ \\ १८३० \end{matrix} \right|$$

णवयसहस्सा [तह] चउसयाणि बावण्णजोयणाणि कला । चउहत्तरिमेत्ताओ तदियपहक्कम्मि मंदरे ताओ ।।३२७।।

$$९४५२ \left| \begin{matrix} ७४ \\ १८३० \end{matrix} \right|$$

तियतियएक्कतिपंचा अंककमे पंचसत्तछदुगकला । अट्ठदुणवदुगभजिदा ताओ खेमाए तदियपहसूरे ।।३२८।।

$$५३१३३ \left| \begin{matrix} २६७५ \\ २९२८ \end{matrix} \right|$$

दुगछदुगअट्ठपंचा अंककमे णवदुगेक्कसत्तकला । खचउछचउइगिभजिदा तदियपहक्कम्मि खेमपुरताओ ।।२२९।।

$$५८२६२ \left| \begin{matrix} ७१२९ \\ १४६४० \end{matrix} \right|$$

दुगअट्ठछदुगछक्का अंककमे जोयणाणि अंसा य । पंचयछअट्ठएक्का ताओ रिट्ठाय तदियपहसूरे ।।३३०।।

$$६२६८२ \left| \begin{matrix} १८६५ \\ १४६४० \end{matrix} \right|$$

गयणेक्कअट्ठसत्ता छक्कं अंकक्कमेण जोयणया । अंसा णवपणदुखइगि तदियपहक्कम्मि रिट्ठपुरे ।।३३१।।

$$६७८१० \Big| \begin{matrix} १०२५६ \\ १४६४० \end{matrix} \Big|$$

णभतियदुगदुगसत्ता अंककमे जोयणाणि अंसा य । पणणवणवचउमेत्ता ताओ खग्गाए तदियपहतवणे ।।३३२।।

$$७२२३० \Big| \begin{matrix} ४६६५ \\ १४६४० \end{matrix} \Big|$$

अट्ठपणतिदयसत्ता सत्तंककमे णवट्ठतितिएक्का । होंति कलाओ ताओ तदियपहक्कम्मि मंजुसपुरीए ।।३३३।।

$$७७३५८ \Big| \begin{matrix} १३३८६ \\ १४६४० \end{matrix} \Big|$$

अट्ठसगसत्तएक्का अट्ठंककमेण पंचदुगएक्का । अट्ठ य अंसा ताओ तदियपहक्कम्मि ओसहपुरीए ।।३३४।।

$$८१७७८ \Big| \begin{matrix} ८१२५ \\ १४६४० \end{matrix} \Big|$$

सत्तणभणवयछक्का अट्ठंककमेण णवसगट्ठेक्का । अंसा होदि हु ताओ तदियपहक्कम्मि पुंडरीगिणिए ।।३३५।।

$$८६६०७ \Big| \begin{matrix} १८७६ \\ १४६४० \end{matrix} \Big|$$

दुगअट्ठएक्कचउणव अंककमे तिमदुगछक्क अंसा य । णभतियअट्ठेक्कहिदा तदियपहक्कम्मि पढमपहताओ ।।३३६।।

$$६४१८२ \Big| \begin{matrix} ६२३ \\ १८३० \end{matrix} \Big|$$

चउणवदिसहस्सा इगिसयं च सगसीदि जोयणा अंसा । बाहत्तरि सत्तसया तदियपहक्कम्मि विदियपहताओ ।।३३७।।

$$६४१८७ \Big| \begin{matrix} ७७२ \\ १८३० \end{matrix} \Big|$$

चउणउदिसहस्सा इगिसयं च बाणउदि जोयणा अंसा । सोलससया तिरधिया तदियपहक्कम्मि तदियपहताओ ।।३३८।।

$$६४१६२ \Big| \begin{matrix} १६०३ \\ १८३० \end{matrix} \Big|$$

चउणउदिसहस्सा इगिसयं च अडणउदि जोयणा अंसा । तेसट्ठी दोण्णि सया तदियपहक्कम्मि तुरिमपहताओ ।।३३९।।

$$६४१६८ \Big| \begin{matrix} २६३ \\ १८३० \end{matrix} \Big|$$

एवं मज्झिल्लपहआइल्लपरिहिपरियंतं णेदव्वं ।

चउणवदिसहस्सा छस्सयाणि चउसट्ठि जोयणा अंसा । चउहत्तरि अट्ठसया तदियपहक्कम्मि मज्झपहताओ ।।३४०।।

$$६४६६४ \Big| \begin{matrix} ८७४ \\ १८३० \end{matrix} \Big|$$

एवं दुचरिममग्गंतं णेदव्वं ।

पणणउदिसहस्सा इगिसयं च छादाल जोयणाणि कला । अट्ठत्तरि पंचसया तदियपहक्कम्मि बहिपहे ताओ ।।३४१।।

$$९५१४६ \left| \begin{matrix} ५७८ \\ १८३० \end{matrix} \right|$$

सगतियपणसगपंचा एक्कं कमसो दुपंचचउएक्का । अंसा हुवेदि ताओ तदियपहक्कम्मि लवणछट्ठंसे ।।३४२।।

$$१५७५३७ \left| \begin{matrix} १४५२ \\ १८३० \end{matrix} \right|$$

धरिऊण दिणमुहुत्ते पडिवीहिं सेसएसु मग्गेसुं । सव्वपरिहीण तावं दुचरिममग्गंत णेदव्वं ।।३४३।।

पंचविहत्ते इच्छियपरिरयरासिम्मि होदि जं लद्धं । सा तावखेत्तपरिही बाहिरमग्गम्मि दुमणिठिदसमए ।।३४४।।

छच्च सहस्सा तिसया चउवीसं जोयणाणि दोण्णि कला । पंचहिदा मेरुणगे तावो बाहिरपहट्ठिदक्कम्मि ।।३४५।।

$$६३२४ \left| \begin{matrix} २ \\ ५ \end{matrix} \right|$$

पंचत्तीससहस्सा पणसय बावण्ण जोयणा अंसा । अट्ठहिदा खेमोवरि तावो बाहिरपहट्ठिदक्कम्मि ।।३४६।।

$$३५५५२ \left| \begin{matrix} १ \\ ८ \end{matrix} \right|$$

तियअट्ठणवट्ठतिया अंककमे सत्त दोण्णि अंसा य । चालविहत्ता ताओ खेमपुरे बाहिपहट्ठिदक्कम्मि ।।३४७।।

$$३८९८३ \left| \begin{matrix} २७ \\ ४० \end{matrix} \right|$$

एक्कत्तालसहस्सा णवसयचालीस जोयणा भागा । पणतीसं रिट्ठाए ताबो बाहिरपहट्ठिदक्कम्मि ।।३४८।।

$$४१९४० \left| \begin{matrix} ३५ \\ ४० \end{matrix} \right|$$

पंचत्तालसहस्सा बाहत्तरि तिसय जोयणा अंसा । सत्तरस अरिट्ठपुरे तावो बाहिरपहट्ठिदक्कम्मि ।।३४९।।

$$४५३७२ \left| \begin{matrix} १७ \\ ४० \end{matrix} \right|$$

अट्ठत्तालसहस्सा तिसया उणतीस जोयणा अंसा । पणुवीसा खग्गोवरि तावो बाहिरपहट्ठिदक्कम्मि ।।३५०।।

$$४८३२९ \left| \begin{matrix} २५ \\ ४० \end{matrix} \right|$$

एक्कावण्णसहस्सा सत्तसया एक्कसट्ठि जोयणया । सत्तंसा बाहिरपहठिदसूरे मंजुसे तांओ ।।३५१।।

$$५१७६१ \left| \begin{matrix} ७ \\ ४० \end{matrix} \right|$$

चउवण्णसहस्सा सगसयाणि अट्ठरस जोयणा अंसा । पण्णरस ओसहिपुरे तावो बाहिरपहट्ठिदक्कम्मि ।।३५२।।

$$५४७१८ \left| \begin{matrix} १५ \\ ४० \end{matrix} \right|$$

अट्ठावण्णसहस्सा इगिसयउणवण्ण जोयणा अंसा । सगतीस बहिपहट्ठिदतवणे ताओ पुरम्मि चरिमम्मि ।।३५३।।

$$५८१४६ \left| \begin{matrix} ३७ \\ ४० \end{matrix} \right|$$

तेसट्ठिसहस्साणिं सत्तरसं जोयणाणि चउअंसा । पंचहिदा बहिमग्गट्ठिदम्मि दुमणिम्मि पढमपहताओ ।।३५४।।

$$६३०१७ \left| \begin{matrix} ४ \\ ५ \end{matrix} \right|$$

तेसट्ठिसहस्साणिं तिसया चालीस जोयणा दुकला । मज्झपहतावखेत्तं विरोचणे बाहिरमग्गट्ठिदे ।।३५५।।

$$६३०२१ \left| \begin{matrix} १ \\ ५ \end{matrix} \right|$$

एवं मज्झिमपहंतं णेदव्वं।

तेसट्ठिसहस्साणिं तिसया चालीस जोयणा दुकला । मज्झपहतावखेत्तं विरोचणे बाहिरमग्गट्ठिदे ।।३५६।।

$$६३३४० \left| \begin{matrix} २ \\ ५ \end{matrix} \right|$$

एवं दुचरिममग्गंतं णेदव्वं ।

तेसट्ठिसहस्साणिं छस्सय बासट्ठि जोयणाणि कला । चत्तारो बहिमग्गट्ठिदम्मि तवणम्मि बहिपहे ताओ ।।३५७।।

$$६३६६२ \left| \begin{matrix} ४ \\ ५ \end{matrix} \right|$$

एक्कं लक्खं णवजुदचउवण्णसयाणि जोयणा अंसो । बाहिरपहट्ठिदक्के तावखिदी लवणछट्ठंसे ।।३५८।।

$$१०५४०६ \left| \begin{matrix} १ \\ ५ \end{matrix} \right|$$

आदिमपहादु बाहिरपहम्मि भणस्स गमणकालम्मि । हाएदि किरणसत्ती वड्ढदि यागमणकालम्मि ।।३५९।।

तावक्खिदिपरिधीए ताओ एक्ककमलणाहम्मि । दुगुणिदपरिमाणाओ सहस्सकिरणेसु दोण्हिम्मि ।।३६०।।

। तावखिदिपरिही सम्मत्ता ।।

सव्वासुं परिहीसुं पढमपहट्ठिदसहस्सकिरणम्मि । बारसमुहुत्तमेत्ता पुह पुह उप्पज्जदे रत्ती ।।३६१।।

इच्छिदपरिहिपमाणं पंचविहत्तम्मि होदि जं लद्धं । सा तिमिरखेत्तपरिही पढमपहट्ठिददिणेसम्मि ।।३६२।।

$$\left| \begin{matrix} १ \\ ५ \end{matrix} \right|$$

छच्च सहस्सा तिसया चउवीसं जोयणाणि दोण्णि कला । मेरुगिरितिमिरखेत्तं आदिममग्गट्ठिदे तवणे ।।३६३।।

$$६३२४ \left| \begin{matrix} २ \\ ५ \end{matrix} \right|$$

पणतीससहस्सा पणसयाणि बावण्णजोयणा अंसा । अट्ठहिदा खेमाए तिमिरखिदी पढमपहठिदपयंगे ।।३६४।।

$$३५५५२ \left| \begin{matrix} १ \\ ८ \end{matrix} \right|$$

तियअट्ठणवट्ठतिया अंककमे सगदुगंस चालहिदा । खेमपुरीतमखेत्तं दिवायरे पढममग्गठिदे ।।३६५।।

$$३८६८३ \Big| \begin{matrix} २७ \\ ४० \end{matrix} \Big|$$

एक्कत्तालसहस्सा णवसयचालीस जोयणाणि कला । पणतीस तिमिरखेत्तं रिट्ठाए पढमपहगददिणेसे ।।३६६।।

$$४१६४० \Big| \begin{matrix} ३५ \\ ४० \end{matrix} \Big|$$

बावत्तरि तिसयाणिं पणदालसहस्स जोयणा अंसा । सत्तरस अरिट्ठपुरे तमखेत्तं पढमपहसूरे ।।३६७।।

$$४५३७२ \Big| \begin{matrix} १७ \\ ४० \end{matrix} \Big|$$

अट्ठत्तालसहस्सा तिसया उणतीस जोयणा अंसा । पणुवीसं खग्गाए बहुमज्झिमपणिधितमखेत्तं ।।३६८।।

$$४८३२६ \Big| \begin{matrix} २५ \\ ४० \end{matrix} \Big|$$

एक्कावण्णसहस्सा सत्तसया एक्कसट्ठि जोयणया । सत्तंसा तमखेत्तं मंजुसपुरमज्झपणिधीए ।।३६९।।

$$५१७६१ \Big| \begin{matrix} ७ \\ ४० \end{matrix} \Big|$$

चउवण्णसहस्सा सगसयाणि अट्ठरसजोयणा अंसा । पण्णरस ओसहीपुरबहुमज्झिमपणिधितिमिरखिदी ।।३७०।।

$$५४७१८ \Big| \begin{matrix} १५ \\ ४० \end{matrix} \Big|$$

अट्ठावण्णसहस्सा इगिसय उणवण्ण जोयणा अंसा । सगतीस पुंडरीगिणिपुरीए बहुमज्झपणिधितमं ।।३७१।।

$$५८१४६ \Big| \begin{matrix} ३७ \\ ४० \end{matrix} \Big|$$

तेसट्ठिसहस्साणिं सत्तरसं जोयणाणि चउअंसा । पंचहिदा पढमपहे तमपरिही पहठिददिणेसे ।।३७२।।

$$६३०१७ \Big| \begin{matrix} ४ \\ ५ \end{matrix} \Big|$$

तेसट्ठिसहस्साणिं जोयणया एक्कवीस एक्ककला । विदियपहतमिरखेत्तं आदिममग्गट्ठिदे सूरे ।।३७३।।

$$६३०२१ \Big| \begin{matrix} १ \\ ५ \end{matrix} \Big|$$

तेसट्ठिसहस्साणिं चउवीसं जोयणाणि चउ अंसा । तदियपहतिमिरभूमी मत्तंडे पढममग्गगदे ।।३७४।।

$$६३०२४ \Big| \begin{matrix} ४ \\ ५ \end{matrix} \Big|$$

एवं मज्झिममग्गंतं णेदव्वं ।

तेसट्ठिसहस्साणिं तिसया चालीस जोयणा दुकला । मज्झिमपहतिमिरखिदी तिव्वकरे पढममग्गठिदे ।।३७५।।

$$६३३४० \Big| \begin{matrix} २ \\ ५ \end{matrix} \Big|$$

तेसट्ठिसहस्साणिं छस्सयबासट्ठिजोयणाणि कला । चत्तारो बहिमग्गे तमखेत्तं पढमपहठिदे तवणे ।।३७६।।

$$६३६६२ \left| \begin{matrix} ४ \\ ५ \end{matrix} \right|$$

एक्कं लक्खं णवजुदचउवण्णसयाणि जोयणा अंसा । जलछट्ठभागतिमिरं उण्हयरे पढममग्गठिदे ।।३७७।।

$$१०५४०६ \left| \begin{matrix} १ \\ ५ \end{matrix} \right|$$

इच्छियपरिरयरासिं सगसट्ठीतियसएहिं गुणिदूणं । णभतियअट्ठेक्कहिदे तमखेत्तं बिदियपहठिदे सूरे ।।३७८।।

$$\left| \begin{matrix} ३६७ \\ १८३० \end{matrix} \right|$$

एक्कचउक्कतिछक्का अंककमे दुगदुगच्छअंसा य । पचेक्कणवयभजिदा मेरुतमं बिदियपहतवणे ।।३७९।।

$$६३४१ \left| \begin{matrix} ६२२ \\ ९१५ \end{matrix} \right|$$

णवचउछप्पंचतिया अंककमे सत्तछक्कसत्तंसा । अट्ठदुणवदुगभजिदा खेमाए मज्झपणिधितमं ।।३८०।।

$$३५६४९ \left| \begin{matrix} ७६७ \\ २९२८ \end{matrix} \right|$$

णभणवणभणवयतिया अंककमे णवचउक्कसगदुकला । णभचउछचउएक्कहिदा खेमपुरीपणिधितमखेत्तं ।।३८१।।

$$३९०९० \left| \begin{matrix} २७४९ \\ १४६४० \end{matrix} \right|$$

पंचपणगयणदुगचउ अंककमे पणचउक्कअडछक्का । अंसा तिमिरक्खेत्ते मज्झिमपणिधीए रिट्ठाए ।।३८२।।

$$४२०५५ \left| \begin{matrix} ६८४५ \\ १४६४० \end{matrix} \right|$$

छण्णवचउक्कपणचउ अंककमे णवयपंचसगपंचा । अंसा मज्झिमपणिहीतमखेत्तमरिट्ठणयरीए ।।३८३।।

$$४५४९६ \left| \begin{matrix} ५७५९ \\ १४६४० \end{matrix} \right|$$

एक्कं छच्चउअट्ठा चउ अंककमेण पंचपंचट्ठा । णव य कलाओ खग्गामज्झिमपणधीए तिमिरखिदी ।।३८४।।

$$४८४६१ \left| \begin{matrix} ६८५५ \\ १४६४० \end{matrix} \right|$$

दुगणभणवेक्कपंचा अंककमे णवयछक्कसत्तट्ठा । अंसा मंजुसणयरीमज्झिमपणधीए तमखेत्तं ।।३८५।।

$$५१९०२ \left| \begin{matrix} ८७६९ \\ १४६४० \end{matrix} \right|$$

सत्तछअट्ठचउक्का पंचंककमेण जोयणा अंसा । पंचछअट्ठदुगेक्का ओसहिपुरपणिधितमखेत्तं ।।३८६।।

$$५४८६७ \left| \begin{matrix} १२८६५ \\ १४६४० \end{matrix} \right|$$

अट्ठखतिअट्ठपंचा अंककमेण जोयणाणि अंसा य । णवसगसगएक्केक्का तमखेत्तं पुंडरीगिणीणयरे ।।३८७।।

$$५०३०८ \left| \begin{matrix} ११७७६ \\ १४६४० \end{matrix} \right|$$

णवअट्ठेक्कतिछक्का अंककमे तिणवसत्तएक्कंसा । णभतियअट्ठेक्कहिदा बिदियपहक्कम्मि पढमपहतिमिरं ।।३८८।।

$$६३१८६ \left| \begin{matrix} १७६३ \\ १८३० \end{matrix} \right|$$

तियणवएक्कतिछक्का अंकाण कमे दुगेक्कसत्तंसा । पंचेक्कणवविहत्ता बिदियपहक्कम्मि बिदियपहतिमिरं ।।३८९।।

$$६३१६३ \left| \begin{matrix} ७१२ \\ ६१५ \end{matrix} \right|$$

छण्णवएक्कतिछक्का अंककमे अडदुगट्ठएक्कंसा । गयणतिअट्ठेक्कहिदा बिदियपहक्कम्मि तदियमग्गतमं ।।३९०।।

$$६३१६६ \left| \begin{matrix} १८२८ \\ १८३० \end{matrix} \right|$$

एवं मज्झिममग्गंतं णेदव्वं।

तेसट्ठिसहस्सा पणसयाणि तेरस य जोयणा अंसा । चउदालजुदट्ठसया बिदियपहक्कम्मि मज्झमग्गतमं ।।३९१।।

$$६३५१३ \left| \begin{matrix} ८४४ \\ १८३० \end{matrix} \right|$$

छत्तियअट्ठतिछक्का अंककमे णवयसत्तछक्कंसा । पंचेक्कणवविहत्ता बिदियपहक्कम्मि बाहिरे तिमिरं ।।३९२।।

$$६३८३६ \left| \begin{matrix} ६७६ \\ ६१५ \end{matrix} \right|$$

एवं दुचरिममग्गंतं णेदव्वं ।

सत्तणवछक्कपणणभएक्कंककमेण दुगसगतियंसा । णभतियअट्ठेक्कहिदा लवणोदहिछट्ठभागतमं ।।३९३।।

$$१०५६९७ \left| \begin{matrix} ३७२ \\ १८३० \end{matrix} \right|$$

एवं सेसपहेसुं वीहिं पडि जामिणीमुहुत्ताणिं । ठविऊणाणेज्ज तमं छक्कोणियदुसयपरिहीसुं ।।३९४।।

$$१९४ \left|\right.$$

सव्वपरिहीसु रत्तिं अट्ठरसमुहुत्तयाणि रविबिंबे । बहिपहठिदम्मि एदं धरिऊण भणामि तमखेत्तं ।।३९५।।

इच्छियपरिरयरासिं तिगुणं कादूण दसहिदे लद्धं । होदि तिमिरस्स खेत्तं बाहिरमग्गट्ठिदे सूरे ।।३९६।।

$$\begin{matrix} ३ \\ १० \end{matrix} \left|\right.$$

णव य सहस्सा चउसय छासीदी जोयणाणि तिण्णि कला । पंचहिदा मेरुतमं बाहिरमग्गे ठिदे तवणे ।।३९७।।

$$९४८६ \left| \begin{matrix} ३ \\ ५ \end{matrix} \right|$$

तेवण्णसहस्साइं तिसया अडवीसजोयणा तिकला । सोलसहिदा य खेमामज्झिमपणधीए तमखेत्तं ।।३९८।।

$$५३३२८ \left| \begin{matrix} ३ \\ १६ \end{matrix} \right|$$

अट्ठावण्णसहस्सा चउसयपणहत्तरी य जोयणया । एक्कत्तालकलाओ सीदिहिदा खेमणयरीए ।।३९९।।

$$५८४७५ \left| \begin{matrix} ४१ \\ ८० \end{matrix} \right|$$

बासट्ठिसहस्सा णव सयाणि एक्करस जोयणा भागा । पणुवीस सीदिभजिदा रिट्ठाए मज्झपणिधितमं ।।४००।।

$$६२९११ \left| \begin{matrix} २५ \\ ८० \end{matrix} \right|$$

अट्ठासट्ठिसहस्सा अट्ठावण्णा य जोयणा अंसा । एक्कावण्णं तिमिरं रिट्ठपुरीमज्झपणिधीए ।।४०१।।

$$६८०५८ \left| \begin{matrix} ५१ \\ ८० \end{matrix} \right|$$

बाहत्तरिं सहस्सा चउसयचउणउदि जोयणा अंसा । पणुतीसं खग्गाए मज्झिमपणिधीए तिमिरखिदी ।।४०२।।

$$७२४९४ \left| \begin{matrix} ३५ \\ ८० \end{matrix} \right|$$

सत्तत्तरिं सहस्सा छस्सय इगिदाल जोयणाणि कला । एक्कासट्ठी मंजुसणयरीपणिहीए तमखेत्तं ।।४०३।।

$$७७६४१ \left| \begin{matrix} ६१ \\ ८० \end{matrix} \right|$$

बासीदिसहस्साणिं सत्तत्तरिजोयणा कलाओ वि । पंचत्तालं ओसहिपुरीए बाहिरपहट्ठिदक्कम्मि ।।४०४।।

$$८२०७७ \left| \begin{matrix} ४५ \\ ८० \end{matrix} \right|$$

सत्तासीदिसहस्सा बेसयचउवीस जोयणा अंसा । एक्कत्तरी अ तमिसप्पणिधीए पुंडरीगिणीणयरे ।।४०५।।

$$८७२२४ \left| \begin{matrix} ७१ \\ ८० \end{matrix} \right|$$

चउणउदिसहस्सा पणसयाणि छव्वीस जोयणा अंसा । सत्त य दसपविहत्ता बहिपहतवणम्मि पढमपहतिमिरं ।।४०६।।

$$९४५२६ \left| \begin{matrix} ७ \\ १० \end{matrix} \right|$$

चउणउदिसहस्सा पणसयाणि इगितीस जोयणा अंसा । चत्तारो पंचहिदा बहिपहभाणुम्मि बिदियपहतिमिरं ।।४०७।।

$$९४५३१ \left| \begin{matrix} ४ \\ ५ \end{matrix} \right|$$

चउणउदिसहस्सा पणसयाणि सगतीस जोयणा अंसा । तदियपहतिमिरखेत्तं बहिमग्गठिदे सहस्सकरे ।।४०८।।

$$९४५३७ \left| \begin{matrix} ४ \\ ५ \end{matrix} \right|$$

चउणउदिसहस्सा पणसयाणि बादालजोयणा तिकला । दसपविहत्ता बहिपहठिदतवणे तुरिममग्गतमं ।।४०६।।

$$६४५४२ \left| \begin{matrix} ३ \\ १० \end{matrix} \right|$$

एवं मज्झिममग्गाइल्लमग्गं ति णेदव्वं ।

पंचाणउदिसहस्सं दसुत्तरा जोयणाणि तिण्णि कला । पंचहिदा मज्झपहे तिमिरं बहिपहठिदे तवणे ।।४१०।।

$$६५०१० \left| \begin{matrix} ३ \\ ५ \end{matrix} \right|$$

एवं दुचरिममग्गं ति णेदव्वं ।

पंचाणउदिसहस्साचउसयचउणउदि जोयणा अंसा । बाहिरपहतमखेत्तं दीहत्तं बाहिरद्धठिदे ।।४११।।

$$६५४६४ \left| \begin{matrix} १ \\ ५ \end{matrix} \right|$$

तियएक्कएक्कअट्ठा पंचेक्कंक्कमेण चउअंसा । बहिपहठिददिवसयरे लवणोदहिछट्ठभागतमं ।।४१२।।

$$१५८११३ \left| \begin{matrix} ४ \\ ५ \end{matrix} \right|$$

एदाणिं तिमिराणं भंगाणिं होंति एक्कभाणुम्मि । दुगुणिदपरिमाणाणिं दोसुं पि य हेमकिरणेसुं ।।४१३।।

पढमपहादो बाहिरपहम्मि दिवसाहिवस्स गमणेसुं । वड्ढंति तिमिरखेत्ता आगमणेसुं च परियंति ।।४१४।।

एवं सव्वपहेसुं भणियं तिमिरक्खिदीण परिमाणं । एत्तो आदावतिमिरक्खेत्तफलाइं परूवेमो ।।४१५।।

लवणंबुरासिवासच्छट्ठमभागस्स परिहिबारसमे । पणलक्खेहिं गुणिदे तिमिरादवखेत्तफलमाणं ।।४१६।।

चउठाणेसुं सुण्णा पंचदुणभछक्कणवयएक्कदुगा । अंककमे जोयणया तं खेत्तफलस्स परिमाणं ।।४१७।।

$$२१९६०२५०००० \left|\right.$$

एदे तिगुणिय भजिदं दसेहि एक्कादवक्खिदीय फलं । तेत्तिय दुतिभागहदं होदि फलं एक्कतमखेत्तं ।।४१८।।

$$६५८८०७५००० \left| \text{ति } ४३९२०५०००० \right|$$

एदं आदवतिमिरक्खेत्तफलं एक्कतिव्वकिरणम्मि । दोसुं विरोचणेसुं णादव्वं दुगुणपुव्वपरिमाणं ।।४१९।।

अट्ठारस चेव साया तावक्खेत्तं तु हेट्ठदो तवदि । सव्वेसिं सूराणं सतमेक्कं उवरि तावं तु ।।४२०।।

$$१८०० \left| १०० \right|$$

एत्तो दिवायराणं उदयत्थमणेसु जाणि रूवाणिं । ताइं परमगुरूणं उवदेसेणं परूवेमो ।।४२१।।

बाणविहीणे वासे चउगुणसरताडिदम्मि जीवकदी । इसुवग्गा छग्गुणिदा तीए जुदो होदि चावकदी ।।४२२।।

तियजोयणलक्खाणिं दस य सहस्साणि ऊणवीसेहिं । अवहरिदाइं भणिदं हरिवरिससरस्स परिमाणं ।।४२३।।

$$\begin{matrix} ३१०००० \\ १९ \end{matrix} \Big|$$

तम्मज्झे सोधेज्जं सीदिस्समधियसदं च जं सेसं । सो आदिममग्गादो बाणं हरिवरिसविजयस्स ।।४२४।।

$$१८० \Big|$$

तियजोयणलक्खाणिं छच्च सहस्साणि पणसयाणिं पि । सीदिजुदाणिं आदिममग्गादो तस्स परिमाणं ।।४२५।।

$$\begin{matrix} ३०६५८० \\ १९ \end{matrix} \Big|$$

णवणवदिसहस्साणिं छस्सयचत्तालजोयणणिं च । परिमाणं णादव्वं आदिममग्गस्स सूईए ।।४२६।।

९९६४० |

तियठाणेसुं सुण्णा चउछप्पंचदुखछणवसुण्णा । पंचदुगंककमेणं एक्कं छत्तिभजिदा अ धणुवग्गो ।।४२७।।

२५०९६०२५६४००० / ३६१ |

तेसीदिसहस्सा तियसयाणि सत्तत्तरी य जोयणया । णव य कलाओ आदिमपहादु हरिवरूसधणुपट्ठं ।।४२८।।

८३३७७ | ९/१६ |

तद्धणुपट्ठस्सद्धं सोधेज्जसु चक्खुपासखेत्तम्मि । जं अवसेसपमाणं णिसधाचलउवरिमखिदी सा ।।४२९।।

४१६८८ | १४/१६ |

आदिमपरिहिं तिगुणिय वीसहिदो लद्धमेत्ततेसट्ठी । दुसदा सत्तत्तालं सहस्सया वीसहरिदसत्तंसा ।।४३०।।

४७२६३ | ७/२० |

एदं चक्खुप्पासोक्किट्ठक्खेत्तस्स होदि परिमाणं । तं एत्थ णेदव्वं हरिवरिससरासपट्ठद्धं ।।४३१।।

पंचसहस्सा [तह] पणसयाणि चउहत्तरी य जोयणया । बेसयतेत्तीसंसा हारो सीदीजुदा तिसया ।।४३२।।

५५७४ | २३३/३८० |

उवरिम्मि णिसहगिरिणो एत्तियमाणेण पढममग्गठिदं । पेच्छंति तवणिबिंबं भरहक्खेत्तम्मि चक्कहरा ।।४३३।।

उवरिम्मि णीलगिरिणो तेत्तियमाणेण पढममग्गगदो । एरावदम्मि विजए चक्की देक्खंति इयररविं ।।४३४।।

मग्गेक्कमुहुत्ताणिं खेमादीतियपुरम्मि अधियाणिं । किंचूणएक्कणाली रत्ती य अरिट्ठणयरम्मि ।।४३५।।

णालि १ ।

तावे खग्गपुरीए अत्थमणं होदि मंजुसपुरम्मि । अवरण्हमधियणलिया ओसहियणयरम्मि साधियमुहुत्तं ।।४३६।।

तावे मुहुत्तमधियं अवरण्हं पुंडरीगिणीणयरे । तप्पणिधी सुररण्णे दोण्णि मुहुत्ताणि अदिरेगो ।।४३७।।

तक्कालम्मि सुसीमप्पणधीए सुरवणम्मि पढमपहे । होदि यवरण्हकालो तिण्णि मुहुत्ताणि अदिरेगो ।।४३८।।

तिय तिय मुहुत्तमधिया सुसीमकुंडलपुरम्मि दो दो य । एक्केक्कसाधियाणि य अवराजिदपहंकरंकपउमपुरे ।।४३९।।

सुभणयरे अवरण्हं साधियणाली य होदि परिमाणं । णालितिभागं रत्ती किंचूणं रयणसंचयपुरम्मि ।।४४०।।

एरावदम्मि उदओ जंकाले होदि कमलबंधुस्स । तावे दिणरत्तीओ अवरविदेहेसु साहेमि ।।४४१।।

खेमादिसुरवणंतं हुवंति जे पुव्वरत्तिअवरण्हा । कमसो ते णादव्वा अस्सपुरीपहुदि णवयठाणेसुं ।।४४२।।

होंति अवज्झादिसु णवठाणेसुं पुव्वरत्तिअवरण्हं । पुव्वुत्तरयणसंचयपुरादिणयराण सारिच्छा ।।४४३।।

किंचूणछम्मुहुत्ता रत्ती जा पुंडरीगिणीणयरे । तह होदि वीदसोके भरहेरावदखिदीसु मज्झण्णे ।।४४४।।

तावे णिसहगिरिंदे उदयत्थमणाणि होंति भाणुस्स । णीलगिरिंदेसु तहा एक्कखणे दोसु पासेसुं ।।४४५।।

पंचसहस्सा [तह] पणसयाणि चउहत्तरी य अदिरेगो । तेत्तीस बेसयंसा हारो सीदीजुदा तिसया ।।४४६।।

५५७४ | २३३/३८० |

एत्तियमेत्तादु परं उवरिं णिसहस्स पढममग्गम्मि । भहक्खेत्ते चक्की दिणयरबिंबं ण देक्खंति ।।४४७।।

उवरिम्मि णीलगिरिणो ते परिमाणादु पढममग्गम्मि । एरावदम्मि चक्की इदरदिणेसं ण देक्खंति ।।४४८।।

सिहिपवणदिसाहिंतो जंबूदीवस्स दोण्णि रविबिंबा । दो जोयणाणि पुह पुह आदिममग्गादु बिइयपहे ।।४४९।।

लंघता जंकाले भरहेरावदखिदीसु पविसंति । ताधे पुव्वुत्ताइं रत्तीदिवसाणि जायंति ।।४५०।।

एवं सव्वपहेसुं उदयत्थमणाणि ताणि णादूणं । पडिवीहिं दिवसणिसा बाहिरमग्गंतमाणेज्जं ।।४५१।।

सव्वपरिहीसु बाहिरमग्गट्ठिदे दिवहणाहबिंबम्मि । दिणरत्तीओ बारस अट्ठरसमुहुत्तमेत्ताओ ।।४५२।।

बाहिरपहादु आदिमपहम्मि दुमणिस्स आगमणकाले । पुव्वुत्तदिणणिसादी हुवंति अधियाओ ऊणाओ ।।४५३।।

मत्तंडदिणगदीए एक्कं चिय लब्भदे उदयठाणं । एवं दीवे वेदीलवणसमुद्देसु आणेज्ज ।।४५४।।

$$\frac{१७०}{६१} \Big| १ \Big| १७६ \Big| \frac{१७०}{६१} \Big| १ \Big| ४ \Big| \frac{१७०}{६१} \Big| १ \Big| \frac{२०१७८}{६१} \Big|$$

ते दीवे तेसट्ठी छव्वीसंसा खसत्तएक्कहिदा । एक्को च्चिय वेदीए कलाओ चउहत्तरी होंति ।।४५५।।

$$६३ \Big| \frac{२६}{१७०} \Big| १ \Big| \frac{७४}{१७०} \Big|$$

अट्ठारसुत्तरसदं लवणसमुद्दम्मि तेत्तियकलाओ । एदे मिलिदा उदया तेयसीदिसदाणि अट्ठताल कला ।।४५६।।

$$११८ \Big| \frac{११८}{७०} \Big|$$

अट्ठासीदिगहाणं एक्कं चिय होदि जत्थ चारखिदी । तज्जोगो वीहीओ पडिवीहिं होंति परिहीओ ।।४५७।।

परिहीसु ते चरंते ताणं कणयाचलस्स विच्चालं । अण्णं पि पुव्वभणिदं कालवसादो पणट्ठमुवएसं ।।४५८।।

। गहाणं परूवणा सम्मत्ता ।

ससिणो पण्णरसाणं वीहीणं ताण होंति मज्झम्मि । अट्ठ च्चिय वीहीओ अट्ठावीसाण रिक्खाणं ।।४५९।।

णव अभिजिप्पहुदीणिं सादी पुव्वाओ उत्तराओ वि । इय बारस रिक्खाणिं चंदस्स चरंति पढमपहे ।।४६०।।

तदिए पुणव्वसू मघ सत्तमए रोहिणी य चित्ताओ । छट्ठम्मि कित्तियाओ तह य विसाहाओ अट्ठमए ।।४६१।।

दसमे अणुराहाओ जेट्ठा एक्कारसम्मि पण्णरसे । हत्थो मूलादितियं मिगसिरदुगपुस्सअसिलेसा ।।४६२।।

ताराओ कित्तियादिसु छप्पंचतियेक्कछक्कतियछक्का । चउदुगदुगपंचेक्का एक्कचउछतिणवचउक्का य ।।४६३।।

चउतियतियपंचा तह एक्करसजुदं सयं दुगदुगाणिं । बत्तीस पंच तिण्णि य कमेण णिद्दिट्ठसंखाओ ।।४६४।।

६ । ५ । ३ । १ । ६ । ३ । ६ । ४ । २ । २ । ५ । १ । १ । ४ । ६ । ३ । ६ ।

४ । ४ । ३ । ३ । ५ । १११ । २ । २ । ३२ । ५ । ३ ।

वीयणयसयलउड्ढी कुरंगसिरदीवतोरणाणं च । आदववारणवम्मियगोमुत्तं सरजुगाणं च ।।४६५।।

हत्थुप्पलदीवाणं अधियरणं हारवीणसिंगा य । विच्छुवदुक्कयवावी केसरिगयसीस आयारा ।।४६६।।

मुरयं पतंतपक्खी सेणा गयपुव्वअवरगत्ता य । णावा हयसिरसरिसा णं चुल्ली कित्तियादीणं ।।४६७।।

णियताराणं संखा सव्वाणं ठाविदूण रिक्खाणं । पत्तेक्कं गुणिदव्वं एक्करससदेहि एक्करसे ।।४६८।।

१११९ ।

होंति परिवारतारा मूलंमिस्साओ सयलताराओ । तिविहाइं रिक्खाइं मज्झिमवरअवरभेदेहिं ।।४६६।।

६६६६ । ५५५५ । ३३३३ । ११११ । ६६६६ । ३३३३ । ६६६६ । ४४४४ । २२२२ । २२२२ । ५५५५ । ११११ । ११११ । ४४४४ । ६६६६ । ३३३३ । ९९९९ । ४४४४ । ४४४४ । ३३३३ । ३३३३ । ५५५५ । १२३३२१ । २२२२ । २२२२ । ३५५५२ । ५५५५ । ३३३३ ।

६६७२ । ५५६० । ३३३६ । १११२ । ६६७२ । ३३३६ । ६६७२ । ४४४८ । २२२४ । २२२४ । ५५६० । १११२ । १११२ । ४४४८ । ६६७२ । ३३३६ । १०००८ । ४४४८ । ४४४८ । ३३३६ । ३३३६ । ५५६० । १२३४३२ । २२२४ । २२२४। ३५५८४ । ५५६० । ३३३६ ।

अवराओ जेट्ठद्दासदभिसभरणीओ सादिअसिलेस्सा । होंति अ वराओ पुणव्वस्सु तिउत्तरा रोहणिविसाहाओ ।।४७०।।

सेसाओ मज्झिमाओ जहण्णभे पंचउत्तरसहस्सं । तं चिय दुगुणं तिगुणं मज्झिमवरभेसु णभखंडा ।।४७१।।

१००५ । २०१० । ३०१५ ।

अभिजिस्स छस्सयाणिं तीसजुवणिं हुवंति णभखंडा । एवं णक्खत्ताणं सीमविभागं वियाणेहि ।।४७२।।

६३० ।

पत्तेक्कं रिक्खाणिं सव्वाणि मुहुत्तकालेणं । लंघंति गयणखंडे पणतीसट्ठारससयाणिं ।।४७३।।

१८३५ ।

दोससिणक्खत्ताणं परिमाणं भणमि गयणखंडेसुं । लक्खं णव य सहस्सा अट्ठसया काहलायारा ।।४७४।।

रिक्खाण मुहुत्तगदी होदि पमाणं फलं मुहुत्तं च । इच्छा णिस्सेसाइं मिलिदाइं गयणखंडाणिं ।।४७५।।

१८३५ । १०९८०० ।

तेरासियम्मि लद्धं णियणियपरिहीसु सो गमणकालो । तम्माणं उणसट्ठी होंति मुहुत्ताणि अदिरेको ।।४७६।।

५९ ।

अदिरेकस्स पमाणं तिण्णि सयाणिं हवंति सत्त कला । तिसएहि सत्तसट्ठीसंजुत्तेहिं विभत्ताणिं ।।४७७।।

$\left|\begin{smallmatrix}३०७\\३६७\end{smallmatrix}\right|$

सवणादिअट्ठभाणिं अभिजिस्सादीओ उत्तरा पुव्वा । वच्चंति मुहुत्तेणं बावण्णसयाणि अधियपणसट्ठी ।।४७८।।

अधियप्पमाणमंसा अट्ठारसहस्सदुसयतेसट्ठी । इगिवीससहस्साणिं णवसयसट्ठी हवे हारो ।।४७९।।

$५२६५\left|\begin{smallmatrix}१८२६३\\२१९६०\end{smallmatrix}\right|$

वच्चंति मुहुत्तेणं पुणव्वसुमघा तिसत्तदुगपंचा । अंककमे जोयणया तियणभचउएक्कएक्ककला ।।४८०।।

$५२७३\left|\begin{smallmatrix}११४०३\\२१९६०\end{smallmatrix}\right|$

बावण्णसया पणसीदिउत्तरा सत्तत्तीस अंसा य । चउणउदिपणसयहिदा जादि मुहुत्तेण कित्तिया रिक्खा ।।४८१।।

$५२८५\left|\begin{smallmatrix}३७\\५९४\end{smallmatrix}\right|$

पंचसहस्सा दुसया अट्ठासीदी य जोयणा अधिया । चित्ताओ रोहिणीओ जंति मुहुत्तेण पत्तेक्कं ।।४८२।।

अदिरेकस्स पमाणं कलाओ सगसत्ततिणहदुगमेत्ता । अंककमे तह हारो खछक्कणवएक्कदुगमाणे ।।४८३।।

$५२८८\left|\begin{smallmatrix}२०३७७\\२१९६०\end{smallmatrix}\right|$

बावण्णसया बाणउदि जोयणा वच्चदे विसाहा य । सोलससहस्सणवसयसगदालकला मुहुत्तेणं ।।४८४।।

$$५२९२\left|\begin{matrix}१६९४७\\२१९६०\end{matrix}\right|$$

तेवण्णसयाणिं जोयणाणि वच्चदि मुहुत्तेणं । चउवण्ण चउसया दससहस्स अंसा य अणुराहा ।।४८५।।

$$५३००\left|\begin{matrix}१०४५४\\२१९६०\end{matrix}\right|$$

तेवण्णसयाणिं जोयणाणि चत्तारिं वच्चदि जेट्ठा । अंसा सत्तसहस्सा चउवीसजुदा मुहुत्तेणं ।।४८६।।

$$५३०४\left|\begin{matrix}७०२४\\२१९६०\end{matrix}\right|$$

पुस्सो असिलेसाओ पुव्वासाढा य उत्तरासाढा । हत्थो मिगसिरमूला अद्दाओ पत्तेक्कं ।।४८७।।
तेवण्णयसया उणवीसजोयणा जंति इगिमुहुत्तेणं । अट्ठाणउदी णवसय पण्णरससहस्स अंसा य ।।४८८।।

$$५३१९\left|\begin{matrix}१५९९८\\२१९६०\end{matrix}\right|$$

मंडलखेत्तपमाणं जहण्णभे तीस जोयणा होंति । तं चिय दुगुणं तिगुणं मज्झिमवरमेसु पत्तेक्कं ।।४८९।।

$$\left|३०\right|६०\left|९०\right|$$

अट्ठारस जोयणया हवेदि अभिजिस्स मंडलक्खित्तं । सट्ठियणहमेत्ताओ णियणियताराण मंडलखिदीओ ।।४९०।।
उड्ढाधो दक्खिणाए उत्तरमज्झेसु सादिभरणीओ । मूलं अभिजीकित्तियरिक्खाओ चरंति णियमग्गे ।।४९१।।
एदाणिं रिक्खाणिं णियणियमग्गेसु पुव्वभणिदेसुं । णिच्चं चरंति मंदरसेलस्स पदाहिणकमेणं ।।४९२।।
एदि मघा मज्झण्हे कित्तियरिक्खस्स अत्थमणसमए । उदए अणुराहाओ एवं जाणेज्ज सेसाओ ।।४९३।।

। एवं णक्खत्ताणं परूवणा सम्मत्ता ।

दुविहा चरअचराओ पइण्णताराओ ताण वरसंखा । कोडाकोडीलक्खं तेत्तीससहस्सणवसया पण्णं ।।४९४।।

१३३९५०००००००००००००० ।

छत्तीस अचरतारा जंबूदीवस्स चउदिसाभाए । एदाओ दोससिणो परिवारा अद्धमेक्कम्मि ।।४९५।।

३६ । ६६९७५०००००००००००० ।

रिक्खगमणादु अधियं गमणं जाणेज्ज सयलताराणं । ताणं णामप्पहुदिसु उवएसो संपइ पणट्ठो ।।४९६।।
चंदादो मत्तंडो मत्तंडादो गहा गहाहिंतो । रिक्खा रिक्खाहिंतो ताराओ होंति सिग्घगदी ।।४९७।।

। एवं ताराणं परूवणं सम्मत्तं ।

अयणाणि य रविसणिणो सगसगखेत्ते गहा य जे चारी । णत्थि अयणाण भगणे णियमा ताराण एमेव ।।४९८।।
रविअयणे एक्केक्कं तेसीदिसया हवंति दिणरत्ती । तेरसदिवसा चंदे सत्तट्ठीभागचउचालं ।।४९९।।

$$१८३\ ।\ १३\left|\begin{matrix}४४\\६७\end{matrix}\right|$$

दक्खिणअयणं आदी पज्जवसाणं तु उत्तरं अयणं । सव्वेसिं सूराणं विवरीदं होदि चंदाणं ।।५००।।
छच्चेव सया तीसं भगणाणं अभिजिरिक्खविक्खंभा । दिट्ठा सव्वंदरिसिहिं सव्वेहि अणंताणाणेणं ।।५०१।।

६३० ।

सदभिसभरणी अद्दा सादी तह अस्सिलेसस्सजेट्ठा य । पंचुत्तरं सहस्सा भगणाणं सीमविक्खंभा ।।५०२।।

एदं चेव य तिगुणं पुणव्वसू रोहिणी विसाहा य । तिण्णेव उत्तराओ अवसेसाणं भवे बिउणं ।।५०३।।

चउवण्णं च सहस्सा णव य सया होंति सयलरिक्खाणं । विगुणियगयणक्खंडा दोचंदाणं पि णादव्वं ।।५०४।।

५४६०० ।

एयं च सयसहस्सा अट्ठाणउदी सया य पडिपुण्णा । एसो मंडलछेदो भगणाणं सीमविक्खंभो ।।५०५।।

१०६८०० ।

अट्ठारसभागसया तीसं गच्छदि रवी मुहुत्तेणं । णक्खत्तसीमछेदो ते चेट्ठं इमेण बोद्धव्वा ।।५०६।।

५८३० ।

सत्तरसट्ठट्ठीणि हु चंदे सूरे बिसट्ठिअहियं च । सत्तट्ठी वि य भगणा चरइ मुहुत्तेण भागाणं ।।५०७।।

१७६८ । १८३० । १८३५ ।

चंदरविगयणखंडे अण्णोण्णविसुद्धसेसबासट्ठी । एयमुहुत्तपमाणं बासट्ठिफलिच्छया तीसा ।।५०८।।

१ । ६२ । ३० ।

एयट्ठतिण्णिसुण्णं गयणक्खंडेण लब्भदि मुहुत्तं । अट्ठरसट्ठी य तहा गयणक्खंडेण किं लद्धं ।।५०९।।

१८३० । १८६० । १ ।

चंदादो सिग्घगदी दिवसमुहुत्तेण चरदि खलु सूरो । एक्कं चेव मुहुत्तं एक्कं एयट्ठिभागं च ।।५१०।।

$$1\left|\frac{1}{61}\right|$$

रविरिक्खगमणखंडे अण्णोण्णं सोहिऊण जं सेसं । एयमुहुत्तपमाणं फल पण इच्छा तहा तीसं ।।५११।।

१ । ५ । ३० ।

तीसट्ठारसया खलु मुहुत्तकालेण कमइ जइ सूरो । तो केत्तियकालेणं सयपंचासं कमेइ त्ति ।।५१२।।

१८३० । १ । १५० ।

सूरादो णक्खत्तं दिवसमुहुत्तेण जइणतरमाहु । एक्कस्स मुहुत्तस्स य भागं एक्कट्ठिमे पंच ।।५१३।।

$$\left|\frac{5}{61}\right|$$

णक्खत्तसीमभागं भजिदे दिवसस्स जइणभागेहिं । लद्धं तु होइ रविससिणक्खत्ताणं तु संजोगा ।।५१४।।

तिसयदलगगणखंडे कमेइ जइ दिणयरो दिणिक्केणं । तउ रिक्खाणं णियणिय णहखंडगमण को कालो ।।५१५।।

१५० । १ । ६३० ।

अभिजी छच्च मुहुत्ते चत्तारि य केवलो अहोरत्ते । सूरेण समं गच्छदि एत्तो सेसाणि वोच्छामि ।।५१६।।

अ. रा. ४, मु. ६ ।

सदभिसभरणीअद्दा सादी तह अस्सिलेसजेट्ठा य । छच्चेव अहोरत्ते एक्कावीसा मुहुत्तेणं ।।५१७।।

अ. रा. ६, मु. २१ ।

तिण्णेव उत्तराओ पुणव्वसू रोहिणी विसाहा य । वीसं च अहोरत्ते तिण्णेव य होंति सूरस्स ।।५१८।।

अ. रा. २०, मु. ३ ।

अवसेसा णक्खत्ता पण्णारस वि सूरगदा होंति । बारस चेव मुहुत्ता तेरस य समे अहोरत्ते ।।५१९।।

अ. १३, मु. १२ ।

सत्तट्ठिगयणखंडे मुहुत्तमेत्तेण कमइ जो चंदो । भगणाण गयणखंडे को कालो होइ गमणम्मि ।।५२०।।

६७ । १ । ६३० ।

अभिजिस्स चंदचारो सत्तट्ठी खंडिदे मुहुत्तेगे । भागो य सत्तवीसा ते पुण अहिया णवमुहुत्तेहिं ।।५२१।।

$$६ \Big| \frac{२७}{६७}$$

सदभिसभरणीअद्दा सादी तह अस्सलेसजेट्ठा य । एदे छण्णक्खत्ता पण्णारसमुहुत्तसंजुत्ता ।।५२२।।

१५ |

अवसेसा णक्खत्ता पण्णरसा तीसदिमुहुत्ता य । चंदम्मि एस जोगो णक्खत्ताणं समक्खादं ।।५२३।।

३० |

तिण्णेव उत्तराओ पुणव्वसू रोहिणी विसाहा य । एदे छण्णक्खत्ता पणदालमुहुत्तसंजुत्ता ।।५२४।।

४५ |

दुमणिस्स एक्कअयणे दिवसा तेसीदिअधियएक्कसयं । दक्खिणअयणं आदी उत्तरअयणं च अवसाणं ।।५२५।।

१८३ |

एक्कादिदुउत्तरियं दक्खिणआउट्टियाए पंच पदा । दोआदिदुउत्तरयं उत्तरआउट्टियाए पंच पदा ।।५२६।।

तिप्पंचदुउत्तरियं दसपदपज्जंतदेहि अवहरिदं । उसुपस्स य होदि पदं वोच्छं आउट्टिउसुपदिणं रिक्खं ।।५२७।।

रूऊणंकं छगुणं भोगजुदं उसुवं उसुपउंदि तिथिमाणं । तं बारगुणं पव्वस्समविसमे किण्हसुक्कं च ।।५२८।।

सत्तगुणे ऊणंकं दसहिदसेसेसु अयणदिवसगुणं । सत्तट्ठिहिदे लद्धं अभिजादीदे हवे रिक्खं ।।५२९।।

आसाढपुण्णिमीए जुगणिप्पत्ती दु सावणे किण्हे । अभिजिम्मि चंदजोगे पाडिवदिवसम्मि पारंभो ।।५३०।।

सावणकिण्हे तेरसि [illegible]यसिररिक्खम्मि बिदियआउट्टी । तदिया विसाहरिक्खे दसमीए सुक्कलम्मि तम्मासे ।।५३१।।

पंचसु वरिसे एदे सावणमासम्मि उत्तरे कट्ठे । आवित्ती दुमणीणं पंचेव य होंति णियमेणं ।।५३२।।

माघस्स किण्हपक्खे सत्तमिए रुद्दणाममुहुत्ते । हत्थम्मि ट्ठिददुमणी दक्खिणदो एदि उत्ताभिमुहे ।।५३३।।

चोत्थीए सदभिसए सुक्के बिदिया तइज्जयं किण्हे । पक्खे पुस्से रिक्खे पडिवाए होदि तम्मासे ।।५३४।।

किण्हे तयोदसीए मूले रिक्खम्मि तुरिमआवित्ती । सुक्के पक्खे दसमिय कित्तियरिक्खम्मि पंचमिया ।।५३५।।

पंचसु वरिसे एदे माघे मासम्मि दक्खिणे कट्ठे । आवित्ती दुमणीणं पंचेव य होंति णियमेणं ।।५३६।।

होदि हु पढमं विसुपं कत्तियमासम्मि किण्हतइयाए । छसु पव्वमदीदेसु वि दोहिणिणामम्मि रिक्खम्मि ।।५३७।।

वइसाहकिण्हपक्खे णवमीए धणिट्ठणामणक्खत्ते । आदीदो अट्ठारस पव्वमदीदे दुइज्जयं उसुयं ।।५३८।।

कत्तियमासे पुण्णिमिदिवसे इगितीसपव्वमादीदो । तीदाए सादीए रिक्खे होदि हु तइज्जयं विसुयं ।।५३९।।

वइसाहसुक्कपक्खे छट्ठीए पुणव्वसुक्खणक्खत्ते । तेदालसंखपव्वमदीदेसु चउत्थयं विसुयं ।।५४०।।

कत्तियमासे सुक्किलबारसिए पंचवण्णपरिसंखे । पव्वमदीदे उसुयं पंचमयं होदि णियमेणं ।।५४१।।

वइसाहकिण्हपक्खे तदियाए [अट्ठसट्ठिपरिसंखे । पव्वमदीदे उसुपं] छट्ठमयं होदि णियमेणं ।।५४२।।

कत्तियमासे किण्हे णवमीदिवसे मघाए णक्खत्ते । सीदीपव्वमदीदे होदि पुढं सत्तमं उसुयं ।।५४३।।

बइसाहपुण्णिमीए अस्सिणिरिक्खे जुगस्स पढमादो । तेणउदी पव्वेसु वि होदि पुढं अट्ठमं उसुयं ।।५४४।।

कत्तियमासे सुक्किच्छट्ठीए उत्तरादिभद्दपदे । पंचुत्तरएक्कसयं पव्वमदीदेसु णवमयं उसुयं ।।५४५।।

वइसाहसुक्कबारसि उत्तरपुव्वम्हि फग्गुणी रिक्खे । सत्तारसएक्कसयं पव्वमदीदेसु दसमयं उसुयं ।।५४६।।

पणवरिसे दुमणीणं दक्खिणुत्तरायणं उसुयं । चय आणेज्जो उस्सप्पिणिपढमआदिचरिमंतं ।।५४७।।
पल्लस्ससंखभागं दक्खिणअयणस्स होदि परिमाणं । तेत्तियमेत्तं उत्तरअयणं उसुपं च तद्दुगुणं ।।५४८।।

दक्खि प/a | उत्त प/a | उसुप प २/a |

अवसप्पिणिए एवं वत्तव्वा ताओ रहडघडिएणं । होंति अणंताणंता पुव्वं वा दुमणिपक्खित्तं ।।५४९।।
चत्तारो लवणजले धादइदीवम्मि बारस मियंका । बादाल कालसलिले बाहत्तरि पुक्खरद्धम्मि ।।५५०।।

४ । १२ । ४२ । ७२ ।

णियणियससीण अद्धं दीवसमुद्दाण एक्कभागम्मि । अवरे भागं अद्धं चरंति पंतिक्कमेणं च ।।५५१।।
एक्केक्कचारखेत्तं दोद्दोचंदाण होदि तव्वासो । पंचसया दससहिदा दिणयाबिंबादिरित्ता य ।।५५२।।
पुह पुह चारक्खेत्ते पण्णरस हुवंति चंदवीहीओ । तव्वासो छप्पण्णा जोयणया एक्कसट्ठिहिदा ।।५५३।।

१५ | ५६/६१ |

णियणियचंदघमाणं भजिदूणं एक्कसट्ठिरूवेहिं । अडवीसेहिं गुणिदं सोहियणियउवहिदीववासम्मि ।।५५४।।
ससिसंखापविहत्तं सव्वब्भंतरवीहिट्ठिदिंदूणं । दीवाणं उवहीणं आदिमपहजगदिविच्चालं ।।५५५।।
उणवण्णसहस्सा णवसयणवणउदिजोयणा य तेत्तीसा । अंसा लवणसमुद्दे अब्भंतरवीहिजगदिविच्चालं ।।५५६।।

४९९९९ | ३३/६१ |

दुगतिगतियतियतिण्णि य विच्चालं धादइम्मि दीवम्मि । णभछक्कएक्कअंसा तेसीदिसदेहिं अवहरिदा ।।५५७।।

३३३३२ | १६०/१८३ |

सगचउणहणवएक्का अंककमे पणखदोण्णि अंसा य । इगिअट्ठदुएक्कहिदा कालोदयजगदिविच्चालं ।।५५८।।

१९०४७ | २०५/१२८१ |

सुण्णं चउठाणेक्का अंककमे अट्ठपंचतिण्णि कला । णवचउपंचविहत्तो विच्चालं पुक्खरद्धम्मि ।।५५९।।

११११० | ३५८/५४९ |

एदाणि अंतराणिं पढमप्पहसंठिदाण चंदाणं । बिदियादीण पहाणं अधिया अब्भंतरे बहिं ऊणा ।।५६०।।
लवणादिचउक्काणं वासपमाणम्मि णियससिदलाणं । बिंबाणिं फेलित्ता तत्तो णियचंदसंखअद्धेणं ।।५६१।।
भजिदूणं जं लद्धं तं पत्तेक्कं ससीण विच्चालं । एवं सव्वपहाणं अंतरमेदम्मि णिद्दिट्ठं ।।५६२।।
णवणउदिसहस्सं णवसयणवणउदि जोयणा य पंच कला । लवणसमुद्दे दोण्णं तुसारकिरणाण विच्चालं ।।५६३।।

९९९९९ | ५/६१ |

पंच चउठाणछक्का अंककमे सगतिएक्क अंसा य । तियअट्ठेक्कविहत्ता अंतरमिंदूण धादईसंडे ।।५६४।।

६६६६५ | १३७/१८३ |

चउणवगयणट्ठतिया अंककमे सुण्णएक्कचारि कला । इगिअडदुगइगिभजिदा अंतरमिंदूण कालोदे ।।५६५।।

$$३८०६४ \left| \begin{matrix} ४१० \\ १२८१ \end{matrix} \right|$$

एक्कचउट्ठाणदुगा अंककमे सत्तछक्कएक्क कला । णवचउपंचविहत्ता अंतरमिंदूण पोक्खरद्धम्मि ।।५६६।।

$$२२२२१ \left| \begin{matrix} १६७ \\ ५४६ \end{matrix} \right|$$

णियणियपढमपहाणं जगदीणं अंतरप्पमाणसमं । णियणियलेस्सगदीओ सव्वमियंकाण पत्तेक्कं ।।५६७।।

$$२२२२१ \left| \begin{matrix} १७१ \\ ५४६ \end{matrix} \right|$$

तीसं णउदी तिसया पण्णरसजुदा य चाल पंचसया । लवणप्पहुदिचउक्के चंदाणं होंति वीहीओ ।।५६८।।

३० । ६० । ३१५ । ५४० ।

णियपहपरिहिपमाणे पुह पुह दुसदेक्कवीससंगुणिदे । तेरससहस्ससगसयपणुवीसहिदे मुहुत्तगदिमाणं ।।५६९।।

$$\left| \begin{matrix} २२१ \\ १३७२५ \end{matrix} \right|$$

सेसाओ वण्णणाओ जंबूदीवम्मि जाओ चंदाणं । ताओ लवणे धादइसंडे कालोदपुक्खरद्धेसुं ।।५७०।।

। एवं चंदाणं परूवणा सम्मत्ता ।

चत्तारि होंति लवणे बारस सूरा य धादईसंडे । बादाला कालोदे बावत्तरि पुक्खरद्धम्मि ।।५७१।।

१२ । ४२ । ७२ ।

णियणियरवीण अद्धं दीवसमुद्दाण एक्कभागम्मि । अवरे भागे अद्धं चरंति पंतिक्कमेणेव ।।५७२।।

एक्केक्कचारखेत्तं दोद्दो दुमणीण होदि तव्वासो । पंचसया दससहिदा दिणवइबिंबादिरित्ता य ।।५७३।।

$$१ । २ । ५१० \left| \begin{matrix} ४८ \\ ६१ \end{matrix} \right|$$

एक्केक्कचारखेत्ते चउसीदिजुदसदेक्कवीहीओ । तव्वासो अडदालं जोयणया एक्कसट्ठिहिदा ।।५७४।।

$$१८४ \left| \begin{matrix} ४८ \\ ६१ \end{matrix} \right|$$

लवणादिचउक्काणं वासपमाणम्मि णियरविदलाणं । बिंबाणिं फेलित्ता तत्तो णियपूसण द्वेणं ।।५७५।।

भजिदूणं जं लद्धं तं पत्तेक्कं रवीण विच्चालं । तस्स य अद्धपमाणं जगदीयासण्णमग्गाणं ।।५७६।।

णवणउदिसहस्साणिं णवसयणवणउदिजोयणाणिं पि । तेरसमेत्तकलाओ भजिदव्वा एक्कसट्ठीए ।।५७७।।

$$९९९९९ \left| \begin{matrix} १३ \\ ६१ \end{matrix} \right|$$

एत्तियमेत्तपमाणं पत्तेक्कं दिणयराण विच्चालं । लवणोदे तस्सद्धं जगदीणं णिययपढममग्गाणं ।।५७८।।

छावट्ठिसहस्साणिं छस्सयपण्णट्ठि जोयणाणि कला । इगिसट्ठीजुत्तसयं तेसीदीजुदसयं हारो ।।५७९।।

$$६६६६५ \left| \begin{matrix} १६१ \\ १८३ \end{matrix} \right|$$

एदं अंतरमाणं एक्केक्करवीण धादईसंडे । लेस्सागदी तदद्धं तस्सरिसा उदधियाबाधा ।।५८०।।

अडतीससहस्सा चउणउदी जोयणाणि पंच सया । अट्ठाहत्तरि हारो बारसयसयाणि इगिसीदी ।।५८१।।

$$३८०६४ \Big| \begin{matrix} ५७८ \\ १२८१ \end{matrix} \Big|$$

एदं अंतरमाणं एक्केक्करवीण कालसलिलम्मि । लेस्सागदी तदद्धं तस्सरिसं उवहिआबाहा ।।५८२।।
बावीससहस्साणिं वेसयइगिवीस जोयणा अंसा । दोण्णिसया उणदालं हारो उणवण्णपंचसया ।।५८३।।

$$२२२२१ \Big| \begin{matrix} २३६ \\ ५४६ \end{matrix} \Big|$$

एदं अंतरमाणं एक्केक्करवीण पोक्खरद्धम्मि । लेस्सागदी तदद्धं तस्सरिसा उदधिआबाहा ।।५८४।।
ताओ आबाधाओ दोसुं पासेसु संठिदरवीणं । चारक्खेत्तेणहिया अब्भंतरए बहिं ऊणा ।।५८५।।
जंबूयंके दोण्हं लेस्सा वच्चंति चरिममग्गादो । अब्भंतरए णभतियतियसुण्णा पंच जोयणया ।।५८६।।

५०३३० ।

चरिमपहादो बाहिं लवणे दोणभदुतितिय जोयणया । वच्चइ लेस्सा अंसा सयं च हारा तिसीदिअधियसया ।।५८७।।

$$३३००२ \Big| \begin{matrix} १०० \\ १८३ \end{matrix} \Big|$$

पढमपहसंठियाणं लेस्सगदीण चदुअट्ठणवचउरो । अंककमे जोयणया तियतिय भागस्सेस पुहहाणिवड्ढीओ ।।५८८।।

$$३३५१३ \Big| \begin{matrix} ७ \\ ३ \end{matrix} \Big| (?)$$

लवणप्पहुदिचउक्के णियणियखेत्तेसु दिणयरमयंका । वच्चंति ताण लेस्सा अण्णक्खेत्तं ण कइया वि ।।५८९।।
अट्ठासट्ठित्तिसया लवणम्मि हुवंति भाणुवीहीओ । चउरुत्तरएक्कारससयमेत्ता धादईसंडे ।।५९०।।

३६८ । ११०४ ।

चउसट्ठी अट्ठसया तिण्णि सहस्साणि कालसलिलम्मि । चउवीसुत्तरछसया छच्च सहस्साणि पोक्खरद्धम्मि ।।५९१।।

३८६४ । ६६२४ ।

णियणियपरिहिपमाणे सट्ठिमुहुत्तेहि अवहिदे लद्धं । पत्तेक्कं भाणूणं मुहुत्तगमणस्स परिमाणं ।।५९२।।
सेसाओ वण्णणाओ जंबूदीवम्मि जाओ दुमणीणं । ताओ लवणे धादइसंडे कालोदपुक्खरद्धेसुं ।।५९३।।

। सूरप्परूवणा ।

बावण्णा तिण्णि सया होंति गहाणं च लवणजलहिम्मि । छप्पण्णा अब्भहियं सहस्समेक्कं च धादईसंडे ।।५९४।।

३५२ । १०५६ ।

तिण्णि सहस्सा छसयं छण्णउदी होंति कालउवहिम्मि । छत्तीस्सब्भहियाणिं तेसट्ठिसयाणि पुक्खरद्धम्मि ।।५९५।।

३६९६ । ६३३६ ।

। एवं गहाण परूवणा सम्मत्ता ।

लवणम्मि बारसुत्तरसयमेत्ताणिं हुवंति रिक्खणिं । छत्तीसेहिं अधिया तिण्णिसया धादईसंडे ।।५९६।।

११२ । ३३६ ।

छाहत्तरिजुत्ताइं एक्करससयाणि कालसलिलम्मि । सोलुत्तरदोसहस्सा दीववरे पोक्खरद्धम्मि ।।५९७।।

११७६ । २०१६ ।

सेसाओ वण्णणाओ जंबूदीवम्मि जाव रिक्खाणं । ताओ लवणे धादइसंडे कालोदपोक्खरद्धेसुं ।।५९८।।

दोण्णि च्चिय लक्खाणिं सत्तट्ठीसहस्स णवसयाणिं पि । होंति हु लवणसमुद्दे ताराणं कोडिकोडीओ ।।५९९।।

२६७९००००००००००००००० ।

अट्ठ च्चिय लक्खाणिं तिण्णि सहस्साणि सगसयाणिं पि । होंति हु धादईसंडे ताराणं कोडकोडीओ ।।६००।।

८०३७०००००००००००००००० ।

अट्ठावीसं लक्खा कोडाकोडीण बारससहस्सा । पण्णासुत्तरणवसयजुत्ता ताराणि कालोदे ।।६०१।।

२८१२९५०००००००००००००० ।

अट्ठत्तालं लक्खा बावीससहस्सबेसयाणिं च । होंति हु पोक्खरदीवे ताराणं कोडकोडीओ ।।६०२।।

४८२२२०००००००००००००० ।

सेसाओ वण्णणाओ जंबूदीवस्स वण्णणसमाओ । णवरि विसेसो संखा अण्णण्णा खीलताराणं ।।६०३।।

एक्कसयं उणदालं लवणसमुद्दम्मि खीलताराओ । दसउत्तरं सहस्सा दीवम्मि य धादईसंडे ।।६०४।।

१३९ । १०१० ।

एक्कत्तालसहस्सा बीसुत्तरमिगिसयं च कालोदे । तेवण्णसहस्सा बेसयाणि तीसं च पुक्खरद्धम्मि ।।६०५।।

। ४११२० । ५३२३० ।

माणुसखेत्ते ससिणो छासट्ठी होंति एक्कपासम्मि । दोपासेसुं दुगुणा तेत्तियमेत्ताओ मत्तंडा ।।६०६।।

६६ । १३२ ।

एक्करससहस्साणिं होंति गहा सोलसुत्तरा छसया । रिक्खा तिण्णि सहस्सा छस्सयछण्णउदिअदिरित्ता ।।६०७।।

११६१६ । ३६९६ ।

अट्ठासीदीलक्खा चालीससहस्ससगसयाणिं पि । होंति हु माणुसखेत्ते ताराणं कोडकोडीओ ।।६०८।।

८८४०७०००७०००००००००० ।

पंचाणउदिसहस्सं पंचसया पंचतीसअब्महिया । खेत्तम्मि माणुसाणं चेट्ठंते खीलताराओ ।।६०९।।

९५५३५ ।

सव्वे ससिणो सूरा णक्खत्ताणिं गहा य ताराणिं । णियणियपहपणिधीसुं पंतीए चरंति णभखंडे ।।६१०।।

सव्वे कुणंति मेरुं पदाहिणं जंबुदीवजोदिगणा । अद्धपमाणा धादइसंडे तह पोक्खरद्धम्मि ।।६११।।

। एवं चरगिहाणं चारो सम्मत्तो ।

मणुसुत्तरादु परदो सयंभुरमणो त्ति दीवउवहीणं । अचरसरूवठिदाणं जोइगणाणं परूवेमो ।।६१२।।

एत्तो मणुसुत्तरगिरिंदप्पहुदि जाव सयंभुरमणसमुद्दो त्ति संठिदचंदाइच्चाणं विण्णासविहिं वत्तइस्सामो। तं जहा- माणुसुत्तरगिरिंदादो पण्णाससहस्सजोयणाणि गंतूणं पढमवलयं होदि। तत्तो परं पत्तेक्कमेक्कलक्खजोयणाणि गंतूण बिदियादिवलयाणि होंति जाव सयंभूरमणसमुद्दो त्ति णवरि सयंभूरमणसमुद्दस्स वेदीए पण्णाससहस्सजोयणाणिमपाविय तम्मि पदेसे चरिमवलयं होदि। एवं सव्ववलयाणि केत्तिया होंति त्ति उत्ते चोद्दसलक्खजोयणेहिं भजिदजगसेढी पुणो तेवीसवलएहि परिहीणं होदि। तस्स ठवणा $\frac{\text{रि २३ ।}}{१४०००००}$

एदाणं बलयाणं संठिदचंदाइच्चपमाणं वत्तइस्सामो- पोक्खरवरदीवद्धस्स पढमवलए संठिदचंदाइच्चा पत्तेक्कं चउदालब्भहिय-एक्कसयं होदि। १४४ । १४४ । पुक्खरवरणीररासिस्स पढमवलए संठिदचंदाइच्चा पत्तेक्कं अट्ठासीदिअब्भहियदोण्णिसयमेत्तं होदि। हेट्ठिमदीवस्स वा रयणायरस्स वा पढमवलए संठिदचंदाइच्चादो तदंणतरोवरिमदीवस्स वा णीररासिस्स वा पढमवलए संठिदचंदाइच्चा पत्तेक्कं दुगुणं होऊण गच्छइ जाव सयंभूरमणसमुद्दो त्ति। तत्थ अंतिमवियप्पं वत्तइस्सामो- सयंभूरमणसमुद्दस्स पढमवलए संठिदचंदाइच्चा अद्धबीसलक्खेण भजिदणवसेढीओ पुणो चउरूवहिद सत्तावीसरूवेहिं अब्भहियं होइ। तच्चेदं। $\frac{- ६}{२८०००००} \Big| \frac{२७}{४} \Big|$

पोक्खरवरदीवद्धपहुदि जावसयंभूरमणसमुद्दो त्ति पत्तेक्कदीवस्स वा उवहिस्स वा पढमवलयसंठिदचंदाइच्चाणं आणयणहेदु इमा सुत्तगाहा-

पोक्खरवरुवहिपहुदिं उवरिमदीओवहीण विक्खंभं । लक्खहिदं णवगुणिदं सगसगदीउवहिपढमवलयफलं ।।

विचयं पुण पडिवलयं पडि पत्तेक्कं चउत्तरकमेण गच्छइ जाव सयंभूरमणसमुद्दं ति। दोचरिम दीवस्स वा उवहिस्स वा दु पणजादपढमवलयट्ठाणं मोत्तूण सव्वत्थ चउक्कं उरुत्तरकमं वत्तव्वं। मणुसुत्तरगिरिंदादो पण्णाससहस्सजोयणाणि गंतूण पढमवलयम्मि ठिदचंदाइच्चाणं विच्चालं सत्तेतालसहस्स णवसयचोद्दसजोयणाणि पुणो छहत्तरिजादसदंसा तेसीदिजुदएक्कसयरूवेहिं भजिदमेत्तं होदि। तं चेदं ४७६१४ | १७६ / १८३ | बिदियवलये चंदाइच्चाणमंतरं अट्ठेतालसहस्स-छसय-छादाला जोयणाणि पुणो इगिसयतीस जुदाणं दोण्णि सहस्सा कलाओ होदि दोण्णिसयसत्तावण्णरूवेणब्भहियदोण्णिसहस्सेण हरिदमेत्तं होदि। तं चेदं। ४८६४६ | २१३० / २२५७ | एवं णेदव्वं जाव सयंभूरमणसमुद्दो त्ति। तत्थ अंतिमवियप्पं वत्तइस्सामो- सयंभूरमणसमुद्दस्स पढमवलए एक्केक्कचंदाइच्चाणमंतरं तेतीससहस्स-तिसय-इगितीस-जोयणाणि अंसा पुण पण्णारसजुदेक्कसयं हारो तेसीदिजुदएक्कसयरूवेण अब्भहियं होदि पुणो रूवस्स असंखेज्जभागेणब्भहियं होदि। तच्चेदं ३३३३१ । भा | ११५ / १८३ | एवं सयंभूरमणसमुद्दस्स बिदियपहप्पहुदि दुचरिमपहंतं विसेसाहियपरूवेण जादि। एवं सयंभूरमणसमुद्दस्स चरिमवलयम्मि चंदाइच्चाणं विच्चालं भण्णमाणे छादालसहस्स-एक्कसय बावण्णजोयणपमाणं होदि पुणो बारसाहियएक्कसयकलाओ हारो तेणउदिरूवेणब्भहिय सत्तसयमेत्तं होदि। तं चेदं ४६१५२। धण अंसा | ११२ / ७९३ |

। एवं अचरजोइगणपरूवणा समत्ता ।

एत्तो चंदाण सपरिवाराणमाणयणविहाणं वत्तइस्सामो। तं जहा- जंबूदीवादिपंचदीवसमुद्दे मुत्तूण तदियसमुद्दमादिं कादूण जाव सयंभूरमणसमुद्दो ति एदासिमाणयणकिरिया ताव उच्चदे- तदियसमुद्दम्मि गच्छो बत्तीस, चउत्थदीवे गच्छो चउसट्ठी, उवरिमसमुद्दे गच्छो अट्ठावीसुत्तरसयं। एवं दुगुणकमेण गच्छा गच्छंति जाव सयंभूरमणसमुद्दं ति। संपहि एदेहि गच्छेहि पुध पुध गुणिज्जमाणरासिपरूवणा कीरिदे- तदियसमुद्दे बेसदमट्ठासीदिमुवरिमदीवे तत्तो दुगुणं, एवं दुगुणदुगुणकमेण गुणिज्जमाणरासीओ गच्छंति जाव सयंभूरमणसमुद्दं पत्ताओ त्ति। संपहि अट्ठासीदिविसदेहि गुणिज्जमाणरासीओ ओवट्टिय लद्धेण सगसगगच्छे गुणिय अट्ठासीदिबेसदमेव सव्वगच्छाणं गुणिज्जमाणं कादव्वं। एवं कदे सव्वगच्छा अण्णोण्णं पेक्खिदूण चउग्गुणकमेण अवट्ठिदा जादा। संपइ चत्तारिरूवमादिं कादूण चदुरुत्तरकमेण गद संकलणाए आणयणे कीरमाणे पुव्विल्लगच्छेहिंतो संपहियगच्छा रूऊणा होंति, दुगुणजादट्ठाणे चत्तारि रूववड्ढीए अभावादो। एदेहि गच्छेहि गुणिज्जमाणमज्झिमधणाणि चउसट्ठिरूवमादिं कादूण दुगुण दुगुणकमेण गच्छंति जाव सयंभूरमणसमुद्दो त्ति। पुणो गच्छसमीकरणट्ठं सव्वगच्छेसु एगेगरूवपक्खूणो कायव्वो। एवं कादूण चउसट्ठिरूवेहि मज्झिमधणाणिमोवट्टिय लद्धेण सगसगगच्छे गुणिय सव्वगच्छाणं चउसट्ठिरूवाणिं गुणिज्जमाणत्तणेण ठवेदव्वाणि। एवं कदे रिणरासिस्स पमाणं उच्चदे- एगरूवमादिं कादूण गच्छं पडि दुगुण दुगुणकमेण जाव सयंभूरमणसमुद्दो त्ति गदरिणरासी होदि। संपहि एवं ठिदसंकलणाणमाणयणं उच्चदि छरूवाहियजंबूदीवच्छेदणएहि परिहीणरज्जुच्छेदणाओ गच्छं काऊण जदि संकलणा आणिज्जदि तो जोदिसिय जीवरासी ण उप्पज्जदि, जगपदरस्स बेछप्पण्णंगुल-[सद-]वग्गभागहाराणुववत्तीदो। तेण रज्जुच्छेदणासु अण्णेसिं पि तप्पाओग्गाणं संखेज्जरूवाणं हाणिं काऊण गच्छा ठवेयव्वा। एवं कदे तदियसमुद्दो आदी ण होदि त्ति णासंकणिज्जं सो चेव आदी होदि, सयंभूरमणसमुद्दस्स परभागसमुप्पण्णरज्जुच्छेदणयसलागाणमवणयणकरणादो । सयंभूरमणसमुद्दस्स परदो रज्जुच्छेदणया अत्थि त्ति कुदो णव्वदे। बेछप्पण्णंगुलसदवग्गसुत्तादो। जेत्तियाणि दीव सायररूवाणि जंबूदीवच्छेदणाणि छरूवा-हियाणि तेत्तियाणि रज्जुच्छेदणाणिं ति परियम्मेणं एदं वक्खाणं किं ण विरुज्झदे। ण, एदेण सह विरुज्झदि, किंतु सुत्तेण सह ण विरुज्झदि। तेणेदस्स वक्खाणस्स गहणं कायव्वं, ण परियम्मसुत्तस्स; सुत्तविरुद्धत्तादो। ण सुत्तविरुद्धं वक्खाणं होदि, अदिप्पसंगादो। तत्थ जोइसिया णत्थि त्ति कुदो णव्वदे। एदम्हादो चेव सुत्तादो। एसा तप्पाउग्गसंखेज्जरूवाहियजंबूदीवछेदणयसहिददीव-समुद्दरूवमेत्तरज्जुच्छेदणयपमाणपरिक्खाविही ण अण्णाइरियउवदेस-परंपराणुसारिणी, केवलं तु तिलोयपण्णत्तिसुत्ताणुसारिणी, जोदिसियदेवभागहारपदुप्पाइयसुत्तावलंबिजुत्तिबलेण पयदगच्छसाधणट्ठमेसा परूवणा परूविदा। तदो ण एत्थ इदमित्थमेवेत्ति एयंतपरिग्गहेण असग्गाहो कायव्वो, परमगुरुपरंपरागउवएसस्स जुत्तिबलेण विहडावेदुमसक्कियत्तादो, अदिंदिएसु पदत्थेसु छदुमत्थवियप्पाण मविसंवादणियमाभावादो। तम्हा पुव्वाइरियवक्खाणापरिच्चाएण एसा विदिसा हेदुवादाणुसारिविउप्पण्णसिस्साणुग्गहण-अवुप्पण्णजणउप्पायणट्ठं च दरिसेदव्वा। तदो ण एत्थ संपदायहविरोधो कायव्वो त्ति।

एदेण विहाणेण परूविदगच्छं विरलिय रूवं पडि चत्तारि रूवाणि दादूण अण्णोण्णभत्थे कदे कित्तिया जादा इदि उत्ते संखेज्जरूवगुणिदजोयलक्खस्स वग्गं पुणो सत्तरूवसदीए गुणिय चउसट्ठिरूववग्गेहि पुणो वि गुणिय जगपदरे भागे हिदे तत्थ लद्धमेत्तं होदि। पुणो एदं दुट्ठाणे रचिय एक्कारासिं बेसदअट्ठासीदिरूवेहिं गुणिदे सव्वआदिधणपमाणं होदि। अवररासिं चउसट्ठिरूवेहिं गुणिदे सव्वपचयधणं होदि। एदे दो रासीओ मेलिय रिणरासिमवणिय गुणगार भागहाररूवाणिमोवट्टाविय भारभूदसंखेज्जरूवगुणिदजोयणलक्खवग्गं पदरंगुलकदे संखेज्जरूवेहिं गुणिदपण्णट्ठिसहस्स-पंचसय-छत्तीस-रूवमेत्तपदरंगुलेहि जगपदरमवहरिदमेत्तं सव्वजोइसियबिंबपमाणं होदि। तं चेदं। ४ । ६५५३६१६५५३६१ । पुणो एक्कम्मि बिंबम्मि तप्पाउग्गसंखेज्जजीवा अत्थि त्ति तं संखेज्जरूवेहि गुणिदेसिं सव्वजोइसिय जीवरासिपरिमाणं होदि। तं चेदं १६५५३६१ ।

चंदस्स सदसहस्सं सहस्स रविणो सदं च सुक्कस्स । वासाधियेहि पल्लं तं पुण्णं धिसणणामस्स ।।६१४।।

सेसाणं तु गहाणं पल्लद्धं आउगं मुणेदव्वं । ताराणं तु जहण्णं पादद्धं पादमुक्कस्सं ।।६१५।।

प १ व १००००० । प १ व १००० । प १ व १०० । प १ | प $\frac{१}{२}$ | प $\frac{१}{८}$ | प $\frac{१}{४}$ |

। आऊ समत्ता ।

एवमाइरियपरंपरागयतिलोयपण्णत्तीए जोइसियलोयसरूवणिरूवणपण्णत्ती णाम सत्तमो महाधियारो सम्मत्तो ।।७।।

अट्ठमो महाधियारो

उत्तरकुरुमणुवाणं एक्केणूणेणं तह य बालेणं । पणवीसुत्तरचउसयकोदंडेहिं विहीणेणं ।।६।।

इगिसट्ठीअहिएणं लक्खेणं जोयणेण ऊणाओ । रज्जूओ सत्त गयणे उड्ढट्ठं णाकपडलाणिं ।।७।।

$\frac{-७}{७}$ रिण १०००६१ रिण दंड ४२५ रि वा १ ।

। णिवासखेत्तं सम्मत्तं ।

कणयद्दिचूलिउवरिं उत्तरकुरुमणुवएक्कबालस्स । परिमाणेणंतरिदो चेट्ठेदि हु इंदओ पढमो ।।८।।

पढमे चरिमं सोधिय रूऊणियइंदयप्पमाणेणं । भजिदूणं जं लद्धं ताओ इह हाणिवड्ढीओ ।।१६।।

ते रासि ६२ । ४४००००० । १ ।

सत्तरिसहस्सणवयसगसट्ठीजोयणाणि तेवीसं । अंसा इगितीसहिदा हाणी पढमादु चरिमदो वड्ढी ।।२०।।

७०६६७ | $\frac{२३}{३१}$ |

चउदाललक्खजोयण उणतीससहस्सयाणि बत्तीसं । इगितीसहिदा अट्ठ य कलाओ विमलिंदयस्स वित्थारो ।।२१।।

४४२६०३२ | $\frac{८}{३१}$ |

तेदाललक्खजोयणअट्ठावण्णासहस्सचउसट्ठी । सोलसकलाओ कहिदा चंदिंदयरुंदपरिमाणं ।।२२।।

४३५८०६४ | $\frac{१६}{३१}$ |

पणतीसुत्तरणवसय इगिदालसहस्स जोयणदुलक्खा । पण्णरसकला रुंदं पीदिंकरइंदए कहिदो ।।७६।।

$$२४१६३५\left|\frac{१५}{३१}\right|$$

सत्तरिसहस्स णवसय सत्तट्ठीजोयणाणि इगिलक्खा । तेवीसंसा वासो आइच्चे इंदए होदि ।।८०।।

$$१७०६६७\left|\frac{२३}{३१}\right|$$

एक्कं जोयणलक्खं वासो सव्वट्ठिसिद्धिणामस्स । एवं तेसट्ठीणं वासो सिट्ठो सिसूण बोहट्ठं ।।८१।।

$$\left|१०००००\right|$$

मेरुतलादो उवरिं दिवड्ढरज्जूए आदिमं जुगलं । तत्तो हुवेदि बिदियं तेत्तियमेत्ताए रज्जूए ।।११८।।
तत्तो छज्जुगलाणिं पत्तेक्कं अद्धअद्धरज्जूए । एवं कप्पा कमसो कप्पातीदा य ऊणरज्जूए ।।११६।।

$$\frac{-३}{१४}\left|\frac{-३}{१४}\right|\frac{}{१४}\left|\frac{}{१४}\right|\frac{}{१४}\left|\frac{}{१४}\right|\frac{}{१४}\left|\frac{}{१४}\right|\frac{}{१४}\left|\frac{}{७}\right|$$

। एवं भेदपरूवणा सम्मत्ता ।

आइच्चइंदयस्स य पुव्वादिसु लच्छिलच्छिमालिणिया । वइरो वइरोइणिया चत्तारो वरविमाणाइं ।।१२३।।
अण्णदिसाविदिसासुं सोमज्जं सोमरूवअंकाइं । पडिहं पइण्णयाणि य चत्तारो तस्स णादव्वा ।।१२४।।
कणयट्टिचूलउवरिं किंचूणदिवड्ढरज्जुबहलम्मि । सोहम्मीसाणक्खं कप्पदुगं होदि रमणिज्जं ।।१२६।।

$$\frac{}{१४}\ ३\left|\right.$$

ऊणस्स य परिमाणं चालजुदं जोयणाणि इगिलक्खं । उत्तरकुरुमणुवाणं बालग्गेणादिरित्तेणं ।।१३०।।

१०००४० ।

छासीदीअधियसयं बासट्ठी सत्तविरहिदेक्कसयं । इगितीसं छण्णउदी सीदी बाहत्तरी य अडसट्ठी ।।१५५।।
चउसट्ठी चालीसं अडवीसं सोलसं च चउ चउरो । सोहम्मादीअट्ठसु आणदपहुदीसु चउसु कमा ।।१५६।।
हेट्ठिममज्झिमउवरिमगेवज्जेसुं अणुद्दिसादिदुगे । सेढीबद्धपमाणप्पयासणट्ठं इमे पभवा ।।१५७।।

१८६ । ६२ । ६३ । ३१ । ६६ । ८० । ७२ । ६८ । ६४ । ४० । २८ । १६ । ४ । ४ ।

सोहम्मादिचउक्के तियएक्कतियेक्कयाणि रिणपचओ । सेसेसुं कप्पेसुं चउचउरूवाणि दादव्वा ।।१५८।।

३ । १ । ३ । १ । ४ । ४ । ४ । ४ । ४ । ४ । ४ । ४ ।

इगितीससत्तचउदुगएक्केक्कछतितितियएक्केक्का । ताणं कमेण गच्छा बारसठाणेसु रचिदव्वा ।।१५६।।

३१ । ७ । ४ । २ । १ । १ । ६ । ३ । ३ । ३ । १ । १ ।

गच्छं चयेण गुणिदं दुगुणिदमुहमेलिदंचयविहीणं । गच्छद्धेणप्पहदे संकलिदं एत्थ णादव्वं ।।१६०।।
तेदालीससयाणिं इगियत्तरिउत्तराणि सेढिगदा । सोहम्मणामकप्पे इगितीसं इंदया होंति ।।१६१।।

४३७१ । ३१ ।

सत्तावण्णा चोद्दससयाणि सेढिंगदाणि ईसाणे । पंचसया अडसीदी सेढिगदा सत्त इंदया तदिए ।।१६२।।

। १४५७ । ५८८ । ७ ।

माहिंदे सेढिगदा छण्णउदीजुदसदं च बम्हम्मि । सट्ठी जुदतिसयाणिं सेढिगदा इंदयचउक्कं ।।१६३।।

। १६६ । ३६० । ४ ।

छप्पण्णब्भहियसयं सेढिगदा इंदया दुवे छट्ठे । महसुक्के बाहत्तरि सेढिगया इंदओ एक्को ।।१६४।।

१५६ । २ । ७२ । १ ।

अडसट्ठी सेढिगया एक्को च्चिय इंदयं सहस्सारे । चउवीसुत्तरतिसया छइंदया याणदादियचउक्के ।।१६५।।

। ६८ । १ । ३२४ । ६ ।

हेट्ठिममज्झिमउवरिमगेवज्जाणं च सेढिगदसंखा । अट्ठब्भहिएक्कसयं कमसो बाहत्तरी य छत्तीसं ।।१६६।।

। १०८ । ७२ । ३६ ।

ताणं गेवज्जाणं पत्तेक्कं तिण्णि इंदया चउरो । सेढिगदाण अणुद्दिस अणुत्तरे इंदया हु एक्केक्का ।।१६७।।

अधहेट्ठिमगेवज्जे ण होंति तेसिं पइण्णयविमाणा । बत्तीसं मज्झिल्ले उवरिमये होंति बावण्णा ।।१७६।।

० । ३२ । ५२ ।

तत्तो अणुद्दिसाये चत्तारि पइण्णया वरविमाणा । तेसट्ठिअहिप्पाए पइण्णया णत्थि अत्थि सेढिगया ।।१७७।।

सक्कदुगम्मि सहस्सा सोलस एक्केक्कजेट्ठदेवीए । चेट्ठंति चारुअणुवमरूवा परिवारदेवीओ ।।३०८।।

अट्ठचउदुगसहस्सा एक्कसहस्सं सणक्कुमारदुगे । बम्हम्मि लंतविंदे कमेण महसुक्कइंदम्मि ।।३०९।।

पंचसया देवीओ होंति सहस्सारइंददेवीणं । अट्ठाइज्जसयाणिं आणदइंदादियचउक्के ।।३१०।।

। १६००० । ८००० । ४००० । २००० । १००० । ५०० । २५० ।

तत्तो दुगुणं ताओ णियणियतणुविकुव्वणकराओ । आणदइंदचउक्कं जाव कमेणं पवत्तव्वो ।।३१५।।

३२००० । ६४००० । १२८००० । २५६००० । ५१२००० । १०२४००० ।

पढमादु अट्ठतीसे दक्खिणपंतीए चक्कणामस्स । पणुवीससेढिबद्धे सोलसमे तह सणक्कुमारिंदो ।।३४१।।

तस्सिंदयस्स उत्तरदिसाए पणुवीससेढिबद्धम्मि । सोलसमसेढिबद्धे चेट्ठेदि महिंदणामिंदो ।।३४२।।

छासट्ठीकोडिलक्खा कोडिसहस्साणि तेत्तियाणिं पि । कोडिसया छच्चेव य छासट्ठीकोडियहियाणिं ।।४६१।।

छासट्ठीलक्खाणिं तेत्तियमेत्ताणि तह सहस्साणिं । छस्सयछासट्ठीओ दोण्णि कला तियविहत्ताओ ।।४६२।।

एदाणिं पल्लाइं आऊ उडुविंदयम्मि उक्कस्से । तं सेढीबद्धाणं पइण्णयाणं च णादव्वं ।।४६३।।

६६६६६६६६६६६६६ | २/३ |

उडुपडलुक्कस्साऊ इच्छियपडलप्पमाणरूवेहिं । गुणिदूणं आणेज्जं तस्सिं जेट्ठाउपरिमाणं ।।४६४।।

चोद्दसठाणेसु तिया एक्कं अंकक्कमेण पल्लाणिं । एक्ककला उक्कस्से आऊविमलिंदयम्मि पुढं ।।४६५।।

| १३३३३३३३३३३३३३३ | १/३ |

चोद्दसठाणे सुण्णं दुगं च अंकक्कमेण पल्लाणिं । उक्कस्साऊ चंदिदयम्मि सेढीपइण्णएसुं च ।।४६६।।

२०००००००००००० |

चोद्दसठाणे छक्का दुगं च अंकक्कमेण पल्लाणिं । दोण्णि कला उक्कस्से आऊ वग्गुम्मि णादव्वो ।।४६७।।

२६६६६६६६६६६६६६ | २/३ |

तिण्णि महण्णवउवमा तिण्णि कला इंदयम्मि वणमाले । चत्तारि उवहिउवमा एक्ककला णागपडलम्मि ।।४६९।।

सा ३ | क ३/७ | सा ४ | १/७ |

पढमे बिदिए जुगले बम्हादिसु चउसु आणददुगम्मि । आरणजुगले कमसो सव्विंदेसुं सरीररक्खाणं ।।५१८।।
पलिदोवमाणि आऊ अड्ढाइज्जं हुवेदि पढमम्मि । एक्केक्कपल्लवड्ढी पत्तेक्कं उवरिउवरिम्मि ।।५१९।।

$$\frac{५}{२}\left|\frac{७}{२}\right|\frac{९}{२}\left|\frac{११}{२}\right|\frac{१३}{२}\left|\frac{१५}{२}\right|\frac{१७}{२}\left|\frac{१९}{२}\right|$$

बाहिरमज्झब्भंतरपरिसाए होंति तिण्णि चत्तारिं । पंच पलिदोवमणिं उवरिं एक्केक्कपल्लवड्ढीए ।।५२०।।

३,४,५ । ४, ५, ६ । ५, ६, ७ । ६, ७, ८ । ७, ८, ९ । ८, ९, १० । ९, १०, ११ । १०, ११, १२ |

कप्पं पडि पंचादी पल्ला देवीण वट्टदे आऊ । दोदोवड्ढी तत्तो लोयायणिये समुद्दिट्ठं ।।५३०।।

५ । ७ । ९ । ११ । १३ । १५ । १७ । १९ । २१ । २३ । २५ । २७ । २९ । ३१ । ३३ । ३५ |

बद्धाउं पडि भणिदं उक्कस्संमज्झिमंजहण्णाणिं । घादाउवमासेज्जं अण्णसरूवं परूवेमो ।।५४१।।

एत्थ उडुम्मि पढमपत्थले जहण्णमाऊ दिवड्ढपलिदोवमं उक्कस्समद्धसागरोवमं। अद्धसागरोवमं मुहं होदि, भूमी अड्ढाइज्जसागरोवमाणि। भूमीदो मुहमवणिय उच्छेहेण भागे हिदे तत्थ एक्कसागरोवमस्स पण्णारसभागोवरिम वड्ढी होदि $\left|\frac{१}{१५}\right|$ एदमिच्छिदपत्थडसंखाए गुणिय मुहे पक्खित्ते विमलादीण तीसण्हं पत्थडाणमाउआणि होंति। तेसिमेसा संदिट्ठी-

$$\left|\frac{१७}{३०}\right|\frac{१९}{३०}\left|\frac{२१}{३०}\right|\frac{२३}{३०}\left|\frac{२५}{३०}\right|\frac{२७}{३०}\left|\frac{२९}{३०}\right|\frac{३१}{३०}\left|\frac{३३}{३०}\right|\frac{३५}{३०}\left|\frac{३७}{३०}\right|\frac{३९}{३०}\left|\frac{४१}{३०}\right|\frac{४३}{३०}\left|\frac{४५}{३०}\right|\frac{४७}{३०}\left|\frac{४९}{३०}\right|\frac{५१}{३०}\left|\frac{५३}{३०}\right|$$

$$\left|\frac{५५}{३०}\right|\frac{५७}{३०}\left|\frac{५९}{३०}\right|\frac{६१}{३०}\left|\frac{६३}{३०}\right|\frac{६५}{३०}\left|\frac{६७}{३०}\right|\frac{६९}{३०}\left|\frac{७१}{३०}\right|\frac{७३}{३०}\left|\text{सा}\ \frac{५}{२}\right|$$ सणक्कुमारमाहिंदे सत्त पत्थडा। एदेसिमाउव-
पमाणमाणिज्जमाणे मुहमड्ढाइज्जसागरोवमाणि, भूमी अद्धसागरोवमहियसत्त सागरोवमाणि, सत्त उच्छेहो होदि। तेसिं संदिट्ठी-

$$\left|\frac{३ \mid ३}{१४}\right|\frac{३ \mid १३}{१४}\left|\frac{४ \mid ९}{१४}\right|\frac{५ \mid ५}{१४}\left|\frac{६ \mid १}{१४}\right|\frac{६ \mid ११}{१४}\left|\frac{७ \mid १}{२}\right|\text{सा}$$ बम्ह बम्हुत्तर कप्पे चत्तारि पत्थला। एदेसिमाउव-
माणिज्जमाणे मुहं अद्धसागरोवमहियसत्तसागरोवमाणि, भूमी अद्धसागरोवमहियदससागरोवमाणि। एदेसिमाउआण संदिट्ठी।

$$\left|\frac{८ \mid १}{४}\right|९\left|\frac{९ \mid ३}{४}\right|\frac{१० \mid १}{२}\Bigg|$$

उवहिउवमाणजीवी वरिससहस्सेण दिव्वअमयमयं । भुंजदि मणसाहारं णिरुवमयं तुट्ठिपुट्ठिकरं ।।५५१।।
जेत्तियजलणिहिउवमा जो जीवदि तस्स तेत्तिएहिं च । वरिससहस्सेहि हवे आहारो पणुदिणाणि पल्लमिदे ।।५५२।।
अरुणवरदीवबाहिरजगदीदो जिण्णवरुत्तसंखाणिं । गंतूण जोयणाणिं अरुणसमुद्दस्स पणिधीए ।।५६७।।
एक्कदुगसत्तएक्के अंककमे जायणाणि उवरि णहं । गंतूणं वलएणं चेट्ठेदि तमो तमक्काओ।।५६८।।

१७२१ ।

आदिमचउकप्पेसुं देसवियप्पाणि तेसु कादूणं । उवरिगदबम्हकप्पप्पढमिंदयपणिधितल पत्तो ।।५६६।।
मूलम्मि रुंदपरिही हुवेदि संखेज्जजोयणा तस्स । मज्झम्मि असंखेज्जा उवरिं तत्तो यसंखेज्जो ।।६००।।
संखेज्जजोयणाणिं तमकायादो दिसाए पुव्वाएं । गच्छिय सडंसमुखायारथरो दक्खिणुत्तरायामो ।।६०१।।
णामेण किण्हराई पच्छिमभागे वि तारिसो य तमो । दक्खिणउत्तरभागे तम्मेत्तं गंधुव दीहचउरस्सा ।।६०२।।
एक्केक्ककिण्हराई हुवेदि पुव्वावरट्ठिदायामा । एदाओ राजीओ णियमा ण छिवंति अण्णोण्णं ।।६०३।।
संखेज्जजोयणाणिं राजीहिंतो दिसाए पुव्वाए । गंतूणब्भंतरए राजी किण्हा य दीहचउरस्सा ।।६०४।।
उत्तरदक्खिणदीहा दक्खिणराजिं ठिदा य छिविदूणं । पच्छिमदिसाए उत्तरराजिं छिविदूण होदि अण्णतमो ।।६०५।।
संखेज्जजोयणाणिं राजीदो दक्खिणाए आसाए । गंतूणब्भंतरए एक्कं चिय किण्णराजियं होइ ।।६०६।।

दीहेण छिंदिदस्स य जवखेत्तस्सेक्कभागसारिच्छा । पच्छिमबाहिरराजिं छिविदूणं सा ठिदा णियमा ।।६०७।।
पुव्वावरआयामो तमकाय दिसाए होदि तप्पट्ठी । उत्तरभागम्मि तमो एक्को छिविदूण पुव्वबहिराजी ।।६०८।।
अरुणवरदीवबाहिरजगदीए तह य तमसरीरस्स । विच्चाल णहयलादो अब्भंतरराजितिमिरकायाणं ।।६०९।।
विच्चालं आयासे तह संखेज्जगुणं हवेदि णियमेणं । तं माणादो णेयं अब्भंतरराजिसंखगुणजुत्ता ।।६१०।।
अब्भंतरराजीदो अधिरेगजुदो हवेदि तमकाओ । अब्भंतरराजीदो बाहिरराजी व किंचूणा ।।६११।।
बाहिरराजीहिंतो दोण्णं राजीव जो दु विच्चालो । अधिरित्तो इय अप्पाबहुवं होदि हु चउद्दिसासुं पि ।।६१२।।
एदम्मि तमिस्से जे विहरंते अप्परिद्धिया देवा । दिम्मूढा वच्चंते माहप्पेणं महद्धियसुराणं ।।६१३।।
राजीणं विच्चाले संखेज्जा होइ बहुविहविमाणा । एदेसु सुरा जादा खादा लोयंतिया णाम ।।६१४।।
संसारवारिरासी जो लोओ तस्स होंति अंतम्मि । जम्हा तम्हा एदे देवा लोयंतिय त्ति गुणणामा ।।६१५।।
चत्तारि च लक्खाणिं सत्तसहस्साणि अडसयाणिं पि । छब्भहियाणिं होदि हु सव्वाणं पिंडपरिमाणं ।।६३४।।

४०७८०६ ।

एदाए बहुमज्झे खेत्तं णामेण ईसिपब्भारं । अज्जुणसुवण्णसरिसं णाणारयणेहिं ___परिपुण्णं ।।६५६।।
उत्ताणधवलछत्तोवमाणसंठाणसुंदरं एदं । पंचत्तालं जोयणलक्खाणिं वाससंजुत्तं ।।६५७।।
तम्मज्झबहलमट्ठं जोयणया अंगुलं पि यंतम्मि । अट्ठमभूमज्झगदो तप्परिही मणुवखेत्तपरिहिसमो ।।५५८।।

८ । अं १ ।

सक्कीसाणा पढमं माहिंदसणक्कुमारया बिदियं । तदियं च बम्हलंतववासी तुरिमं सहस्सयारगदा ।।६८५।।
आणदपाणदआरणअच्चुदवासी य पंचमं पुढविं । छट्ठी पुढवी हेट्ठा णवविधगेवज्जगा देवा ।।६८६।।
सव्वं च लोयणालिं अणुद्दिसाणुत्तरेसु पस्संति । सक्खेत्ते य सकम्मे रूवमगदमणंतभागो य ।।६८७।।
कप्पामराणं णियणियओहीदव्वं सविस्ससोवचयं । ठविदूण य हरिदव्वं तत्तो धुवभागहारेणं ।।६८८।।
णियणियखेणियदेसं सलागसंखा समप्पदे जाव । अंतिल्लखंधमेत्तं एदाणं ओहिदव्वं खु ।।६८९।।
होंति असंखेज्जाओ सोहम्मदुगस्स वासकोडीओ । पल्लस्सासंखेज्जो भागो सेसाण जहजोग्गं ।।६९०।।

। एवं ओहिणाणं गदं ।

सोहम्मीसाणदुगे विंदगुलतदियमूलहदसेढी । बिदियजुगलम्मि सेढी एक्करसमवग्गमूलहिदा ।।६९१।।
बम्हम्मि होदि सेढी सेढीणववग्गमूलअवहरिदा । लंतवकप्पे सेढी सेढीसगवग्गमूलहिदा ।।६९२।।

९ । ७ ।

महसुक्कम्मि य सेढी सेढीपणवग्गमूलभजिदव्वा । सेढी सहस्सयारे सेढीचउवग्गमूलहिदा ।।६९३।।

५ । ४ ।

अवसेसकप्पजुगले पल्लासंखेज्जभागमेक्केक्के । देवाणं संखादो संखेज्जगुणा हुवंति देवीओ ।।६९४।।

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हेट्ठिममज्झिमउवरिमगेवज्जेसुं अणुद्दिसादिदुगे । पल्लासंखेज्जसो सुराण संखाए जहजोग्गं ।।६९५।।

| प |

| ९ |

णवरि विसेसो सव्वट्ठसिद्धिणामम्मि होदि संखेज्जा । देवाणं परिसंखा णिद्दिट्ठा वीयरागेहिं ।।६९६।।

। संखा गदा ।

एवमाइरियपरंपरागदतिलोयपण्णत्तीए देवलोयसरूवणिरूवणपण्णत्ती णाम अट्ठमो महाधियारो सम्मत्तो ।।७।।

णवमो महाधियारो

अट्ठमखिदीए उवरिं पण्णासब्भहियसत्तयसहस्सा । दंडाणिं गंतूणं सिद्धाणं होदि आवासो ।।३।।

पणदोछप्पणइगिअडणहचउसगचउखचदुरअडकमसो । अट्ठहिदा जोयणया सिद्धाण णिवासखिदिमाणं ।।४।।

८४०४७४०८१५६२५ ।

८

। णिवासखेत्तं गदं ।

तीदसमयाण संखं अडसमयब्भहियमासछक्कहिदा । अडहीणछस्सयाहदपरिमाणजुदा हुवंति ते सिद्धा ।।५।।

अ । ५६२ |

मा ६ स ८ |

। संखा गदा ।

पणकदिजुदपंचसया ओगाहणया धणूणि उक्कस्से । आउट्ठहत्थमेत्ता सिद्धाण जहण्णठाणम्मि ।।६।।

५२५ । ह $\frac{७}{२}$ |

तणुवादबहलसंखं पणसयरूवेहि ताडिदूण तदो । पण्णरसदेहि भजिदे उक्कस्सोगाहणं होदि ।।७।।

१५७५ । ५०० | ५२५ |

१५००

तणुवादबहलसंखं पणसयरूवेहि ताडिदूण तदो । णवलक्खेहिं भजिदे जहण्णमोगाहणं होदि ।।८।।

१५७५ । ५०० | $\frac{७}{२}$ |

६००००

लोयविणिच्छयगंथे लोयविभागम्मि सव्वसिद्धाणं । ओगाहणपरिमाणं भणिदं किंचूणचरिमदेहसमो ।।९।।

दीहत्तं बाहल्लं चरिमभवे जस्स जारिसं ठाणं । तत्तो तिभागहीणं ओगाहण सव्वसिद्धाणं ।।१०।।

पण्णासुत्तरतिसया उक्कस्सोगाहणं हवे दंडं । तियभजिदसत्तहत्था जहण्णओगाहणं ताणं ।।११।।

३५० । ह | $\frac{७}{३}$ |

तणुवादपवणबहले दोहिं गुणि णवेण भजिदम्मि । जं लद्धं सिद्धाणं उक्कस्सोगाहणं ठाणं ।।१२।।

२२५० । १५७५ । ५०० । १ । एदेण तेरासिलद्धं २ । १५७५ । ३५० ।

तणुवादस्स य बहले छस्सयपण्णत्तरीहि भजिदम्मि । जं लद्धं सिद्धाणं जहण्णओगाहणं होदि ।।१३।।

१३५००००० । १५७५ । २००० । १ । तेरासिएण सिद्धं $\frac{१५७५}{६७५}$ | $\frac{७}{३}$ |

एवमाइरियपरंपरागयतिलोयपण्णत्तीए सिद्धलोयसरूवणिरूवणपण्णत्ती णाम णवमो महाधियारो सम्मत्तो ।।७।।

The measurements about the various structures for the 24 ford founders of the hyposerpentine (avasarpiṇī) period are given in arithmatical regressions. The common differences are therefore negative in every case.

The circular common grounds, the dhūlisālakoṭa, its arcade, the pride-pillar ground, the conscious-tree ground (caitya vṛkṣa bhūmi), the preaching structure of a ford-founder (samavasaraṇa) the perfume-cottage, the eight great auspicious objects (prātihārya) are the material which may be drawn geometrically as per given description.

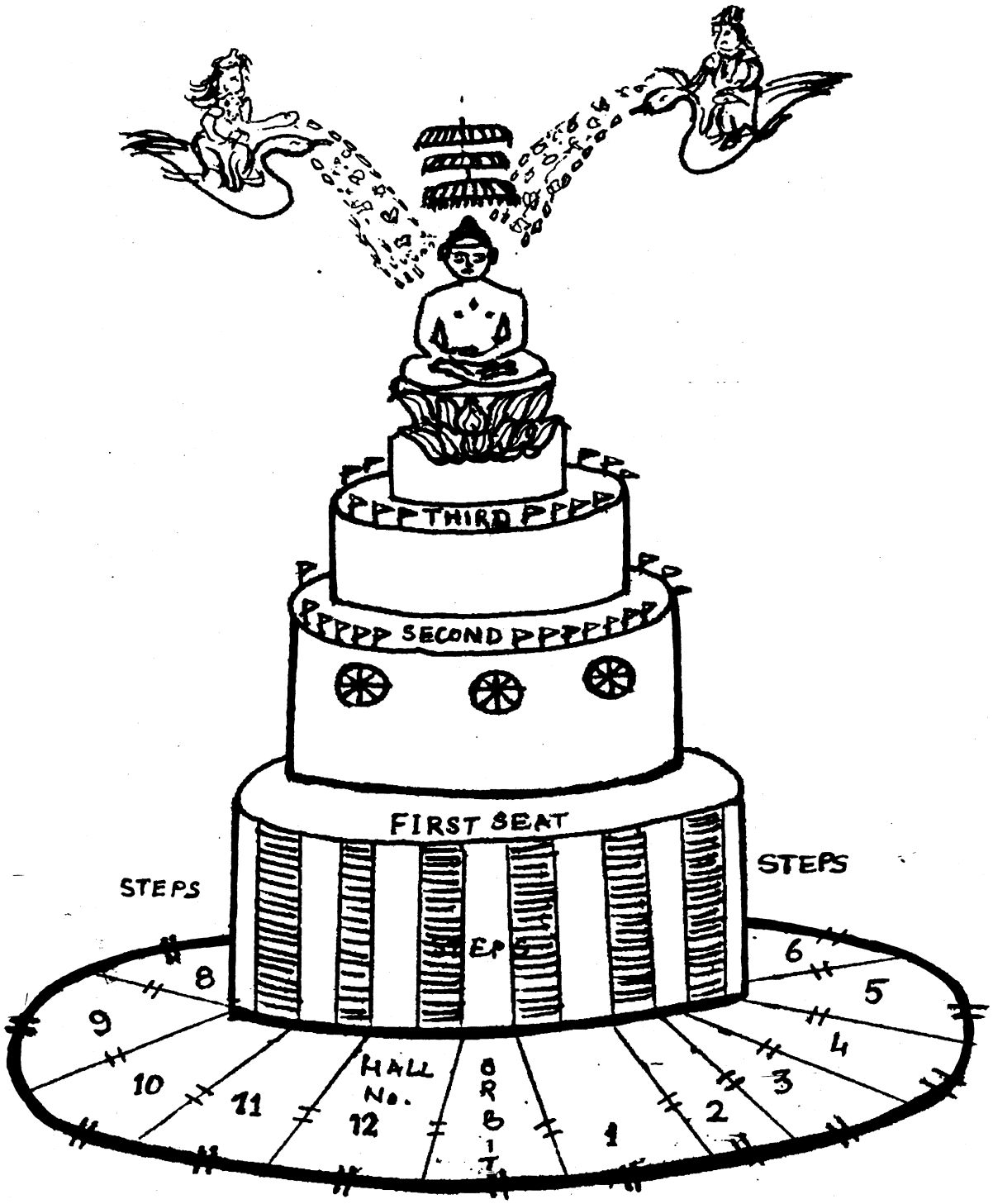


FIG. No. ( ) GANDHA KUTI

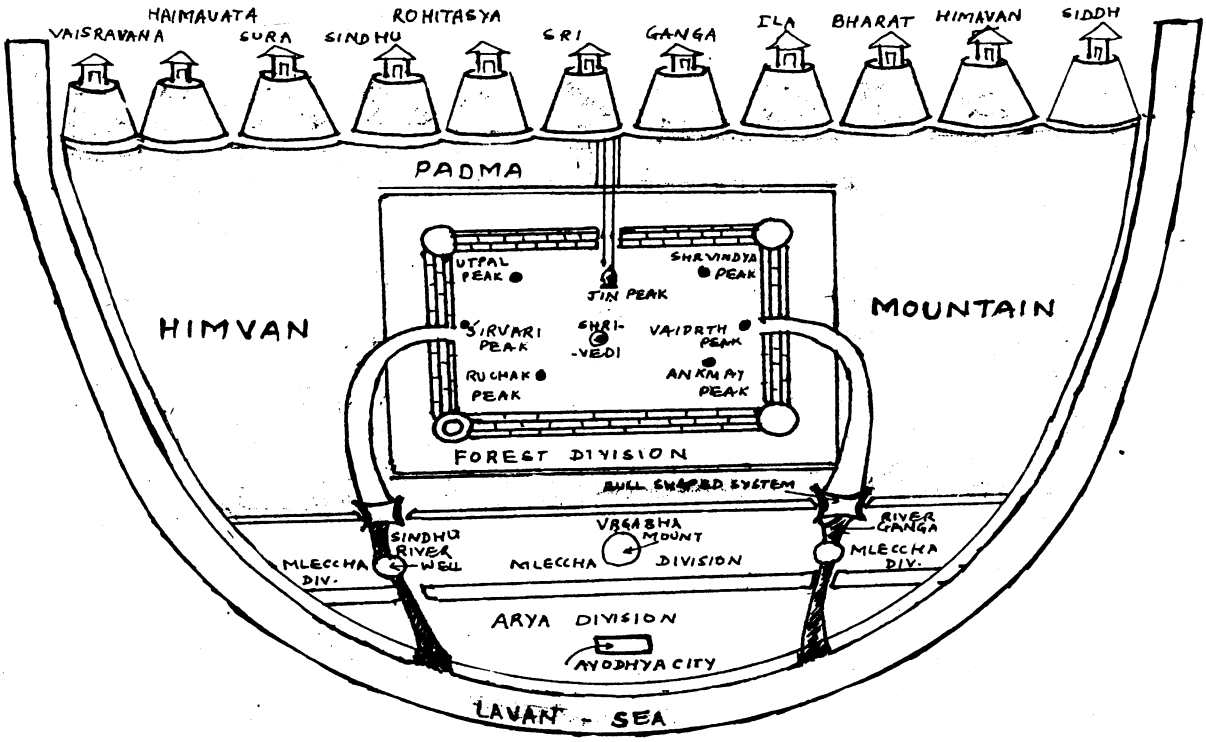


FIG. No. ( ) BHARAT KSETRA (HIMVAN MOUNTAIN RANGE MAGNIFIED)

4·5·10

VV. 4·1624 et seq.

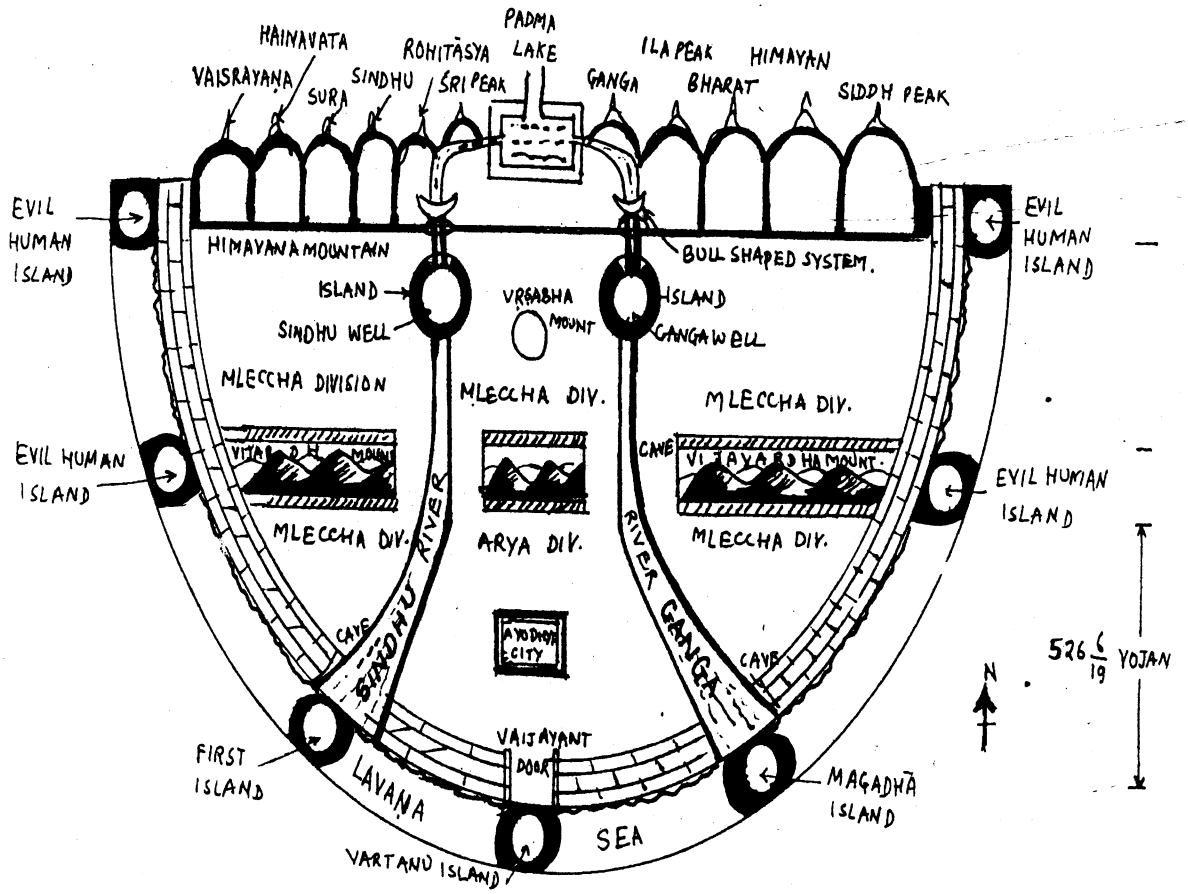


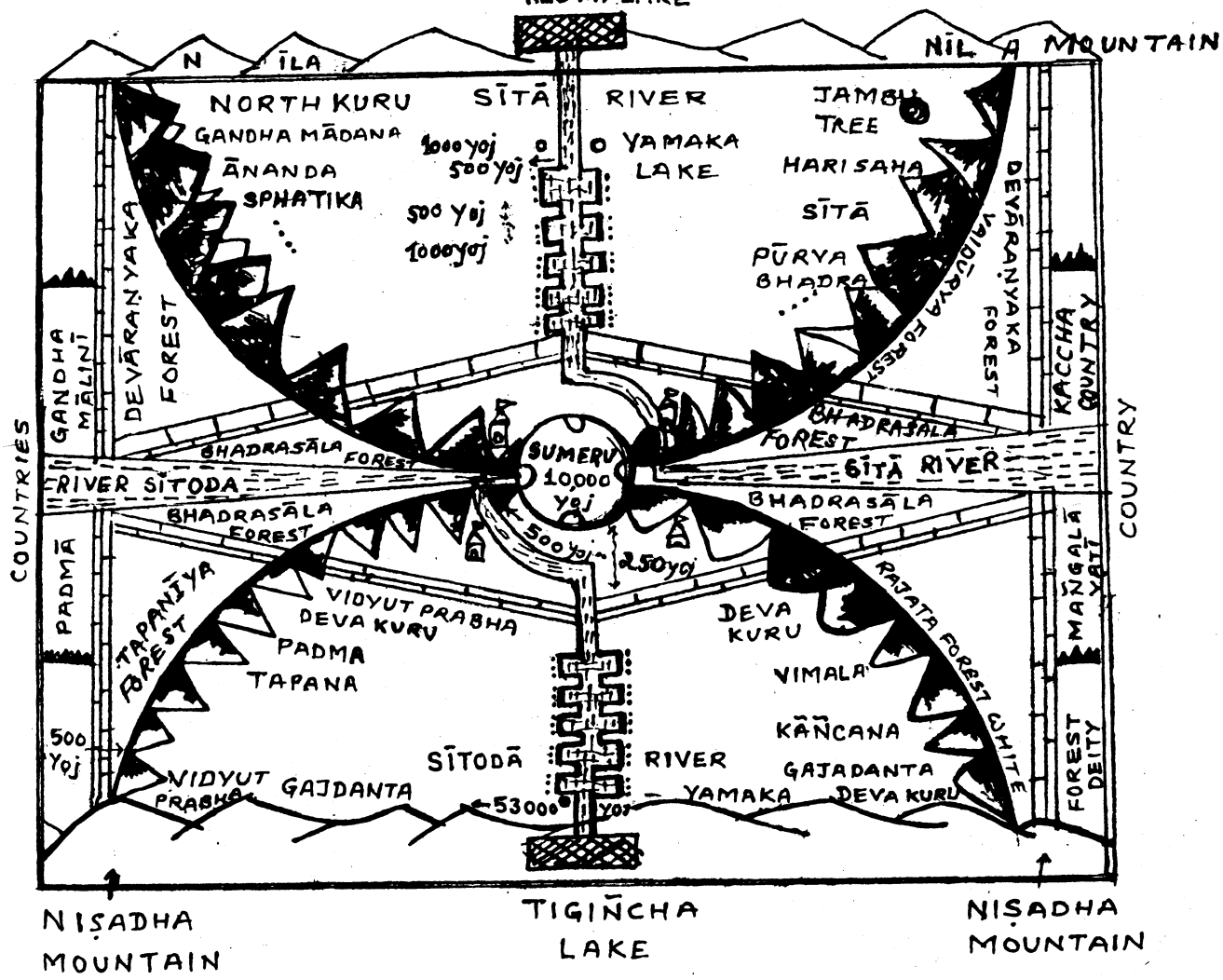
FIG. No. ( ) BHARATA KSETRA

4.5.9.

VV. 4.1624 et seq.

IV.

DEVA KURU NORTH KURU AND GAJADANTA



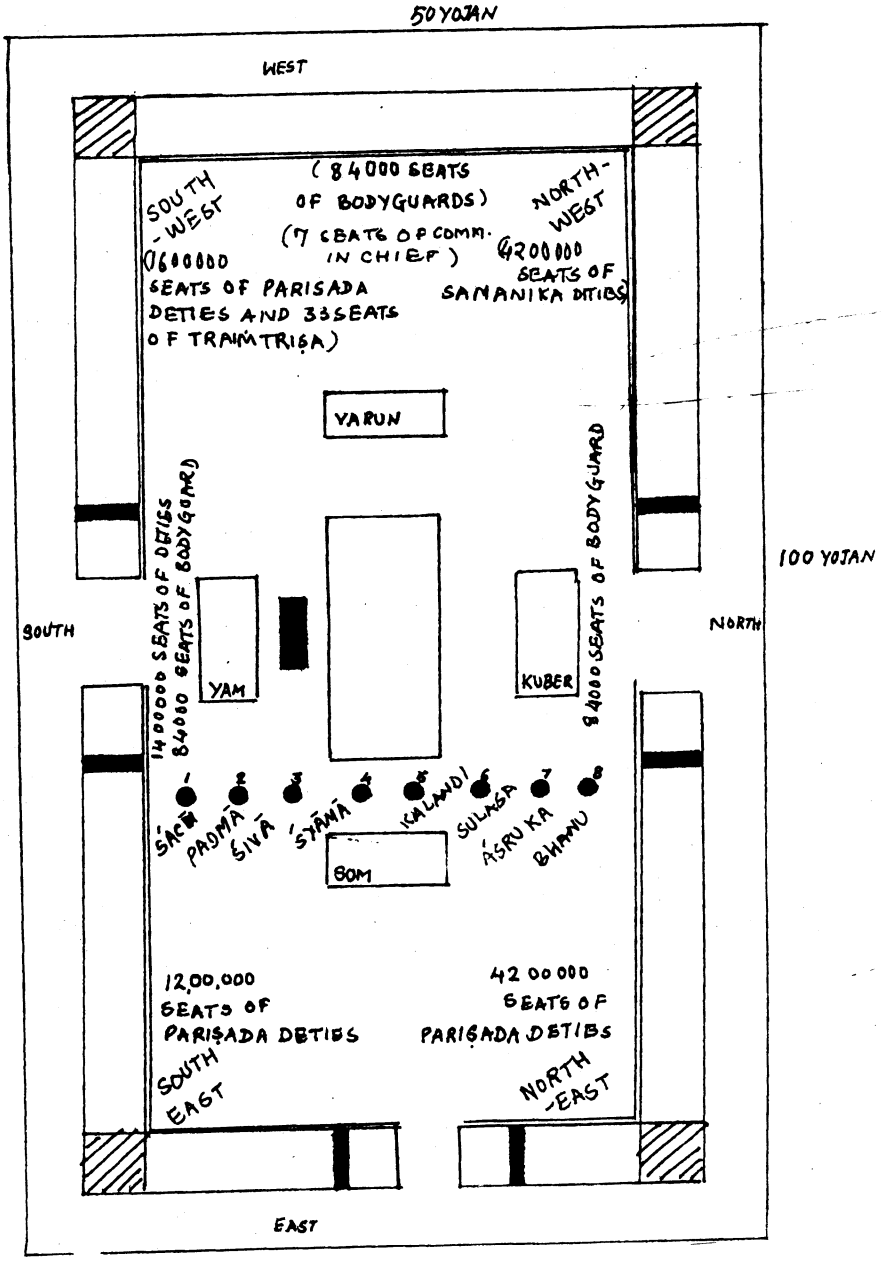


FIG. No. ( ) ASSEMBLY OF SAUDHARMENDRA

4. 15.1. V. 4.1975 et seq.

(vv.4.719 et seq.)

The measurements about the various structures for the 24 ford-founders of the hyposerpentine (avasarpiṇī) period are given in arithmetical regressions. The common differences are therefore negative in every case.

The circular common grounds, the dhūliśālā koṭa, its arcade, the pride-pillar ground, the conscious-tree ground (caitya vṛkṣa bhūmi), the preaching structure of a ford-founder (samavasaraṇa), the perfume-cottage, the eight great auspicious objects (prātihārya) are the material (which may be drawn geometrically as per given description.

IV . A.M. 214. 1

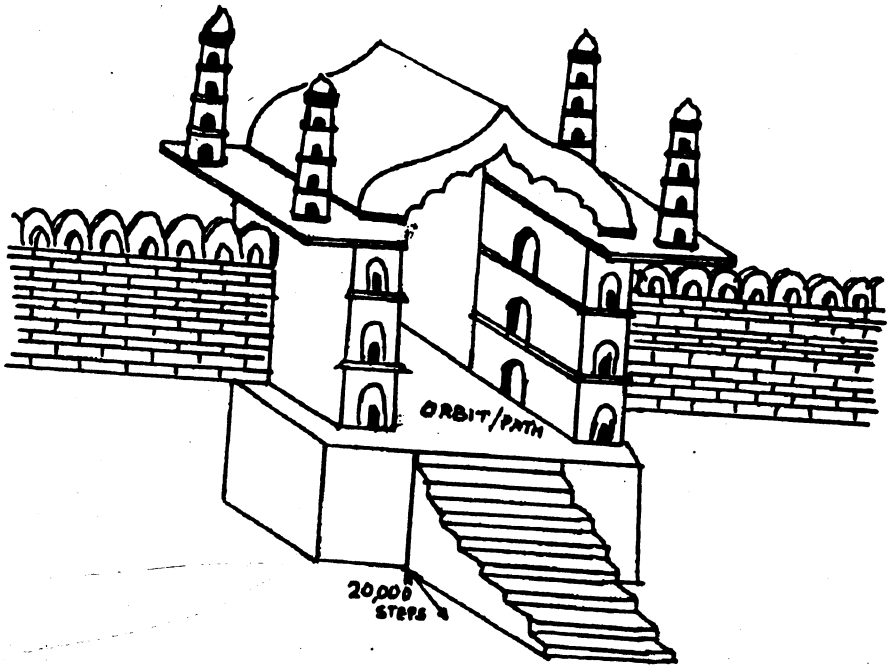


FIG.NO. (4.5.4) DULIŚĀLAKOT AND ITS ARCADE DOOR

Roman Transliteration of Devanāgarī

VOWELS

Short:	अ	इ	उ	ऋ	ऌ	and	ऽ	
	a	i	u	ṛ	ḷ			
Long:	आ	ई	ऊ	ए	ओ	ऐ	औ	
	ā	ī	ū	e	o	ai	au	
Anusvāra:	ं	=	ṁ					
Visarga:	ः	=	ḥ					
Non-aspirant	ः	=	s					

CONSONANTS

Classified:	क्	ख्	ग्	घ्	ङ्			
	k	kh	g	gh	ṅ			
	च्	छ्	ज्	झ्	ञ्			
	c	ch	j	Jh	ñ			
	ट्	ठ्	ड्	ढ्	ण्			
	ṭ	ṭh	ḍ	ḍh	ṇ			
	त्	थ्	द्	ध्	न्			
	t	th	d	dh	n			
	प्	फ्	ब्	भ्	म्			
	p	ph	b	bh	m			
Unclassified:	य्	र्	ल्	व्	श्	ष्	स्	ह्
	y	r	l	v	ś	ṣ	s	h
Compound:	क्ष्	त्र्	ज्ञ्					
	kṣ	tr	jñ					

Note : Sanskrit न् (n) is generally represented in Prakrit by 'ṅ', but the dental n may occur before other dental, e.g., danta as in Sanskrit. This however is often written दंत daṁta or daṃta. In Jaina works, the dental 'n' is frequently written at the beginning of words. Similarly, for पंच etc. the ङ् generally does not occur, but pronunciation in completion is not exactly understood through symbolism alone above.

WORKS

ABT	Āryabhaṭīya of Āryabhaṭācārya
AGS	Āṅgasuttāṇi
APN	Ādipurāṇa of Ācārya Jinasena
ASG	Artha Saṁdṛṣṭi of Ṭoḍaramala
BBS	Bhadrabāhu Saṁhitā of Ācārya Bhadrabāhu
BJK	Bṛhajjātakaṁ of Varāhamihira Ācārya
BKS	Bṛhatkṣetrasamāsa of Ācārya Jinabhadra
BSG	Bṛhatsaṅgrahaṇī sūtra of Ācārya Candrasūri
BTS	Bhāṣikā Ṭīkā of Ṭoḍaramala
CPJ	Candraprajñapti Sūtram
DVL	Dhavalā Commentary of Vīrasenācārya
DVS	Dravyasaṁgraha of Muni Nemicandra
GJK	Gommaṭasāra Jīvakāṇḍa of Ācārya Nemicandra Siddhānta Cakravartī
GKK	Gommaṭasāra Karmakāṇḍa of Ācārya Nemicandra Siddhānta Cakravartī
GNG	Gaṇitānuyoga (Collection) by Muni K.L. 'Kamal'
GSS	Gaṇitasārasaṅgraha of Mahāvīrācārya
GTK	GaṇitaTilaka of Ācārya Śrīpati
JDL	Jayadhavalā Commentary of Vīrasenācārya and Jinasenācārya
JGD	Jaina Gem Dictionary. by J. L. Jaini
JKP	Jyotiṣa Karaṇḍakam Prakīrṇakam
JLV	Jaina Lakṣaṇāvalī by B. C.Siddhānta śāstrī
JPS	Jaṁbūdīvapaṇṇatti Saṁgaho of Ācārya Paumnandi (Sholapur)
JPT	Jaṁbūdīvapaṇṇatti Saṁgaho (Bombay)
KJP	Kevala Jñāna Praśna Cūḍāmaṇi of Ācārya Samantabhadra
KPS	Kasāya Pāhuḍa Sutta of Ācārya Guṇadhara
LKS	Laghukṣetrasamāsa of Ācārya Ratnaśekhara
LVG	Loka Vibhāga of Ācārya Siṁhasūri
LVV	LaghuVidyānuvāda by Ācārya Kunthusāgara

LVY	Loka Vijaya Yantra (of Ācārya Bhadrabāhu ?)
MBD	Mahābandha of Bhagavanta Ācārya Bhūtabali
MBK	Mahābhāskarīya of Bhāskarācārya
MHP	Mahāpurāṇa of Puṣpadanta
PGT	Pāṭīgaṇita of Śrīdharācārya
PJP	Praśna Jñāna Pradīpikā
PSD	Pañcasiddhāntikā of Varāhamihira Ācārya
PSK	Pañcāstikāya of Ācārya Kundakunda
SKG	Ṣaṭkhaṇḍāgama of Bhagavanta Ācārya Puṣpadanta and Bhagavanta Ācārya Bhūtabali
SPJ	Sūryaprajñapti Sūtram
SSD	Sūryasiddhānta
SVS	Sarvārthasiddhi of PūjyaPāda
TLS	Trilokasāra of Ācārya Nemicandra Siddhāntacakravartī
TPT	Tiloyapaṇṇattī of Ācārya Yativṛṣabha
TVT	Tattvārthavārtika of Bhaṭṭācārya Akalaṅkadeva
UPN	Uttarapurāṇa of Ācārya Guṇabhadra
VDJ	Vedāṇga Jyotiṣa of Lagadha Ācārya
VTN	Vrata Tithi Nirṇaya (by N.C. Śāstrī)
YTR	Yantrarāja of Mahendra Guru
YTS	Yantraśiromaṇi of Śrīviśrāma

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JOURNALS

AHEI	Archives of History of Exact Sciences
AORS	Annals of Bhaṇḍārkara Oriental and Research Society
ARAS	Archaeo-Astronomy
ARVC	Arhat Vacana (Indore)
ASCN	Āsthā Aura Cintana (Felicitation Volume)
ASRE	Asiatic Research
BAMT	Bibliothica Mathematica
BCMS	Bulletin of Calcutta Mathematical Society
CNTR	Centaurus
EPGI	Epigraphica Indica
GNBT	Gaṇita Bhāratī
HRST	Historia Scientiarum
IDIR	Indo-Iranian Journal
IDST	Indological Studies
IJHS	Indian Journal of History of Science
HRMT	Historia Mathematica
ISJM	Proc. International Seminar on Jaina Maths and Cosmology (DJICR, Hastināpura)
JAOS	Journal of American Oriental Society
JASC	Journal of Asiatic Society, Calcutta
JASI	Journal of Astronomical Society of India
JBRS	Journal of Bihar-Orissa Research Society
JGKV	Journal of Gaṅgānātha Jhā Kendrīya Sanskrit Vidyāpeeth (Allahabad)

JNAQ	Jaina Antiquary (Arrah)
JNSB	Jaina Siddhānta Bhāskara (Arrah)
JRAS	Journal of Royal Asiatic Society of Great Britain and Ireland
JRHA	Journal of History of Astronomy
MASI	Memoirs of Archaeological Survey of India
MTED	Mathematics Education
NISI	National Institute of Science in India
SCMT	Scripta Mathematica
TSPJ	Tulsī Prajñā (J.V.B.I. - Ladnun)

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INTRODUCTION

Before we introduce the work on the project, "Mathematical Contents in the Digambara Jaina Texts of the Karaṇānuyoga group", it seems indispensable to give a brief background of the circumstances leading to the compendium of the mathematical knowledge of the cosmos, the three universes (triloka). In every religion or religious philosophy, there is vast literature, yet perhaps mathematics has been applied to the knowledge of astronomy alone. In Jainism, however, there is an application of mathematics and its symbolism, beyond astronomy, the cosmology and the Karma theory, giving a special form of study in history of Mathematical Jainology in India.

Being a secular State, the Govt. of Bihar State took a lead in establishing four institutes as follows:

1. Institute for P. G. Studies and Research in Sanskrit and Vedic Culture at Mithila
2. Institute for P. G. Studies and Research in Prakrit and Jainology at Vaishali
3. Institute for P.G. Studies and Research in Pali and Bauddhology at Nava-Nalanda, Mahabihara
4. Institute for P. G. Studies and Research in Arabic Persian language, literature and Culture at Patna.

Some Universities, as the Sukhāḍiā, Madras and Mysore have department of Jainology, yet the Mathematical Jainology has not found its place in any one of them, at present, a short in interdisciplinary studies in modern context.

An important feature appears to be that upto the period of Maurya Emperor Candragupta, there was the heard knowledge (śruta jñāna) alone for want of a script in India. After having renounced the throne, he appears to have been initiated by Ācārya Bhadrabāhu(c.4th century B.C.), and it seems quite possible that he, being in contact with the Greeks and their script, might have attempted to put the Karma theory, (prevalent in mathematical form in the Digambara Jaina Āgama at present as the Ṣaṭkhaṇḍāgama and the Kasāya Pāhuḍa) into a written document for the posteriority due to its tough and rigid mathematically symbolic form. As such, for twelve years of devoted service at the feet of his initiator, he might have invented the Brāhmī and the Sundarī scripts (mentioned under these names for the linguistic and mathematical forms of studies in the Ādipurāṇa of Jinasenācārya). These have been spoken as the Ghanākṣarī and Hīnākṣarī in anecdotes about

the authors of the Ṣaṭkhaṇḍāgama, by later authors and writers.(Vide Introduction in the Dhavalā, vol.1). The theory of Karma creation, bonds, and annihilation is mathematical and embedded with symbolism. This was in the folk prevalent language, called Prakrit in which sermons were delivered right from the period of Varddhamāna Mahāvīra, who is said to be the last among the twenty four earlier Fordfounders (Tīrthaṅkaras). The pupil-ascetics propagated the sermons all over the country in the folk language of the places they visited and universality creeped in their style of teaching, creating universal brotherhood through non-violence in particular, for all living beings, inclusive of the flora and fauna.

The fundamental principle of the Karma theory is, "As you sow so you reap", at every point and every instant in the cosmos. The individual had full freedom to raise himself of his own accord. This principle of independence from all others, even from a bios as well as a single particle, appealed to the posteriority, not being new for the dynasties. From the ancient times, there have been the Emperors (Cakravartīs), Balabhadras, Vāsudevas, anti-Vāsudevās, apart from the fordfounders. Emphasis has been on the attainment of the serene vision (samyak darśana) which could create a chain reaction in the annihilation of vision-charm and disposition-charm, resulting in endless vision, knowledge, bliss and power. Dr. H. L. Jain[1] traces the mention of Lord Ṛṣabhadeva, the first fordfounder of this era in the Ṛgveda Ṛcā in which Ṛṣabha and Keśī occur together,[1]

"Kakardave Vṛṣabho yukta āsīd,
avāvacīt sārathirasy keśī
dudharyuktasyą dravataḥ sahānasa,
ṛcchanti mā niṣpado mudgalānīm

(Ṛgveda, 10, 102, 6.)

It may also be noted that there was a separation, in the Jina organization, as the Digambara and the Śvetāmbara, from the period of Ācārya Bhadrabāhu and the initiated Maurya Emperor Candragupta,[2] and also further subdivisions later on. Thus not only the Maurya dynasty but also the Kadamba dynasty, the Gaṅga dynasty, the Rāṣṭrakūṭa dynasty, the Cālukya and Hoyasāla dynasty as well as some other dynasties were extending patronage to Jainism under the influence of the vast knowledge, vision and wisdom with kindness towards every life.

As already mentioned, the traditional knowledge of the Vedic religion, Upaniṣadas, Jainism and Buddhism was in heard (śruta and smṛti forms) which seem to have been put in written form only after the invention of the Brāhmī and Sundarī scripts. For such a speculation there are three evidences:

1. The absence of any inscription before the edicts of Aśoka.
2. The statement of Megasthenese that the Indians work without alphabets.
3. There are coins of the successors of Alexander the Great, with Brāhmī and Greek, or Kharoṣṭhī and Greek legends on either of the sides.

In Jaina tradition the śruta has been divided into two classes:

1. dravya śruta (heard knowledge in form of words or other construction)
2. bhāva śruta (heard knowledge in form of norm or meaning or thought)

At present it is not known whether there was any literature on Jainism in written form before Lord Mahāvīra, yet it existed in form of bhāva śruta, called the "pūrvas". The twelfth portion (aṅga) of the Jaina revelation (Āgama) was the Dṛṣṭivāda. In the Dṛṣṭivāda there are contained fourteen pūrvas describing various systems of thoughts, faiths, the profound theory of Karma, learnings and sciences. The 'pūrvas' are the utpāda, the agrāyaṇīya, the vīryānuvāda, the asti-nāsti pravāda, the jñāna pravāda, the satya pravāda, the ātma pravāda, the karma pravāda, the pratyākhyāna, the vidyānuvāda, the kalyāṇavāda (abandhya as per Śvetāmbara tradition), the prāṇavāya, the kriyāviśāla and the lokabindusāra. These include not only the religious, philosophical and moral thoughts but also various arts, astrology, āyurveda, astronomy, magic, tantra and other such types of a compendium of learnings. Only a few chapter of their contents of the Karma theory was with Ācārya Dharasena from whom the renowned disciples, Puṣpadanta and Bhūtabali learned and compiled the Śaṭkhaṅḍāgama.

According to Digambara Jaina tradition, sermons of Lord Mahāvīra were divided into two parts, the inclusive (aṅga praviṣṭa) and the exclusive (aṅga bāhya). The twelve aṅgas are the inclusive part and the fourteen topics are under the exclusive part. They are the sāmāyika, the caturviṁśatistava, the vandanā, the pratikramaṇa, the vainayika, the kṛtikarma, the daśavaikālika, the uttarādhyayana, the kalpavyavahāra, the kalpākalpa, the mahākalpa, the puṇḍarīka, the mahāpuṇḍarīka and the niṣiddhikā. These are also available in the Śvetāmbara tradition. The Śvetāmbara also claim (what the Digambaras not, refuting them as non-authentic) to have eleven aṅgas of the heard knowledge as follows in Ardhamāgadhī: the ācārāṅga, the sūtrakṛtāṅga, the sthānāṅga, the samavāyāṅga, the bhagavatī (vyākhyā prajñapti), the jñātṛadharmakathā, the upāsakādhyayana, the antakṛddaśā, the anuttaropapādikadaśā, the praśnavyākaraṇa, and the vipākaśūtra.

The twelfth aṅga is the Dṛṣṭivāda (only a portion of which is claimed to be with the Digambara Jaina tradition in form of the Śaṭkhaṅḍāgama and the Kasāyapāhuḍa describing

the Karma theory and beyond horizons) was classified into five parts: the parikarma, the sūtra, the pūrvagata, the anuyoga and the cūlikā. Parikarma included the scriptology and mathematics.[3]

We are concerned only with the revelation literature as available with the Digambara Jaina community in Śaursenī Prākrit. The Digambara Jainas regard it as authentic, (the Śvetāmbara do not). The first and foremost ancient work in this tradition is the Kasāyapāhuḍa, in possession of Guṇadharācārya (c.1st century A.D.). The second is the Śaṭkhaṅḍāgama in possession of Dharasenācārya (c.1st century A.D.). The available commentaries, the Dhavalā and the Jayadhavalā, respectively, were compiled by Vīrasenācārya (the latter being completed by Jinasenācārya after the death of Vīrasenācārya), the former set is now available in sixteen volumes and the latter set is available in fifteen volumes. The sixth part of the Śaṭkhaṅḍāgama is called the Mahābandha compiled by Bhūtabalī ācārya. and is also available now in seven volumes.

In this tradition, the compiled literature has been classified into four types of studies:

1. Prathamānuyoga: This includes the texts on purāṇas (myths), caritas (biographies , stories or kathās.
2. Karanāṇuyoga: Texts on astronomy, mathematics, cosmology, cosmography, cosmogony, etc.
3. Caraṇānuyoga: Texts on conducts, rules etc. to be observed by ascetics and laymen.
4. Dravyānuyoga: Theoretical texts on seven tautos (tattvas), bios (jīva), non-bios (ajīva), deep thoughts on their philosophy, Karma theory, purport, measures, classification, denomination etc.

Literature on the Karaṇānuyoga Group

This literature includes the description of the upper, middle and lower universes, of islands and seas, regions, mountains, rivers in form, and measures of their dimensions through mathematical operations.The texts of this group of study divide the whole cosmos into two parts, the universe-space (lokākāśa) and the non-universe-space (alokākāśa). The non-universe space is that part of the cosmos where there is only space without any material, conscious or any other non-concrete fluents (dravyās).The universe-space is that part of the cosmos that contains the bios, matter (pudgala), and the non-concrete aether (dharma) as well

as anti-aether (adharma) continuum fluents cooperating the bios and matter in their states of motion and rest respectively. It also contains the time-particles fluents (kāla dravya), discrete in structure and instrumental in change of modes of all the fluents. The five types of fluents are accommodated by the space continuum fluent. Thus, the fluents region is divided into the upper, middle and lower universes with mathematical structures which are the base of roles of various fluents.

The middle universe is a unified region containing the geography of our earth, the astronomy and cosmological structure through mathematical details in three types of units, the ātmāṅgula, the utsedhāṅgula and the pramāṇāṅgula.The cosmological structure of the middle universe is divided into concentric rings, with Sumeru mountain at the centre. Their sequence defines the number of astral bodies and the rājū (the rope) which is one-seventh part of the world-line (jagaśreṇī) whose cube defines the volume of the whole universe. The rings have been given innumerate in number and their comparative areas etc. studied. They are successively double in width than each of its preceding ring.

The Jambū island is the first ring having a diameter of one lac yojana, where yojana is also of three types depending on the three aṅgulas, having different measures, of course, according to contexts of geography, astronomy and cosmology. The next ring is that of the Lavaṇa sea with a width of two lac yojanas. This sea is surrounded by the island Dhātakīkhaṇḍa, having a width of four lac yojanas. This island is then surrounded by the ring of sea, the Kālodadhi, having a width of eight lac yojanas. This goes on, till the last island is the Svayambhūraṃaṇa. surrounded by the last sea of the similar name. The Kālodadhi is surrounded by the Puṣkaravara island having a ring width of sixteen lac yojanas. Now at half of the distance, that is eight lac yojanas, there is the boundary mountain in ring shape called the Mānuṣottara which can not be crossed by the human beings and beyond which there are no human beings. Thus, upto this point from the centre of the Jambū island, the region is defined as human universe (mānuṣa-loka).

The Jambū island is divided into seven regions through six family mountains (kula-parvatas). the names of regions are Bharata, Haimavata, Hari, Videha, Ramyaka, Hairaṇyavata and Airāvata. The dividing forests are respectively the Himavan, Mahāhimavan, Niṣadha, Nīla, Rukmī and śikharī. Out of these, the central Videha region is the greatest, and in its centre is the Meru mountain. In the Bharata region, the Gaṅgā originates from the Himvan, move towards the eastern sea and the Sindhu moves towards the western sea. In the middle is the Vindhya mountain. These rivers and mountains divide the Bharata region into six parts, in all of which the victorious king is called the ṣaṭkhaṇḍa

cakravartī.

The rāju, as defined (as the width of the madhyaloka (middle universe)) above in terms of the innumerate rings of islands and seas upto the Svambhūramaṇa sea, is used for the height and thickness of the upper universe as seven rājūs and seven rājūs, similar being those of the lower universe. In the upper universe, the first comes the astral universe (jyotirloka) of the sun, the moon, the planets, the constellations and the stars, located through a plan of "yojana" determinable through shadow reckoning and other methods for geographical and astronomical measures.

Above them there are sixteen heavens (svargas) called respectively, as Saudharma, Īśāna, Sānatkumāra, Māhendra, Brahma, Brahmottara, Lāntava, Kāpiṣṭha, Śukra, Mahāśukra, Śatāra, Sahasrāra, Ānata, Prāṇata, Āraṇa and Acyuta. They are also called divisional (kalpa), because the deities residing therein have degrading ranks, 10 divisions successively as Indra, Sāmānika, Trāyastriṅśa, Pāriṣada, Ātamarakṣa, Lokapāla, Anīka, Prakīrṇaka, Ābhiyogya and Kilviṣaka. Above these 16 heavens or paradises are the five celestial-planes beyond division (kalpātīta) over the Nau Graiveyaka, and they are denominated as Vijaya, Vaijayanta, Jayanta, Aparājita and Sarvārthasiddhi Above the Sarvārthasiddhi, there is the foremost part of the upper universe, where reside the liberated souls. Beyond these there is absence of the Dharma fluent, hence neither bios, matter, nor any fluent can enter into the empty space. Similarly, in the lower universe, there are seven hells one below the other successively, called Ratna, Śarkarā, Bālukā, Paṅka, Dhūma, Tamaḥ and Mahātamaḥprabhā.

In the Bharata region of the Jambū island there is a periodic change in the conditions of the living beings etc., degrading in Avasarpiṇī kalpārdha and upgrading in Utsarpiṇī kalpārdha. Accordingly, Suṣamā-Suṣamā, Suṣamā, Suṣamā-Duṣamā, Duṣamā-Suṣamā, Duṣamā and Duṣamā-Duṣamā division of happiness-misery in the Avasarpiṇī, and a reverse order occurs in the Utsarpiṇī in the first three divisions. There is the structure of pleasure-land (bhoga-bhūmi) in which human beings satisfy their demands and all the necessities of food, clothing etc., through the kalpa-trees. They are ignorant obout agriculture, industrial-occupations etc.

At the ultimate end of the Suṣamā-Duṣamā, the orderly arrangments of the pleasure-land gradually comes to an end, and the structure of karma-land ensues. At that time there incarnate 14 kulakaras, successively, who explain the timely duties to be performed, related with the karma-land. At the end of the Suṣamā-Duṣamā period of the Avasarpiṇī, the 14 kulakaras are incarnated as Pratiśruti, Sanmati, Kṣemaṅkara, Kṣemandhara, Sīmaṅkara,

Sīmandhara, Vimalvāhana, Cakṣuṣmān, Yaśasvī, Amicandra, Candrābha, Marudeva, Prasenajita and Nābhirāja. These 14 kulakaras, specifically Nābhirāja, built up the orders of the six types of karmas: Asi, Masi, Kṛṣi, Vidyā,Vāṇijya and Śilpa, After them, in the 4th period of Duṣamā-Suṣamā, there incarnate 63 śalākā puruṣa, Ṛṣabha etc., 24 ford founders (Tīrthaṅkaras) ending with Vardhamāna Mahāvīra, 12 cakaravartīs, 9 baladevas 9 vāsudevas, and 9 anti-vāsudevas. After the nirvāṇa of Mahāvīra the fifth period Duṣamā ensued and it continues at present. All this description is more or less similar in the texts on the Karaṇānuyoga group, both in the Digambara and Śvetāmbara traditions, containing mathematical descriptions.

Digmbara Jaina Texts on the Karaṇānuyoga Group :

1. The Tiloyapaṇṇatti of Ācārya Yativṛṣabha:

The Tiloyapaṇṇatti or Triloka-prajñapti (TPT) is an ancient Indian text in Prakrit. It deals with Jaina Cosmography and also with many topics of religions and cultural interest. It contains 9 chapters as follows :

(a) General Nature of the universe;

(b) Hellish Regions;

(c) Bhavanavāsi Regions;

(d) Human World;

(e) Sub-human World;

(f) Vyantara (Low-deities);

(g) Astral Regions;

(h) Heavenly Regions;

(i) The Realm of Freedom.

Now and then there appear arithmetical, geometrical and sometimes algebraic symbolism. The major bulk is in verse and there are a few prose passages, some detached words, introducing a few verses.

The first chapter contains 283 gāthās and a few prose passages. They are in Indravajrā, Svāgatā, Upajāti, in gāthā metre, Dodhaka, Śārdūlavikrīḍita, Vasantatilakā and Mālinī in various manuscripts as detailed in TPT. It is definitely based on sufficiently ancient

tradition, corroborated by the author as received by him through a succession of teachers, refering to Gurūpadeśa (7-113,162). He refers to and quotes the opinions of certain ancient texts like the Agrāyaṇī, Parikarma and Lokaviniścaya, no more available now. He is frank in admitting in a number of places (3.13, 118, 161; 4. 48, 750 etc.) that the information or traditional instruction about a specified topic had not traditionally reached him through his teachers or is lost beyond recovery. In more than 40 places, we get gāthās called Pāṭhāntaram, and alternative views indicated by athavā. Hence the author's aim appears to record the tradition a faithfully and exhaustively as possible.

The authorship of the text has been discussed by several authors, (TPT, intro.) According to TPT itself, the authorship is two fold. With reference to the artha or norms and grantha or text. Lord Mahāvīra, who is endowed with supernatural gifts and merits is the kartā with reference to the artha or norms. After him, these norms (contents) have been inherited through Gautama Gaṇadhara and other successive ācāryas. The TPT (9.76-77) is interpreted, as Yativṛṣabha indicating, the extent of TPT as in two other works called Cūrṇisvarūpa and (Ṣaṭ-) Karaṇa-svarūpa. The latter possibly composed by himself. Indranandi, the author of the Śrutāvatāra, adds the two following Āryās, (155-156), informing that Yativṛṣabha, studied the sūtras of the Kasāyaprābhṛta from Nāgahasti and Āryamaṅkṣu, acquiring special proficiency; then by way of commentary on the same he wrote Cūrṇisūtras, six thousand in extent. This is corroborated by Vīrasena and Jinasena in their Jayadhavalā commentary of the Kaṣāya prābhṛta. Thus the author of TPT is the same as the Cūrṇisūtras auther of KSP. As KSP is a profound work on Karma theory they had magnified its Cūrṇi contents 10 times, that of Uccāraṇācārya, for explaining it fully well. Yativṛṣabha shows a traditional method of interpretation and manner of exposition, refering to the contents of the Karma pravāda, the 8th pūrva, and to the Karmaprakṛti, the 4th prābhṛta of the 5th vastu of the 2nd pūrva.

The Ṣaṭkaraṇasvarūpa is untraceable though it has been refered to in TPT 1. 116 as the one skilled in Karaṇa. The TPT and KSP's Jayadhavalā possibly contains a reference to Guṇadhara who propounded the Kaṣāyaprābhṛta in gāthās. It implies that Yativṛṣabha held Guṇadhara in high esteem.

According to Vīrasena, Yativṛṣabha was a śiṣya of Āryamaṅkṣu and an antevāsī of Nāgahastī. The former denotes a traditional disciple and the latter denotes a contemporary and close pupil. These two names appear in Śvetāmbara's, 'Nandisūtra'.

After a long dicussion of various facts and the mention of old ancient Prakrit texts by Yativṛṣabha as Aggāyaṇīya, (Maggāyaṇie), Saggāyanī, Diṭṭhivāda, Parikamma, Mūlāyāra,

Loyaviṇicchaya, Loyavibhāga and Logāiṇī, Dr. A. N. Upadhye and Dr. H. L. Jain confirmed the existence of the author, Yativṛṣabha, as flourishing later than Guṇadhara, Āryamaṅkṣu, Nāgahasti, Kundakunda and Sarvanandi, and Kalkin (473 A.D.), and earlier than Vīrasena (816 A.D.), and possibly also Jinabhadra Kṣamā śramaṇa (609 A.D.). Thus his period may be in between these dates from 473 A.D. to 609 A.D..

So far as the Karaṇānuyoga material with its requisite details and mathematical material is concerned, the contents of TPT are closely allied to those of the Sūrya- Candra-Jambū-dvīpa-prajñaptis of the Ardhamāgadhī canon, as well as to other ancient and modern works in Prakrit and Sanskrit, such as Lokavibhāga, Dhavalā, Jayadhavaḷā, Trlokasāra and Jambū-dvīpa prajñapti-saṁgraha, and Trailokyadīpikā. What Kirfel has presented in his Die Kosmographie der Inder (Bonn u. Leipzig, 1920) deserves to be compared in details with the contents of TPT, as the present investigator has done with that in the collection, 'Gaṇitānuyoga'. Further Jinabhadragaṇī's Kṣetrasamāsa and Saṁgrahanī also deserves to be compared with TPT.

As will be seen from the mathematical contents of the TPT, the apporach to the cosmological theory is principle theoretic. The ultimate particle of matter (paramāṇu), the ultimate part of time or instant (samaya), the ultimate part of space (pradeśa), indivisible-corresponding-sections (avibhāgī praticcheda) of knowledge, yoga, kaṣāya etc., all lead to the principle theoretic apporach. The accuracy of calculations, the depth of the penetration of mathematical manipulation is in the study of volumes of the air- envelops surrounding the various portions of the universe, the successive units and their relations, value of $\sqrt{10}$ as π various types of sequences, motion of the sun and the moon, the number of moons and their families in the whole universe.

Apart from the above, TPT describes the 63 śalākā puruṣa and references to the dynasties of various kings, as Pālaka, Puṣyamitra, Vasumitra, Agnimitra, Gandharva Naravāhana, Kalkī etc. which have historical value.

The description of different regions with their rivers, mountains, cities etc., may be interesting to geographical study for their mathematical setting, in the T-O maps. Thus the geography, astronomy and cosmology, all unify in TPT with their separate units, giving intermingling and mysterious results in measures.

The Mathematical Contents of TPT: an Introduction:

The TPT which introduces the essentials of the past, present and future cosmological

sturcture on the basis of tradition is, in main, not a mathematical text. The versified form of presentation describe often the results alone and state the formulae used, here and there. In this text, owing to glimpses of mathematics, some description has been possible about the style of calculations. From the historical point of view, this text appears to be important for its mathematical contents. In this text, there have been found such topics and description, in comparision with other contemporary and some earlier texts, on the basis of which the prevalent knowledge of mathematics can be ascertained as during a few centuries earlier than the compilation of TPT. The most important thing is the description through symbols for proper innumerate and infinite numbers representing number measure (saṁkhyā pramāṇa), and symbols for the sets, through the aṅgula point-set or palya instant-set etc., which form simile measures to give idea of the finite and transfinite property. The use of the symbols must have been very early and may have concern with the invention of the Brāhmī and Sundarī scripts, round about the 4th century B.C. and with the initiation of the renouncing Emperor Candragupta Maurya as Muni Prabhācandra under Ācārya Bhadrabāhu who kept himself isolated for 12 years before his death, having only the Maurya Emperor as his companion at Candragiri Śravaṇabelgolā, Mysore. The forms of the symbols took separate shapes as time passed on and a few symbols remained with certain resemblance to the Brāhmī script so far as the unified alphabet of the set and cardinal or ordinal were concerned. There is a flood of these symbols in the Gommaṭasāra and the Labdhisāra commentaries in Kannaḍa Sanskrit and Dhūṁḍhārī (resp. of c. 13 th, 15th and 18th centuries A.D.). Thus a factual clue lies in the research of the development and origination of these symbols in Brāhmī and Sundarī, a controversial topic may find the solution in this tradition of about 2200 years, starting from 4th century B.C. to 18th century A.D. (Cf.The Labdhisāra, INSA PROJECT, 1984-87)

The second important finding is about the measures in relation to volumes of frustrum of a cone, trapezoids, parallelepipeds, logarithms, a circle and straight line etc. This gives various methods of geometrical and arithmetical study and to some extent the algebraic study. There are various examples of the comparability of various areas etc. in chapter IV on the islands and oceans of the middle universe.

Foundation of Karmic Mathematics in TPT :

The first chapter describes the volume and contents of the whole universe as 16 kha kha kha or ≡ 16 ख ख ख. Here, a dash denotes a world line and its cube is denoted by three horizontal lines, one over the other, ≡, the volume 343 cubic rājūs or $(7)^3$. The 16 denotes

the number of all living beings, 16 kha denotes the number of ultimate particles of matter, 16 kha kha denotes the number of indivisible instants (samayas) in the past beginningless time, the present and the future endless time and 16 kha kha kha denotes the total number of space-points in whole infinte space, the space-point (pradeśa) being the space occupied by an ultimate particle which with its minimum velocity crosses it in an instant (samaya) which is indivisible (v.1. 92 TPT (V))

The existential sets are postulated and their cardinals are indicated through number measure (numerate, innumerate and infinite). Construction sets give simile measure: palyopama instant-construction-set, sāgaropama instant-construction-set, and aṅgula point-construction-set, pratarāṅgula point-set, ghanāṅgula point-set, jagaśreṇī point-construction-set, jagapratara point-set and ghana loka point-set (v.1.93 TPT (V.)).

The aṅgula is of three types pramāṇa, ātmā and utsedha, for the cosmological georgraphical and astronomical measures, according to their proper applications (vv. 1.107-113 TPT (V))

Further, the distance in space is defined in terms of aṅgula for the foot, hand, dhanuṣa, kośa and then yojana which is fundamental in geographical, astronomical and cosmological measures with different purports (1.114 et seq. TPT (V)).

Through the yojana, the palya instant set is defined through a process, (vv.1.116-130,TPT (V)). Through palya set is defined the sāgara instant-(samaya) set. These are also of three types.

Through the palya and sāgara instant-sets, the point-sets of the sūcyaṅgula, and jagaśreṇī are defined through the following equations. Let F denote the finger-point-set (sūcyaṅgula pradeśa rāśi) and P the pit instant-set (palya samaya rāśi), then

$$F = [P]^{(\log_2 P)} \quad \text{and} \quad L = [(F)^3]^{(\log_2 P)/A},$$

where L is the world line (jagaśreṇī) and A is the proper innumerate, (vv.1.131-132 TPT (V)).

The concepts of the ultimate part of space and time as pradeśa and samaya are to be compared with those of various Greek philosophers, including Zeno of Elia who had been famous for his four paradoxes.[4] The modern concepts may also be similarly compared not only with these concepts but also with those put up by Vīrsenācārya in analysis of transfinite numbers through eight geometrical methods.[5]

The number measure has been detailed in the 4th chapter, vv. 310 et seq. This is to be compared with Gorg Cantor work [6], In particular, he not only proved that there could be an infinity greater than another infinity but also its construction through principles of generation of transfinite numbers, rather the generalised principles of induction etc.[7] Similarly there are the methods of comparability[8] (alpabahutva in Jaina school) and transfinite sequences[9] etc. are the modern concepts. The limits of the numerate, innumerate and the infinite are defined. When the innumerate- innumerate is to be defined, the innumerate type of sets are added to the construction numerate numbers, so that the target is achieved. Similarly, in order to produce the infinite- infinite in its true sense, infinite types of sets are added to the construction innumerate numbers, cardinal or ordinal. The clairvoyant knowledge is supposed to be the subject of clairvoyance. The innumerate is the subject of the clairvoyant. Similarly, the infinite is the subject of the omniscient. The numerate upto its maximal is the subject of the omniscript (śrutakevalī).

There is also an assumption of point-bound lines (pradeśa-baddha śreṇīs) along which the bios and matter-particles move along straight directional line or curved lines (having turns). In the Tattvārtharājavārtika (2, 28, 1), Akalaṅka describes that the motion with bends is before 4 samayas or instants, because there is no place (point) in the universe which may not be reachable in more than three bends. The Des-Carte, Cartesian frame works here, and when the point is located below a slant surface the bends, in addition, are to be counted. Just as sixtic (ṣaṣṭika) rice gets cooked in sixty days, as per rule, similarly, the motion with bends finishes in three instants.

In the numeration, zero has been used in decimal notation. For example in TPT (V), ch. 4, v-312, the acalātma time unit is given as $(84)^{31} \times (10)^{90}$ years. There is also the use of method of square over square (vargita-saṁvargita). For example, 2^2 is the square in first process : In the second process we get $[2^2]^{[2^2]}$ and in the third process we get $[2^2]^{[2^2]}$ raised

or

The logarithm to base two and $\log_2 \log_2$ have been used very often.The value of π

has been usesd in two forms : $\sqrt{10}$ and $\frac{355}{113} = 3.141593$, but this occurs in the form

$$\frac{16 \text{ (diameter)} + 16}{113} + 3 \text{ (diameter)} = \text{circumference, hence in place of } \frac{355}{113} \text{ it occurs}$$

in the form $\frac{371}{113}$.

Nemicandra Jyotiṣācāryya[10] remarked about Jaina astronomy as follows:

1. The mention of the five-year Yuga for the first time in Jaina Texts. (Compare with that of the Vedāṅga Jyotiṣa for this remark).
2. The development of the process about the decay of Avama-Tithi, originally by the Jaina preceptors .
3. The constant set (dhruva rāśi) about the constellation in Jaina tradition is more accurate (finer) than the constant-set about the day in the Vedāṅga Jyotiṣa. Possibly, this was helpful in the evolution of the post development rāśis .
4. The Jaina process of evolving parva and tithi seems to have been seen after sixth century A.D. in non Jaina works .
5. There is originality in the process about the samvatsara in Jaina astronomy .
6. It appears as if the Pitāmaha principle has been influenced by the Jaina process about the length of day.
7. The developed form of calculation of time through shadow reckoning occurs as desired period (iṣṭa kāla), bhayāti, etc.

There is also the description about bright and dark regions, due to some type of projection. The use of real and counter suns and moons also require research. In the principle-theoretic approach, the unit of length is 1 uvasannāsanna skandha (the smallest molecule) which is constituted of endlessly endless ultimate-particles, increasing up to the aṅgula which is of three types. Then the units are led up to a yojana. From yojana, through construction of pits in a well defined way, one gets the vyavahāra, uddhāra and addhā palya sets of instants. (ch.1, TPT(V), vv.1.93 -1.130.)

The general formula for the volume of a trapezoid or vetrāsana is given by

$$\frac{\text{top} + \text{base}}{2} \times \text{height} \qquad \text{---(v. 1. 165)}$$

The increase in proportion is given by $\frac{\text{base} - \text{top}}{\text{height}}$ --- (v. 1. 176)

The width in between the base and top at a certain height is given by,

$$\text{base} - \frac{\text{base} - \text{mouth}}{\text{height}} \text{ (desired height).} \qquad \text{--- (v. 1. 176)}$$

Again, the width may also be found out by $\frac{\text{side} + \text{counterside}}{2}$. ---(v. 1. 181)

Similar mathods have been applied to find the value of the volumes of the universe through methods of exhausion.

Chapter I also describes 8 types of universes in different geometrical shapes, having the same volume: General universe, cube or cube-universe, cuboid with different dimensions barley-drum region, barley-middle region, conical mandara region, trapezoid exhausted by barley regions and so on, region cut into peaks.

Chapter II describes the summation of various types of progressions proceeding from a centre of a disc. The summation formulae may be described as follows: When a is the total number of holes in first disc, the common difference in successive discs is d and n is the nth disc, then the number of holes in nth disc = {a - (n -1) d }, (TPT (V), 2/ 58).

In v.2/59, the formula for finding out the sequentially ordered holes with indraka [central] in nth disc is

$$= \left(\frac{a - 5}{d} + 1 - n \right) d + 5$$

In v. 2/60, the value for n may be determined when the above amount for the first disc is denoted by a_1 and that in the nth be assumed to be a_n, then

$$n = \left\{ \frac{a_1 - 5}{d} - \frac{a_n - 5}{d} \right\}.$$

In v. 2/64, if total sum is S, first term is a, common difference is d, number of terms is n, then the formula gives the total sum of the desired series: the desire could be 1, 2, --- .

$$S = \{(n - \text{desire})\, d + (\text{desire} - 1)\, d + (a.2)\} \frac{n}{2},$$

or $$S = [\{(\frac{n-1}{2})^2 + (\frac{n-1}{2})\}\, d + 5]\, n.$$

In verse 2. 69, the formula is as follows :

$$S_1 = \frac{n}{2} [(n + 7)\, d - (7 + 1)\, d + 2a],$$

where 7 is the total number of earths in the hellish region.

In v. 2.70, the alternative formula is as follows :

$$S_1 = \frac{n - 1}{2} \times d + a]\, n,$$

The general formula in another form is given in verse 2.74:

$$S_2 = \frac{[a^2 . d] + (2n . d) - nd}{2}.$$

In order to find out the sum of sequentially ordered holes in all the earths without indrakas, the following summation formula occurs

$$S_3 = \frac{(n^2 - n)\, d + (n . a)}{2} + \frac{a}{2} . n. \qquad \text{.....(v. 2. 81)}$$

Then, in v. 2.82 - 83 the formula for finding out "a" is given as follows :

$$a = \frac{[s_3 \div n / 2] + (d . 7) - 7 - 1 + n]\, d}{2}.$$

Similarly, $d = S_3 \div ([n-1] \frac{n}{2}) - (a \div \frac{n-1}{2})$.

In verse 2.85, the value of n has been found out through the following formula:

$$n = \left\{ \sqrt{ (S_2 \cdot \frac{d}{2}) + (a - \frac{d/2}{2})^2 } - (a - \frac{d/2}{2}) \right\} \div \frac{d}{2}.$$

In the next verse 2.86, an alternative form of formula has been given

$$n = \{ \sqrt{ (2 . d . S_2) + (a - \frac{d}{2})^2 } - (a - \frac{d}{2}) \} \div d.$$

Next, in the verse 2.105, formula have been given to find out d, when the last term l is given,

we have $d = \frac{a - l}{n - 1}$.

If it is required to find the width of nth hole, the formula is $a_n = a - (n - 1) d_1$.

If it is required to find the width of nth hole from last hole,

we have $b_n = b + (n-1) d$,

where a_n and b_n are the symbols for the measure of diameters of those nth holes.

In chapeter III, the only formula is that for summation of a geometric progression, as having n number of terms, a being the first term and r is the common ratio.

S_n = { (r. r. r. ... to n terms) – 1} ÷ (r- 1) × a

$$= \frac{(r^n - 1) a}{r - 1} .$$

The fourth chapter describes the human universe in details. The formula (v. 4.9) gives the value of π as $\sqrt{10}$, as such the circumference = $\sqrt{(\text{diameter})^2 \times 10}$

and the area of the circle = circumference $\times \frac{\text{diameter}}{4}$.

Similarly, the volume of a right circular cone

= area of the circular base × height .

Here the value of $\sqrt{10}$ has been calculated by first

approximation of binomial theorem,

$$\sqrt{10} = \sqrt{(3^2 + 1)} = 3 + \frac{1}{6}.$$

Thus general formulae used are

$$\sqrt{N} = \sqrt{(a^2 + x)} = a + \frac{x}{2a}$$

$$\text{or } \sqrt{N} = \sqrt{(b^2 - y)} = b - \frac{y}{2b},$$

where N is non-cubic integer and a, x, y, b are positive integers.

Through this method, after going over a few steps, the avasannāsanna fraction remainder is $\frac{23213}{105409}$. This has been called the "kha kha padassaṁsassa puḍhaṁ" which has been calculated and proved its clarified form by Dr. R.C. Gupta[11] , (v.4. 55-56).

The next set of verses (4. 59-64) describe the method of finding out the area, in a similar manner, quoting the remainder as $\frac{48455}{105409}$ as earlier, as multiplied by kha kha, for uvasannāsanna, the kha kha representing the number of ultimate particles.

The verse 4.70 describes the formula for the chord of quarter circumference as

$$[(\frac{d}{2})^2 \times 2 = 2r^2]^{1/2},$$

$$\text{or (chord of quarter)}^2 \times \frac{5}{4} = \text{(quarter of circumference)}^2$$

$$= [2 \times \frac{d^2}{4}] \times \frac{5}{4} = \frac{5d^2}{8} = \frac{10r^2}{4}.$$

The verse, 4.180, gives the value of the chord in the form

$$\text{chord} = [\, 4\, [\, (\frac{d}{2})^2 - (\frac{d}{2} - h)^2\,]\,]^{1/2} ,$$

where h is height of segment.

The next verse, 4.181, gives formula for finding out the bow (dhanuṣa) :

bow or arc $= [\, 2\, [\, d + h)^2 - (d)^2\,]\,]^{1/2}$, if $h = r$, arc $= \sqrt{10}$.

The v. 4.182 gives the formula for finding out the height of segment ,

$$h = \frac{d}{2} - [\frac{d^2}{4} - \frac{(\text{chord})^2}{4}]^{1/2}$$

or $(\text{arc})^2 = 6h^2 + (\text{chord})^2$, where h is height of segment.

The vv. 4.285-286 describe the various units of time, starting from indivisible instant (samaya). Innumerate samayas form an āvalī. Numerate āvalīs form a breath or respiration (ucchavāsa). This further is led to a 5 year yuga and ultilmately to the acalātma years, where acalātma $= (84)^{31} \times (10)^{90}$ and then to maximal numerate.

The vv. 4.310-312 describe two types of measures, the number measure and the simile measure. The number measure is of three types : the numerate, the innumerate and the infnite. Some of them are formally innumerate and infinite. The maximal numerate is cognizable by omniscript (śruta kevalī), after which follows the formal innumerate interval. The life-time bond advenience (adhyavasāya) stations amounting to innumerate-universe set of points cardinal, means the number of effective phases of the bios causal for the life-time bond in various steps. Innumerate universe times the preceding set is the cardinal of energy-bonding advenience stations. This means that this is the cardinal number of the set of the eftective phases of the bios in various steps responsible for energy-bond. Innumerdate times the preceding is the number of the indivisible-corresponding-sections of yogas of mind, speech and body. Vīrasena (Dhavalā, book 4, p.338) has mentioned that semi-material-change period is formally called infinite (not in actuality). Similarly, there is a difference of unity between the maximal innumerate-innumerate and minimal. Here, the subject of the clairvoyant (avadhijñānī) ranges upto the maximal innumerate. After this, the range enters into the limit or range of the omniscient, hence it is formally called infinite. When the minimal infinite-infinite is subtracted to three times vargita-saṁvargita (square over square), and three infinite sets are added to the result, then it attains the proper infinite denomination.

This is just as, when innumerate sets are added to numerate set, it attains the proper innumerate denomination. In fact, the set which can not be exhausted for infinite time through constant loss, is infinite, in truth, like the accomplishable (bhavya) bios-set.

The sets have thus been constructed to be used to give the idea of the measure of a set. It is important to note how the construction set, equivalent to omniscience, is expressed, when no process could produce it and it is asserted that the process of squaring leads to the totality of all square sets, but the result is simply the infinite part of omniscience or omnivision, hence it is a division and not fluent.

The verses, 4.1780 et seq., explore the observation of the planetary and other astral bodies, moving along their own orbits, but when seen by an observer appear projected into conical sections. Lishk and Sharma have also remarked in the, "Notion of Obliquity of Ecliptic", implied in the concept of Mount Meru in Jambūdvīpaprajñapti,[12] that the obliquity of the solar orbit has given the configuration to the established Meru mountain.

The verse 4.1793 gives the formula for finding out the slant line of the frustrum of a cone as follows :

$$\text{slant side of frustrum of a cone} = \left[\left(\frac{D - d}{2}\right)^2 + (H)^2\right]^{1/2},$$

where D is the base diameter, d is the diameter of the top and H is the height of the frustrum.

The verse 4.1797 states about a section of the frustrum of a solid cone when cut by a vertical plane passing through the centres of base and top, in form of a regular trapezium. If it is needed to find width "x" at a depth of "h" yojana below the top, then we have

$$x = h \div \frac{D - d}{H} + d$$

$$\text{or} \quad x = D - \left[(H - h) \div \left(\frac{D - d}{H}\right)\right].$$

The verse 4.2025 gives the diameter D of a circle when chord is c and arrow is h. Thus,

$$D = \frac{c^2}{4h} + h \text{ , where c is chord, h is height of segment.}$$

The verse 4.2374 gives the area of the segment of a circle.

$$\text{area of circular segment} = \sqrt{\{(\frac{h}{4}c)^2 \times 10\}} = \frac{hc}{4}\sqrt{10}.$$

The verse 4.2525 mentions that the proportion of areas is similar to that of the square of the diameters of two circles .

$$\frac{D_2^2 - D_1^2}{D_1^2} = (\frac{A_2 - A_1}{A_1}) \quad \text{or} \quad \frac{D_2^2}{D_1^2} = \frac{A_2}{A_1}.$$

The formula for finding out the area of a circle is

$$= \sqrt{\{\frac{(D^2)^2 \times 10}{4}\}} = (\frac{D}{2})^2\sqrt{10} \quad \text{or } \pi r^2. \qquad \text{....(v.4. 2761)}$$

The v.4.2763 mentions the formula for finding out the area of a ring with diameters D_1 and D_2 respectively as follows:

$$\text{area of the ring} = [\{2D_2 - (D_2 - D_1)\}^2 \times (\frac{D_2 - D_1}{4})^2 \times 10]^{1/2}$$

$$= \sqrt{10}[\frac{D_2^2}{4} - \frac{D_1^2}{4}] \quad \text{or } \pi (r_2^2 - r_1^2).$$

The verse 4.2926 states the cardinal number of set of general human beings as

$$\frac{(\text{world line point set cardinal})}{\text{finger width point set cardinal})^{5/8}} - 1$$

In the TPT, vv. 4.2375-77 the various measures of the length, breadth, height, area etc. are given for the regions and mountains of the Harivarṣa, Niṣadha and Videha regions. However, it was found that the method for finding out the given measures for the Himavān mountain, Haimavata region and Mahāhimavān mountain as well as Harivarṣa region, as found by Āryikā Viśuddhamati in the Kannaḍa verses for fine areas, the following formulas, applicable for other regions and mountains are not applicable for those of the Himavān mountain and Haimavata region.

The formula applied is

$$\text{area of circular segment} = [\text{ height of segment} \times \frac{1}{4} \times \text{chord})^2 \times 10]$$

The chapter V describes the oblique universe which is a structure, horizontal, consisting of rings with widths which form a geometrical progression with 2 as common ratio.

The verse 5.33 describes the width of Svayaṁbhūramaṇa sea as (world line ÷ 28) + 75000 yojanas. Even after this, there remain the following amount of range at the surface of the middle universe with domain of 1 rāju and 100000 yojanas.

"[1 rāju $-$ {($\frac{1}{4}$ rāju + 75000 yojanas) + $\frac{1}{8}$ rāju + 375000 yojanas) + ($\frac{1}{16}$ rāju + 18750 yojanas +.....+ 50000 yojanas)}].

Although this sequence is infinite, yet being convergent, on subtraction, there remains slightly less than $\frac{1}{2}$ rāju range east and west.

The verse 5.34 gives formula for defining the inner, the intermediate and the outer diameters through the widths of the sea or, of island. Let these be denoted respectively, by D_a, D_m and D_b ; D_1 be the widths of Jambū island, the widths of 2nth sea be D_{2n} and the width of (2n + 1)th island be denoted by D_{2n+1}.

Then we have

$$Da = D_{2n+1} \times 2 - D_1 \times 3$$

$$D_m = D_{2n+1} \times 3 - D_1 \times 3$$

$$D_b = D_{2n+1} \times 4 - D_1 \times 3$$

The verse 5.35 gives the formula for finding the circumference of nth island and sea as follows.

Let the diameter of the Jambū island be denoted by D_1.

Circumference of the nth island or sea $= \frac{D_1 \sqrt{10}}{D_1} \times$ [diameter of nth island or sea]

There does not seem to be any speciality in this formula.

The verse 5.36 gives the formula for finding out the number of Jambū island areas contained in a desired island or sea. Let the above symbols be taken, then we have this as

$$= \frac{(D_{nb})^2 - (D_{na})^2}{(D_1)^2},$$

where D_{nb} is the external and D_{na} is the internal diameter of the nth island or sea.

The verse 5.242 gives the formula for finding out the gross area of the nth island or sea, making use of the value of π as 3.

This is

$$= [D_n - D_1] (3)^2 \{D_n\}.$$

Here, the quantity product $[D_n - D_1] (3)^2$ has been called the length (āyāma) and D_n is taken as the diameter (viṣkambha) of nth island or sea. It may be remembered that

$D_n = 2^{(n-1)} D_1$ where D_1 is the diameter of the Jambū island.

The area of a circular ring in gross form of the nth region

$$= D_n \ [D_{na} + D_{nm} + D_{nb}],$$

where

$$D_{na} = [2 \{ 2^{n-2} + 2^{n-3} + ... + 2 \} + 1] D_1,$$

$$D_{nb} = [2 \{ 2^{n-1} + 2^{n-2} + ... + 2 \} + 1] D_1,$$

$$D_{nm} = \frac{D_{nb} + D_{na}}{2}.$$

Putting these values in the above,

the gross area

$$= 2^{n-1}\ D_1 [\ D_{na} + \frac{1}{2}\ (D_{nb} + D_{nb}) + D_{nb}\ ]$$

$$= 3^2\ [2^{n-1}\ ]\ (D_1)^2 [\ 2^{n-1} - 1] .$$

The verse 5.244 is similar to the previous verse.

Thus the area of the [$\log_2$ (Apj) + 1]th island or sea is given as

(Apj) (Apj – I) (9000 crore yojanas) square yojanas,

where Apj is minimal peripheral innumerate (jaghanya parīta asaṁkhyāta) and $\log_2$ is logarithm to base two (ardhacceda).

From the earlier relation

$n = \log_2 Apj + 1$, then $2^{n-1} = Apj$.

The author also uses 16 as numerical notation for Ap_j and 15 as $Ap_j - 1$. Similarly, the area of $\{\log_2 (P) + 1\}$th island has been found to be

$= (P) (P - 1) \times 9 \times (10)^{10}$ square yojanas,

where P is the palyopama instant-set constructed in the text TPT.

The gross area of the last Svayaṁbhūramaṇa sea is given in the vv. 5.243-244 as

$D_n (3)^2\ (D_n - D_1)$, where the width of this sea ring is

$$D_n = \frac{\text{world line}}{28} + 75000 \text{ yojanas or } \frac{L}{28} + 75000 \text{ yojanas} .$$

The gross area thus is

$$= \frac{9}{28} L + 675000 \text{ yojanas }]\ [\ \frac{L}{28} - 75000 \text{ yojanas} - 100000 \text{ yojnas }]$$

$$= \frac{9}{784} (L)^2 + [\ 112500 \text{ square yojanas} \times 1 \text{ rāju }]\ - [16875000000 \text{ square yojanas}] .$$

Then, from verse 5.245 onwards, a set of special types of increase in various forms or aspects is given in 19 ways. The first aspect relates a remainder increase given for a desired island or sea whose diameter is D_n and initial diameter is D_{na}, the mentioned increase is

$$= 2D_n - \left(\frac{4D_n + D_{na}}{3}\right).$$

The verses 5.246-247 relate

$$50000 \text{ yojanas} + \frac{D_{na}}{2} = \frac{D_{nb} + (D_n - 200000)}{5}.$$

The verse 5.248 relates an increase given by

$$\left\{\frac{1}{2}(D_{nb}) - D_{na}\right\} = 1\frac{1}{2} \text{ lac yojanas.}$$

The verse 5.250 relates an increase (given by formula)

$$= \frac{(3D_n - 300000) - \left\{\frac{3D_n}{2} - 300000\right\}}{2}.$$

The verse, 5.251 describes an increase given by the amount

$$= \frac{3}{4}D_n - \left\{\frac{D_n - 800000}{12}\right\} = K_n, \text{ say.}$$

The verse 5.252 gives the total of widths of the seas preceding the desired (nth) sea. It is given in terms of K_n as $= \frac{K_n - 200000}{2}$.

The verse 5.261 states, as before, the area of nth island or sea as

$\sqrt{10}\{(D_{nb})^2 - (D_{na})^2\}$. Here, the described increase has been given as

$$= \frac{3(Dn - 100000) \times 4Dn}{(100000)^2}$$

which is equal to the number of Jambū island piece-area-set.

The verse 5.262 gives the area of Lavaṇa sea as (10) $(8\frac{1}{2})$ (600) square yojanas which is 24 times the area of Jambū island, (10) $(8\frac{1}{2})$ (25). Similarly, comparison with other islands and seas may be made.

Again, the area of the Puṣkaravara island = (10) $(8\frac{1}{2})$ $[(\frac{610}{2})^2 - (\frac{280}{2})^2]$ square yojanas which is 2880 times that of Jambū island, and is 96 × 2 in excess of four times the areal piece-logs of Kālodadhi sea. Thus, 2880 = (4 × 672) + 2 (96) . This can be generalized and if the piece-rods of any lower island or sea be assumed to be $K_{sn'}$ or Khaṇḍaśalākās, where n' is counted from Dhātakīkhaṇḍa island, then the number of piece-rods (khaṇḍaśalākās) of the upper sea or island will be $4 \times K_{sn'} + 2^{(n'-1)}$ (96).

Here, the formula for the projection (prakṣepa), 96, is given as follows :

$$\text{projection } 96 = \frac{K_{sn'}}{\frac{D_{n'}}{100000} - 100000},$$

where $K_{sn'}$ are the piece-rods and $D_{n'}$ is the diameter (width) of the island or sea. The increase in piece-rods of an (n' th) island or sea may be given by the formula

$\{(\frac{D_{n'}}{100000})^2 - 1\} \times 8$. Here, $D_{n'}$ is the measure of the width of n'th island or sea.

It is actually the n'th term of an arithmetico-geometric type of sequence whose successive terms are in excess of $24 \times 2^{n'-1}$ over its four times amount. $D_{n'}$ expresses a sum of a geometic progression starting with 8 with common ratio 2. If the increase is the $t_{n'}$ or (n'th term) then the sequence has the n'th term as

$$= \{\frac{(D_{n'} + 100000)(D_{n'} - 100000)}{(100000)^2}\} \times 8$$

The verse 5.264 gives the following formula for the combined piece-rods of all the

preceding islands-oceans when the beginning is from n' th island or sea, as

$$= [\frac{D_{n'}}{2} - 100000\ ] \times [D_{n'} - 100000\ ] + 12500000000\ .$$

Here, the counting of n' is from Dhātakīkhaṇḍa island.

The verse 5.265 gives additional measure as

$$744\ \frac{K_{sn'}}{D_{n'} + 200000}\ .$$

In the verse 5.266, a relation has been given as

$$9\ D_n\ (D_n - 100000) = 3\ [(\frac{D_{nb}}{2})^2 - (\frac{D_{na}}{2})^2\ ].$$

The verse 5.268 gives a formula for finding the sum total of all the preceding islands-seas starting from the nth island or ocean as

$$= [D_n - 100000]\ [\ 9\ (\ D_n - 100000) - 900000] \div 3.$$

The alternative method gives this result as $3\ (\frac{D_{na}}{2})^2$.

In verse 5.271, the total area of preceding all seas is given. As the islands fall on odd numbers, hence we take the desired successive island as (2n -1)th.

Hence this area of all the preceding seas happens to be

$$= [\ D_{2n'-1} - 300000\ ]\ [\ 9\ (\ D_{2n-1} - 100000)\ - 900000] \div 15$$

The verse, 5.274 gives the sum of areas of all the preceding seas when the width of the island be given and then leaving the Jambū island the total area of all the preceding islands from the desired island is as follows.

$$(D_{2n'-1} - 100000)\ [\ (D_{2n-1} - 100000)\ 9 - 2700000] \div 15.$$

Here,

D_{2n-1} is the width of the island in serial number of 2n -1.

The verse 5.276 states the described increase in three places after the Dhātakī island.

in the forms given by

$$\frac{D_{n'}}{2} \times 2\,;\ \frac{D_{n'}}{2} \times 3\,;\ \frac{D_{n'}}{2} \times 4,$$

when counting starts with n' from the Dhātakīkhaṇḍa island.

The verse 5. 277 gives the formula for finding out the measure of increase in width of successive island or sea from a preceding island or sea. Here, the counting starts over n' from the Dhātakīkhaṇḍa island. This is $= \frac{D_{n'}}{2} \times 90.$

The verses 5.280 et seq. describe the number neasure of bios in body-search station through symbols. Here, the point set of a cube-universe (ghana loka) is taken and a set of operations of give, distribute and multiply is adopted again and again, till the set of fire bodied bios is obtained. From this, the sets of earth-bodied, water-bodied, and air bodied bios are produced in gross, fine, developed and undeveloped forms. Then, mobile-bios set is produced or constructed. Then, the set of vegetable bodied bios in general, gross, every, fine, developed and undeveloped forms are constructed. The comparability between these sets is dicussed in verses 5.314 and 5.315.

The verses, 5.319-320 describe the volume of a conch like solid, given by 365 cube yojanas, or by the formula

$[(\text{length})^2 - (\frac{\text{top}}{2}) + (\frac{\text{top}}{2})^2] \times \frac{2}{4}$, detailed by Mādhavacandra Traividya in his Sanskrit commentary of the TLS (op. cit.) . Similarly, there are some more solid figures as the cylinder and a semi-cylinder.

The Seventh Chapter of TPT:

The residence of astral deities is not contained in the very central portion of Jambū island within 13000000000 yojanas. Its outer boundary limit has been given to be

$= \times 110$ yojanas.

49

It seems that this outer limit is more than a rāju. Wherever the outer limit is more than one raju, that region has been said to be inaccessible. The residence of the astral deities has

been recognized in the remaining accessible region. According to the motive of the author, the moon, the sun, the planets, the constellations and the scattered stars, all touch the dense-water (ghanodadhi) air-envelop (vātavalaya), hence there is some or other kind of air-envelop, appearing to be around them, (v. 7.7). Relative to east and west, the astral deities do not touch the dense air-envelop situated in north and south, (v. 7.8). In the verses (vv. 7.13-14), 4 has been taken as numeral for square of a finger, i.e., F^2. For the numerate, the symbol ₹ has been taken. The height of the moon (perhaps the angular distance of the moon) from the surface of the Citrā earth has been given to be 880 yojanas, (v 7.36). The moon has been said to be endowed with cool 12000 rays, (vv. 7.36-37). The moon is a hemi-sphere with plane surface upwards, having a radius of $\frac{28}{61}$ yojana, (v.7.39). The height (angular distance) of the sun compared with that of the moon is 80 yojanas less from that of the earth Citrā, i e. 800 yojanas. The sun is endowed with 12000 hot rays, (vv. 7.65-66). The sun is also a hemi-sphere with diameter of $\frac{48}{61}$ yojana or a radius of $\frac{24}{61}$ yojana, (v. 7.68).

Similarly, Mercury is at height (angular distance) given by 888 yojanas, Venus at 891 yojanas, Jupiter at 894 yojanas, Mars at 897 yojanas, Saturn at 900 yojanas, constellations at 884 yojanas and other stars at 790 yojanas from the Citrā earth, (vv. 7.83-108). Lishk has proved that approximately their relative distances in yojana are the angular distances between their orbital planes. This seems justified as the moon's motion is within $510\frac{48}{61}$ yojanas, signifying the angle of inclination between the ecliptic and the equator as $23\frac{1}{2}^\circ$. Its motion in the Jambū island is 180 yojanas and $330\frac{48}{61}$ yojanas in the Lavaṇa sea, (vv. 7.117 et seq.). The orbits of the moon (and counter moon) are 15, with width of $\frac{56}{61}$ yojana, because only moon moves along them. It is actually a unified motion in winding and unwinding elliptico-spirals[13]. Every orbit has an interval of $35\frac{214}{427}$ yojanas with its adjoining orbit.

The internal orbit of the moon has a circumference of 315089 yojanas and the radius is 49820 yojanas the outer cirumference being $318313\frac{294}{427}$ yojanas.

An important principle is related here: When the radius increases, the circumferential path increases and in order to complete that path in a definite interval of time, the velocities of the moon and the sun adjust so that they may cover the unequal circumferences in the definite period.[14]

The linear velocity of the moon at the innermost orbit in a muhūrta is $5073\frac{7744}{13725}$ yojanas, and when in outer orbit, it is $318313\frac{294}{427} \div 62\frac{23}{221}$ yojanas.

For explaning the phases of the moon, there have been supposed a dina-Rāhu, and for eclipse, a parva-Rāhu. They are having suitable motion, immediately under the moon's image, at a distance of 4 pramāṇāṅgula below it, with a diameter of slightly less than a yojana, and a hemisphere with radius $\frac{250}{8000}$ yojana.

The moon's day has been of $31\frac{23}{442}$ muhūrtas, and parva-Rāhu has been regarded as the cause of lunar eclipse every six months, due to proper position fit for the eclipses, due to its motion.

Like real and counter moons, there have been recognized a real and a counter sun in the Jambū island which move in the similar way, with their 184 orbits and so on.[15] The width of the orbit is equal to diameter of the sun. The 1st orbit is 44820 yojanas from the Meru. The interval beween orbits (although spiroelliptic), each from the next is 2 yojanas. The distance of centre of Jambū island from first orbit of the sun is 49820 yojanas. Both, moons and suns, are opposite to each other, and in the ultimate orbit the opposite suns are at a distance of $2 \times (500330)$ yojanas. The path-orbits of the sun are also winding and unwinding spirals. Thus, there are 15 orbits of the moon and 184 orbits of the sun.

The latitudes-circles (paridhis) have been given to show the locations of the cities.

These have been so fixed that each circle has been taken as increased by $17157\frac{6}{8}$ and 14786 yojanas respectively. Just as the motion of the moon has been shown to be increased or reduced due to motion in fixed times. Compare with small and great circles.

Similarly, the motion of the sun is accelerated and retarded for describing unequal arcs in equal times. On the first orbit, it moves by $5251\frac{29}{60}$ yojanas in a muhūrta. Just as Rāhu is below the moon, so also a similar (black) celestial plane of Ketu moves below the sun. Here, the author describes the latitudes covering 194 circumferences around the Meru. This defines the length of day in various cirumferences, (vv. 7. 265 et seq.)

For example, when the sun is on the innermost latitude-circumference, having the minimum radius from the Meru centre, there is the day of 18 muhūrtas and night of 12 muhūrtas. Here, the muhūrta is 30th part of day-night or 1 muhūrta is equal to 48 minutes. Conversely, when the sun is on the outermost orbit, the day is of 12 muhūrtas and night of 18 muhūrtas (vv.7.277 et seq.)

The division of the illuminated and dark regions or bright and dark areas are through spokes-like lines of a wheel. The regions extend upto the Lavaṇa sea, being divided into 3:2 proprotion, or 108^0 of bright and 72^0 of dark regions when the sun is in its innermost orbit. Just reverse is the case, when it is in its outermost orbit. These regions extend upto 6th part of Lavaṇa sea, which amounts to $50000 + \frac{200000}{6} = 83333\frac{1}{3}$ yojanas. The bright area extends over Meru also upto $9486\frac{3}{5}$ yojana of arc and the dark area extends upto $6323\frac{2}{5}$ yojanas of arc. The areas are respectively 65880750000 square yojanas and 4392050000 square yojanas. The author gives the formula for finding out the bright area as

$$= \frac{\text{the length of day in muhurta} \times \text{circumference of orbit}}{60} \text{ yojanas}$$

The real or counter sun describes the orbit in two counters of 60 muhūrtas and the

day decreases by $\frac{2}{61}$ muhūrta, hence the decrease in the bright area is given by $\frac{p}{60} \times \frac{2}{61}$ square yojanas, where p is the measure of the circumference (paridhi) of the orbit of the sun. The total number of intervals is 183. Consequently, there is similar increase in the dark region. The eye-contact-range (cakṣu sparśa adhvāna) is given by the formula $p_S \times \frac{9}{60}$ yojanas where p_S denotes the value of the circumferences of the located sun's position. For maximal eye-contact-range the value of p_S is 315089 yojanas. The emperor (cakravartī) could see the sun at the maximal distance of $5574\frac{233}{380}$ yojanas, (vv. 7. 292 et seq.)

The rise-stations of the sun could be calculated by dividing the orbital region by $\frac{170}{61}$ which is the common difference in the sun's orbital paths. Thus their total number is 184, (vv.7. 454-456).

The description about planets has become extinct in course of time's calamity. The constellations, move along 1st, 3rd, 6th, 7th, 8th., 10th, 11th and 15th orbits of the moon, respectively.

A moon has a family of 28 constellations and the total number of all constellations in the universe is given by

$$(\text{L or world line})^2 \div [\text{numerate } (F)^2 \times 1097318400000000001933312] \times 7,$$

where F is the set of points in finger-width and L is the set of ponts in the world or universe line (jagaśreṇī), (vv. 7.465-467).

The celestial globe has been divided into 109800 sky-parts (gaganakhaṇḍas). The stars move 1835 sky-parts in a muhūrta, and half the part is traversed in 23 hours, 56 minutes, $4\frac{1060}{1835}$ seconds and the full in $59\frac{307}{367}$ muhūrtas, (vv. 7.475-476).

The verses 7.478 etc. describe velocities of various constellations in separate orbits. All the constellations, however, describe the total number of sky-parts (gagana khaṇḍas) in

$59\frac{307}{367}$ muhūrtas. Whatever be the constellation which sets, that time the following 16th constellation rises. This is so because there is a proportion of 18:12 between day and night, hence the 17th and 11th, 16th and 12th etc. constellations remain, respectively, in the bright and dark regions.

The verse 7.498 describes that the constellations and stars have no laws for solstices as the sun, the moon and the planets describe winding and unwinding spirals. Further, the sun has 183 day-nights in a solstice of 6 months and there are $13\frac{44}{67}$ day-nights in a lunar solstice.

The verse 7.510 gives the relative velocities. The sun moves in $\frac{30\times48}{60}$ hours, as compared with the moon more for $\frac{5}{61}\times\frac{48}{60}$ hours. The sun moves with the Abhijit, constellation for $\frac{630}{150}$ days more or $\frac{630\times30\times48}{150\times60}$ hours more; as the sun moves 150 sky-parts in a day relative to the Abhijit. Similarly, the moon could remain for $\frac{630}{67}$ muhūrtas with Abhijit, and this is $\frac{630}{67}\times\frac{48}{60}$ hours, being called as āsanna muhūrta.

The verses 7.525 et seq. describe the five year yuga and the frequencies (āvṛttis) of solstices during this yuga. The tithis are given when such frequencies occur, and the constellation with the moon located. The equinoxes are similarly described, called as viṣupas, and the tithis and location of the moon on the constellation are given. The total number of the equinoxes in the hyperserpentine period (utsarpiṇī kāla) is found out .

There has not been any commentary on the TPT, neither there is any Sanskrit translation, save that LVG has contained some of its material in Sanskrit to a fairly good extent. In the TPT manuscripts, some lines have been missing, yet some could be found in TPT (V) with mistakes in manipulation of symbols as well as their expressions. However, it has been a compact form which has been given to TPT by a single author :

Yativṛṣabha : (The Author of the TPT):

Several scholars have discussed about the authorship and date of the TPT (vide introduction, TPT, part II). At the beginning or in colophons, the author does not mention about his teachers, yet the following two gāthās attract our attention (TPT, IX, 76-77)

"paṇamaḥ jiṇavaravasahaṁ gaṇaharavasahaṁ taheva guṇa vasahaṁ /

daṭṭhūṇa parisavasahaṁ jadivasahaṁ dhamma sutta pāḍhae vasahaṁ //

cuṇṇissarūva chakkaraṇa sarūva pamāṇa hoi kiṁ jaṁ taṁ (?) /

aṭṭha sahassapamāṇaṁ tiloyapaṇṇattiṇāmae. //

From the verse, first line, it is a salutation to Jinavara Vṛṣabha, yet it is the name Jadivasaha or Yativṛṣabha of the author himself. The next verse indicates the extent of TPT, two other works Cūrṇi-svarūpa and (ṣaṭ-) Karaṇa-svarūpa, (possibly composed by himself) , are being stated. Similarly, the handing down of the study of Kaṣāyaprābhṛta, through generations of teachers, has been described by Indranandi in his Śrutāvatāra in the two following āryās : (155-156)

pārśve toyordvayorapyadhītya sūtrāṇi tāni yativṛṣabhaḥ /

yativṛṣabha nāma dheyo babhūva śāstrārthanipuṇamatiḥ //

tena tato yatipatinā tadgāthāvṛttisūtra rūpeṇa /

racitāni ṣaṭsahasragranthānyatha cūrṇisūtrāṇi //

Thus Yativṛṣabha studied the sūtras of Kaṣāyaprābhṛta from Nāgahasti and Āryamaṅkṣu and acquired special proficiency; and then he wrote a commentary in 6000 Cūrṇi sūtras. In the beginning of the Jayadhavalā commentary by Vīrasenācārya, the blessings of Yativṛṣabha (the author of the Vṛttisūtra), the disciple of Āryamaṅkṣu and close pupil of Nāgahasti are sought. Āryamaṅkṣu and Ārya Nāgahasti appear to be identical with Ajja Maṅgu and Ajja Nāgahatthi mentioned in the Nandi sūtra.

Dr. A.N. Upadhye, in the introduction (op. cit.), has concluded about the date of Yativṛṣabha as follows, (intro. TPT), "In the light of the above evidence, Yativṛṣabha flourished later than Guṇadhara, Āryamaṅkṣu, Nāgahasti, Kundakunda and Sarvanandi (458A.D.) ; he comes possibly soon after Kalkin (473A.D.) who is the last of the outstanding kings mentioned by him; and all that is definitely known is that he is earlier than Vīrasena (816A.D.) and possibly also Jinabhadra Kṣamāśramaṇa (609 A.D.). So, Yativṛṣabha and his TPT are to be assigned to some period between 473A.D. and 609A.D."

Thus, so for as the Karaṇānuyoga material (with its requisite details and mathematical formulae, etc.) is concerned, the contents of TPT are closely allied to those of the Sūrya (Bombay 1919), Candra- and Jambūdvīpa prajñaptis (Bombay 1920, of the Ardhamāgadhī canon, and to other ancient and modern works in Prakrit and Sanskrit, such as the Lokavibhāga, the Dhavalā and the Jayadhavalā commentaries, the Jambūdvīpa-prajañapti-saṅgraha, the Trilokasāra (Bombay 1917) and the Trailokya-dīpikā etc. Now Kirfel's presentation in his Die Kosmographie der Inder (Bonn u. Leipzig, 1920) needs to be compared in details with those of the TPT.

2. The Jambūdīva-Paṇṇatti-Saṁgaho of Paümaṇaṁdi

This is an important Prakrit Text dealing with Jaina Cosmography etc. This contains an introduction in Hindi on the Mathematics of the Tiloyapaṇṇatti by Professor L.C. Jain , in 104 pages. This introduction has been now rendered in details in the INSA project into English version for want of which the historical study into its mathematics, cosmology, and cosmography has been delayed by about 36 years. However, R.C. Gupta and Takao Hayashi as well as his team in Japan could take up certain portions of it and published their brilliant historical findings in Indian Journal of History of Science and Ganita Bharati. T. Saraswati Amma had also rendered its mathematical contents of first four mahādhikāras into English, but that could not be propagated to the western shores out of India. (Vide bibliography).

Mathematical Contants Of The JPS

It is evident from earlies studies (W. Kirfel: Die Kosmographie der Inder , Bonn u. Leipzig 1920, pp.208-340) that Jaina Cosmography and Cosmogony occupies an important position among them. The Jaina cosmographical details are worked out in an elaborate plan which shows a noted consistency and vision forming a base for the theory of Karma of Digambara Jaina School. These details have a close connection with Jaina metaphysical and ethical doctrines as well as Karma theory. Not only the Prathamānuyoga group, but also the Caraṇānuyoga and Dravyānuyoga groups are so much permeated by these details that a clear mathematical understanding of their process need constant and frequent reference to standard works on cosmography which are much more sophisticated in the Digambara Jaina School for its application to the theory of Karma which is full of mathematical and symbolic details. (Cf. LDS, INSA Project, 1984-87). There is found in them a good deal of contemporary mathematics, (set theory, system theory and cybernetics). Hence a special interest in these works, like JTP, TPT, TLS, LVG etc., has been a subject of history of growth of human knowledge in different countries and ages.

In the Ardhamāgadhī canon, (the Śvetāmbara School), there are some works dealing with this subject, but with more astronomical details given in the Sūra paṇṇatti (Skt. Sūrya prajñapti, published with the ṭīkā of Malayagiri, Āgamodaya Samiti, Surat,1919), the Jambūdīva-paṇṇatti (Skt. Jambūdvīpa-prajñapti, pub. with Śānticandra's ṭīkā, Devachanda Lālabhai Jaina Pustakoddhāra, 52 and 54, Bombay, 1920) and Candapaṇṇatti (Skt. Candra-prajñaptiḥ). There is also the commentaries on the Tattvārtha sūtra, having many cosmographical details in chapters 3-4, then there are many post-canonical texts. The Umāsvātī's Jambūdvīpasamāsa with the commentary of Vijaya Simha (Ahmedabad, 1922); the Jinabhadra's Saṁghāyanī with the commentary of Malayagiri (Bhāvanagar saṁvat 1977); the Haribhadra's Jambūdīva-saṁghāyaṇī (Bhāvanagar, 1915), etc., (and Schübring's Die Lehre der Jainas, Berlin u. Leipzig, 1935, p. 216) are available for comparative study with the works of Digambara Jain School on the Karaṇānuyoga group of study.

To the Digambara Jaina category of TPT, LVG and TLS, belongs the Jambūdīva-paṇṇatti-saṁgaho (JPS), which is an authentic edition from Sholapur (vide JPS, The Indian Historical Quarterly, Calcutta, XIV, 1938, pp. 188 ff.). In this edition, the details have been given of the manuscripts of JPS preserved in various public libraries, (JPS, p.10).

In this work, JPS, there are 2429 gāthās divided into thirteen uddeśas (chapters). The manuscripts have been calling this text as Jambū-dvīpa-prajñapti, but this is actually a collection (saṁgraha). The author seems to have compiled this from the Dīva-sāgara-paṇṇatti (vide vv. no. I, 6 and 18 and XIII, 142.) It is not possible to say whether this was Śrutaṅga of the same name included under Parikarma (mathematical operations) which was a part of the 12th aṅga, Diṭṭhivāda, according to a tradition.

The following are the details of various chapters :

Chapter 1:

This contains description of the extent, circumference and area of the Jambū island which stands at the centre of a series of oceans and islands. Various regions, mountains, rivers etc. are detailed in them. There is use of π as $\sqrt{10}$, (v.1.23). The units are given in yojana etc. without introducing them.

Chapter 2 :

This describes the division of the Jambū island into 7 regions, in geometrical proprortion, with two as common ratio, and a symmetry in Bharata, Airāvata types. There are six family-mountains (kula parvatas) dividing the 7 regions. The proportions are given by 1;

2; 4; 8; 16; 32; 64; 32; 16; 8; 4; 2; and 1; totalling to 190 and diamater of one lac yojana of the Jambū island, north to south, is divided proportionately through the rule of three sets, (vv.2.16-20). The arcs, chords, height of segments, etc. could also be calculated proprotionately as above, (vv.2.21 et seq.) through various formulas. Similarly, straight and curved triangles, (called cūlikās), could be calculated through areal formula for triangles etc. Thus, the divisions have been given all their measures in a circle as if divided by parallel chords, proportionately placed, as in above ratios.

This also describes the six periods which are variants for the increase and decrease, improvement or upgradation and degradation in longevity, height, food intake, respiration, growth, number of years etc. These are called, respectively, as the hyperserpentine (utsarpiṇī) and hyposerpentine (avasarpiṇī). We are, at present, under the spell of the hyposerpentine period. They represent cycles and periodicity as in a yuga which is of 5 years.

Chapter : 3.

The six family-mountains have been described for their width and length. Their segments, height of the segments, (vv.3.8 et seq.), triangular corners, etc. have been calculated. The lakes over the mountain tops bear a proportion with the height and depth. The lengths and widths of the lakes are successively double on the successive mountains. The army also bears the same geometrical progression (vv.3.73 and 3.104). Decimal notational numbers have been in use (vv.3.135-136). The number of total rivers is found to be 1456090 in Jambū island, alongwith their tributories. Frustrum of cones, the diameters of the top and bottom as well as height have been given, and at different heights these measurements could be calculated through given formulae, (vide vv.3.213-214). From the height of water over the normal height of the waters, different depths could be calculated, through the same formula for proportionate distribution of dimension etc. This is meant for the under-regions (pātālas) etc.

Chapter : 4

The description of the Meru Sudarśana is given here. It is situated at the very centre of the ab-aeterno-ad-aeternal universe (loka). The description of the universe in terms of its dimensions in rājus is given. The Jambū island surrounds the Meru and is surrounded by innumerate islands and seas whose rings have successively twice the widths in yojanas, the islands and seas being in alternate succession. The dimensions of the Meru are given, (vv. 4.2-22). The peak and the foundation have been given, (vv. 4.23-24). The circumference is calculated from the diameter in case of the Meru's base, the whole mountain being a series of frustrum of a cone, with different diameters at different heights. The slant heights at various

heights of the Meru have been given. The formulas are given, for these proportionate intervals, (vv.4.32-40). A formula for summation of a geometrical series has been given, (vv.4.171-172). Decimal notational numbers are given, (vv.4.198-203). Similarly, here is also the formula for summation of a geometrical series, (vv. 4. 204-205) and (vv. 4.220-223).

Chapter : 5

The Jina temples over the Mandara mountain are described for their dimensional measures.

Chapter : 6

This describes the Devakuru and Uttara kuru regions according to the Ānupūrvī, their mountains, intervals etc. in yojanas, chords, lengths of mountains, height of segments, widths of the regions through formulas whereever needed, (vv. 5.1-13). Formula is also given to know width of a mountain after going a depth from the top, (v.5.47).

Chapter : 7

The Videha region is described here for its mountains and the Meru, chord, arc, slant side and various rivers, regions and forests. Formulas are given for finding widths of every one of the 16 Vijayas, Vakṣāras, rivers etc., (vv.7.8-31). From these, the width of Meru is calculated, (v.7.32). Various Vijayas are described, for their widths and river's widths, (vv. 7. 84-85). Lakes are similarly described, and the caves of Vijayārdha for their lengths, widths and heights.

Chapter : 8

Here, the description of Pūrva Videha is given. This country is endowed with 96 crore villages, (vv. 9.34-36). Dimensions of city are given in yojanas, (v. 8.11). There are 12000 highways, 1000 gopuras, 1000 crosses, and 500 windows. A river has 28000 tributories, (v.8.12). There is a Puṣkalā nation with 6 divisions, 96 $(10)^7$ villages, 26000 cities, 16000 big cities, 24000 great karbaṭas, 4000 maṭaṁbas, 48000 paṭṭanas, 99000 droṇamukhas, 14000 saṁbāhas, etc., (vv. 8. 55-60). In the east, at the shore of an ocean, the dividing forest has trees of various types (śreṣṭha, punnāga, kalpa, saptachada, campaka, aśoka, karpūra, bakula, mandāra.) It has palaces with altars, archades, lakes, flowerings, stadiums, assembly houses, highly decorated luxury houses etc., (vv. 8. 79-81). The similar

rivers, the Gangā and the Sindhu have lengths given by $16592\ \frac{2}{19} - 62\frac{1}{2} = 16529\frac{23}{38}$ yojanas. This signifies a plan of the symmetric structures, just as maṇḍalas for concentration and meditation.

Chapter: 9

This describes the Apara Videha with practically the same cities, structures, architecture, rivers, forests, divisions etc. In brief, the Vijayas have widths given by a calculation as

$$(500 \times 4) + (125 \times 3) + 2922 + 22000 = 27297,$$

then $45000 - 27297 \div 8 = 2212\ \frac{7}{8}$ gives the width. Similarly, the widths of Vakṣāra is defined as

$45000 - (17703 + 375 + 2922 + 22000) \div 4 = 500$.

This is in yojana. The width of the rivers is given by

$45000 - (17703 + 2000 + 2922 + 22000) \div 3 = 125$.

Similarly, the width of divine forest is given by

$45000 - (17703 + 2000 + 2922 + 22000 + 375 + 22000) = 2922$.

Thus, it seems that there has been a plan (yojanā) through which the maṇḍala is prepared or the maps of such structures are prepared.

Chapter :10

This describes the ring of Lavaṇa ocean, with under regions (pātālas), in 4 cardinal directions, symmetrically situated at a distance of 95000 yojanas, with base and top of 10000 yojanas, width and a depth of 1 lac yojanas, with 1 lac yojanas width at the centre. Thus two frustra of cones are joined together to form a drum shape. Every pātāla has three parts, equal to $33333\frac{1}{3}$ yojanas of depths with air below, water above and a moveable mixture of water-air in the middle (one-third) portion . This middle portion is responsible for the rise and fall of tide and ebb in the ocean's water. There are such several sub-pātālas also with the same mechanism of perturbation due to lunar dates in the middle portion of water-air mixture,

(vv.10.1-20). On the new moon or amāvasyā the height of Lavaṇa sea is 11000 yojanas and increasing every day it becomes 16000 yojanas on the full moon day, the increase per day being $(16000-11000) \div 15 = 333\frac{1}{3}$ yojanas. Similarly, the ebb, is explained. This is a curious planning for explanation of tides and ebbs, (vv.10.21). Further, there is described the shape of the Lavaṇa sea.

It is just as if a boat has been placed over another inverted boat. Its width below on the surface of the earth is 10000 yojanas. It increases gradually, till at the plane land it becomes 2 lac yojanas (at water level). Above the water-level (sama bhūmi), there is the water-top in sky. This top is 11000 yojanas higher above the water level on the new moon. And further increasing every day, it becomes 16000 yojanas on the full moon day. The width of the water-top decreases from 2 lac yojanas at water level to 10000 yojanas at the top, thus the total decrease both sides is $95000 \times 2 = 190000$ yojanas. The rate of decrease is

$$\frac{200000-10000}{16000} = \frac{95}{8} = 11\frac{7}{8}$$ per yojana.

So, this top is $11000 \times 11\frac{7}{8} = 130625$ yojanas, at the base,

it is $200000 - 130625 = 69375$ yojanas; and from the top it is calculated as

$5000 \times 11\frac{7}{8} = 59375$, and $59375 + 10000 = 69375$ yojanas, (vv.10.22-26).

That is how the measures of tides and ebbs in terms of yojana have been explained. It may be noted that the model as a whole should be adhered to for a correct understanding of the phenomenon.

There could be found pieces each equivaleut to Jambū island, in the superficial area of the Lavaṇa ring as $\{(500000)^2 - (100000)^2\} \div (100000)^2 = 24$.

Alternatively, $\{(500000 - 200000) \times (200000 \times 4) \div (100000)^2 = 24\}$, (vv.10.88-89). Area of the rings could also be found out as the sum of that of the Jambū island and that of the Lavaṇa sea = 197642353760 square yojanas as the sum of both, that of Lavaṇa sea being 189736659610 square yojanas, (vv.10.91-94). The formulas, for finding the external, middle and internal diameters, are also given, (vv. 10.95 et seq.). For example, that of the width of

Puṣkara island inclusive of that of Lavaṇa is 100000 $(2)^4$ = 1600000 yojanas, (v.10.96).

Chapter :11

This describes the island, sea, lower universe and paradise universe. The mountain ranges in successive islands, from the Dhātakīkhaṇḍa, as well as the regions have areas four times each of its that of preceding dimensions, (v.11.6). From the diameters, internal, intermediate and external, with the use of value of π as $\sqrt{10}$, the value of the respective circumferences have been calculated, (vv.11.11-12). The calculations for dimensions of the regions, occupied by mountain ranges, are given for calculating the internal, intermediate and external widths of parts of the Dhātakīkhaṇḍa. Thus, this forms a geometry of a circle, diameter and chord etc. or straight line. Similarly, small merus are measured for their widths and circumferences, (vv.11.14-24).

The place value has been in a variety, spoken in terms of pair of digits from left to right thus: 11 38 41 99 57 661. So also as one, three, three, six ----- for 1336062311421, (vv.11. 40-41). From the width of Kālodadhi sea, the area of the combined areas of Kālodadhi starting from that of Jambū island is calculated, (vv.11.45-47). The area of Kālodadhi is 672 times that of Jambū island, (v.11.48).

In the Puṣkara island, there is a circular mountain dividing it into two, beyond half of which, human beings have no access. It is called Mānuṣottara mountain. The circumference at this middle is 11700427 yojanas. The circumference of human region is given to be 14230249 yojanas as decreased by a slight amount. This island has 212 divisions, where Bharata region has an inner width as 41579 $\frac{173}{212}$ yojanas. Similarly, its widths in the middle and out are given. As compared with the area of Jambū island, it has an area 1184 times that of the Jambū island, (vv.11.69-73).

It is important to note that leaving Aruṇa, there has been a similarity of names starting from the Jambū to Svayaṁbhū, (vv.11.84-89). There is also description of logarithm to base two, i.e. bisections or cuts at half of half intervals throughout about the rāju or rajju (rope). The counts are given from the islands and seas, (vv. 11. 96-102). This expression is not so clear.

Formulas are given for finding the volumes of the lower universe (adholoka) (vv. 11.106-110), which is in the form of the frustrum of a wedge like regular solid. Various heights and locations of the celestial planes are also given.

Chapter :12

This describes the astral disc division. The height or angle of the moon's celestial plane is given from Citrā earth, (v.12.2). The number of moons at various islands and seas is given, (vv. 12.15-17). This number forms a series, increasing by 4, as a common difference of an arithmetical progression, in various rings of Puṣkara island totalling to

$$\frac{8-1}{2} \times 4 + 144 \times 8 = 1264 .$$

In the rest of islands and seas, the same rule of summation of an arithmetical progression works, (v. 12.18). Here, the concepts of ādidhana, madhyadhana, uttaradhana, sarvadhana have been used, (vv. 12. 46-48), and inter-relation between them is set up. Mūladhana word is also related, (vv. 12.77-78). Calculations for finding out the sum total of all astral bodies in the universe are given, (vv. 12. 86-89). This also corresponds with the measure of rāju or jagaśreṇī, a cosmological measure of distances already related with set of points in a finger width and set of instants in a palya, (vv. 12. 76-85).

Chapter : 13

This chapter describes varuious types of measures and their units. The time is of two types: the behavioral and the deterministic. It is also divided as the numerate, innumerate and infinite, (vv.13. 2-3). The agurulaghu guṇa (non-gravity-levity property) is of fundamental importance as it preserves the existence of the eternal fluentness of a fluent or dravya, (v.13. 4). The fluent time is indivisible so also the behavioral time, (v.13. 4).

There is indivisible instant of time called samaya, innumerate number of which make an āvalī. Then a breath, muhūrta, bhinna muhūrta, day, month, season, ayana, year, yuga, etc. have been defined, (vv.13. 5-8). These further units upto the Acalātma, are called numerate time. The countless is the innumerate time, (vv.13. 9-15).

The paramāṇu is an ultimate particle of matter (13.16). Infinite-infinite ultimate particles constitute a molecule of name avasannāsanna. Thus parmāṇu, trasareṇu, ratharenu hair forepart, etc. reach upto a finger (aṅgula). The aṅgula is of three types: utsedha, pramāṇa and ātma, used for various types of objects: geographical, astronomical and cosmological measures. (Perhaps as ātma, utsedha and pramāṇa respectively), (vv.13. 23-25). The name sūcyaṅgula has been given for point-set definition, defining measures through regional points, and here the text mentions that what has been derived from the ultimate particle etc.,

(v.13. 26), (vv. 13. 26-31 also). The aṅgula unit is further carried through pāda, vitasti etc. to yojana, which has been a subject of deeper study throughout all Indian philosophies. Through this fundamental unit, the Jaina School defines palya and sāgara, (vv.13. 34-47). These are time point or instant or samya sets. Thus, eight types of simile measures are defined which give the measures of the existential sets, through these eight construction sets: palya, sāgara, sūcyaṅgula, pratarāṅgula, ghanāṅgula, jagaśreṇī, lokapratara and loka. The first two are instant-sets and the rest are point-sets, (vv. 13. 35-43).

The remaining part gives in details the theory of knowledge, proving the all- knowing accomplishment (sarvajña siddhi) through pratyakṣa, anumāna, upamā pramāṇas and non-contradictory Āgama pramāṇa, (v. 13. 4-4). The abhinibodha (mati jñāna) is through mind and five senses. This is of 4 types: avagraha, īhā, avāya and dhāraṇā, the total types thus being $4 \times 6 = 24$. When vyañjanāvagraha and arthāvagraha are considered, this number increases to 28. Then the grasping of knowledge is through 12 styles, bahu, bahuvidha and so on, giving the total of $28 \times 12 = 336$ types of mati jñāna, (vv.13. 45-76). Through the instrumentation of the knowledge through senses (mati jñāna), the heard knwoledge (śruta jñāna or scriptural knowledge) manifests. This is divided into pūrvas and aṅgas, (vv. 13. 77-83).

The theory of permutation and combination is used in defining the 18000 types of modesty (śīla) and 8400000 types of qualities (guṇas), (vv.13. 136-137), in the commentary note, (vide Mūlācāra, chapter on śīla.)

THE AUTHOR AND THE PERIOD OF COMPILATION :

There is no mention of its compilation period in this text. However, in the colophon, the author mentions the tradition of preceptors, (ch.13. vv. 153 etc.). According to it, his teacher was Balanandi and the grand teacher was Vīranandi. The author, Padmanandi, attained the knowledge of this text from vidyā guru, Śrī Vijaya, and he had compiled this text for Śrīnandi who was a disciple of Sakalacandra who was disciple of Māghanandi. This was compiled in "Baranagara" city which was in the state, Pāriyatta (Pāriyātrā) where ruled the king Śakti kumāra or Śanti kumāra. Paṇḍita Nathuram premi tried to prove in an article that the preasent U.P. was called Pāriyātrā. In the state of Kota in Rajsthan there is a town called Bārā, which should be this Bārānagara. The tradition of teachers of Padmanandi may be related to the 12 Bhaṭṭārakas (Vikrama era 1144-1206) and their seats, at Bārā in the paṭṭāavali of the Nandi saṁgha. In the history of Rajputana, the king Śaktikumāra has been

mentioned as successor of Śalivāhana, the son of king Naravāhana in the Guhilota dynasty. Possibly this name might be related. In the inscription of Āṭapura (Āhāḍa), there has been given the full list of the dynasty starting from Guhadatta (Guhila) upto Śaktikumāra. This inscription dates Vikrama saṁvat 1034, Vaiśakha śukla 1. Hence this proves to be the compilation period of the JPS. (Vide Nathurama premi, Jaina Sāhitya Aura Itihāsa, Bombay, 1956, pp. 256-265, the article, "Padmanandi kī Jambūdīvapaṇṇatti"). The manuscripts consulted have one from Āmera of samvat 1518, denoting that the period of the author must be earlier than this period. Śaktikumāra seems to have been partial to Jainism, though he was a Pāśupata by faith. Considering all the points above, Padmanandi seems to have composed this JPS at the close of the 10th or at the beginning of the 11th century A.D., at the time of Śantikumāra.

The text JPS could be compared with karaṇānuyoga type of material in various texts of the similar group. For a detailed study of this comparison with the following texts, the introduction to JPS may be consulted on pp. 128 et seq.

(1) the Tiloyapaṇṇatti. (2) the Mūlācāra. (3) the Trilokasāra, (4) the Jambūdvīpa prajñapti-sūtra (of Śvetāmbara school which gives more details of the years, constellations and Jyotiṣa cakra), (5) the Jyotiṣakaraṇḍaka. (This has been written by some preceptor, a follower of Vālabhya vācanā, having 21 chapters, having quite similar to the matter in the Sāryaprajñapti. This is a brief astronomical text. Some verses have similarity in both). (6) the Bṛhatkṣetra samāsa: There are a few verses in both having simlarity.

Comparison with the Vedic Texts: The following works have discussed to a great extent the geographiacal matter in JPS and in other similar Jaina texts as compared with the Vedic and Buddhist texts:

1. S. M. Ali, The Geography of the Purāṇas, New Delhi. 1966
2. M.P. Tripathi, Development of Geographic Knowledge in Ancient India, Varanasi, 1969.
3. B.C. Lal, Prācīna Bharata kā Aitihāsika Bhūgola (Historical Geography of Ancient India), Lucknow, 1972 (Hindi Trans. by R.K. Dvivedi).

It may be clearly noted that whereas the other texts (of the Vedic and Buddhist Schools) proceed with the geographical knowledge model as independent unit in itself, the Digambara Jaina School, specifically prepares the background and basic foundation through a unified model of geography, astronomy, cosmology and Karma. It is a very well knit unification through its own different types of fundamental units, aiming at building up a

mathematical model of Karma theory of every event. The whole of their target of freedom from the known and the unknown is a theory which mathematicalıy Jiscusses the bios-phenomena in nature, through its mathematical model, including all the four theories of geography, astronomy cosmology and Karma. They are based on the indivisible time unit (samaya), indivisible space unit (pradeśa), leading to āvalī and avasannāsanna, through principle theoretic approach. This further leeds to muhūrta and aṅgula. Muhūrta is of 3 types: bhinna muhūrta, antarmuhūrta and muhūrta. Similarly, aṅgula is of 3 types: ātma, utsedha and pramāṇa. Thus, these time and space units play a fundamental role according to their definition, being picked up in the above six ways, according to proper context and fit. In this unified theory, one has to be careful in understanding proper meaning and implication of the material.

3. The Trilokasāra of Nemicandra Siddhāntacakravartī :

This work is by the famous author, Nemicandra Siddhānatcakravarti, of 10th-11th century A.D. He is said to have inspired Cāmuṇḍarāya, the prime minister of Rācamalla of Gaṅga dynasty (Mysore), to erect 57 feet high stone statue of Bhagavāna Bāhubali or Gommaṭeśvara at Śravaṇa Belagola, south India. Bāhubali was the foremost Kāmadeva of this aeon. From the available records, this brother of Sundarī (well versed in mathematics taught by her father Ṛṣabhadeva, the first Tīrthaṅkara of this era), had defeated his elder brother, Bharata cakravartī, and had renounced the world immediately, even after victory due to the world's behaviour.

His statue was erected on sunday the 23rd march, 1028 A.D., Caitra white fifth, Śaka 951. The title of Cakravartī was held by preceptor Nemicandra, beyond that of the Traividya for having gained full mastery over the Ṣaṭkhaṇḍāgama (the Revelation in six portions). From these texts he had compiled the summary texts, the Gommaṭasāra, and further the Labdhisāra from the Kaṣāya prābhṛta texts, (vide the Labdhisāra, INSA project 1984-87). These monumental texts on the mathematical theory of Karma were complied round about the Christian era.

It appears very well that the Tiloyapaṇṇatti might have been before Nemicandra Siddhāntcakravartī. This text by Yativrsabha had made use of original Prakrit texts, as the Aggāyaṇī, the Saṁgoyanī, the Saṁgāhaṇī, the Diṭṭhivāda, the Parikamma, the Mūlāyāra, the Loyaviṇicchaya, the Logāiṇī and the Loka vibhāga. Vīrasenācārya has also mentioned the Tiloyapaṇṇatti several times. It appears definite that our author might have complied the TLS from the TPT, as well as Bṛhaddhārā Parikarma which is not available now. Ācārya

Nemicandra belonged to the Deśīya gaṇa, and from the verses 436-785, it is known that his initiation preceptor was Abhayanandi, whereas his teacher-preceptor of Jaina learning were Vīranandi and Indranandi. From the verse 396, he is seen to mention the name of Kanakanandi as well, who had manifested the Sattva Sthāna after having heard the whole scripture from preceptor Indranandi, and hence he seems to be his elder brotherly disciple. At the end of the Trilokasāra the verse,

"idi ṇemicanda muṇiṇā appasudeṇabhayaṇaṁdivaccheṇa /
raiyo tiloyasāro khamaṁtu taṁ bahusudāiriyā //1018//

mentions that he was the disciple of Abhayanandi who was the preceptor of Vīranandi as well, the author of the Candraprabhacarita.

Cāmuṇḍarāya, the prime minister, was a very learned scholer of Jainism and he has been praised by Nemicandra in colophon of Karmakāṇḍa. Cāmuṇḍarāya seems later, to be initiated by Ajitasena preceptor, and he had written a commentary on the GJK in Kannaḍa language, apart from other works. He had erected, perhaps as minister, the Gommaṭeśvara at Velagula nagara, on Caitra white, 5, sunday at Kumbha lagna, Saubhāgya yoga, Mṛgaśirā nakṣatra, Vikrama saṁvat 1038 (981 A.D.). Nemicandra has been the author of GJK, GKK, TLS, LDS and KPS.

The TLS has 1018 Prakrit verses, with the following three commentaries, available at present:

1. Commentary by Mādhavacandra Traividya (c.1203 A.D.), edited by M. L. Shastri, Bombay, 1917, (V.N.-2444).
2. Commentary by Pt. Ṭoḍaramala of Jaipur (c.1720 A.D.), edited by M. L. Shastri, Bombay, 1918. [He had completed the commentary, Samyakjñānacandrikā, of the GJK, etc. in Saṁvat 1818].
3. Commentary by Āryikā Viśuddhamatī, Shri Mahavirji, Rajsthan, (V.N. 2501), 1976.

The commentary by Mādhavacandra Traividya has been very instructive in so far as various rationale of formulae for π as $\sqrt{10}$, etc. are concerned. It depicts the illustrations deeply and in brief. On the basis of this commentary, Pt. Ṭoḍaramala of Jaipur gave a Ḍhāṇḍhārī (dialect of Rajsthan akin to Hindi) translation with an introduction (pp.1-22), apprising of various mathematical symbols and operations needed for the study of the TLS. That was the style of the 18th century A.D. (vide, Jain, L. C., et al, Ṭoḍaramala of Jaipur -(A Jaina Philosopher Mathematician), op. cit., bibl.)

Mādhavacandra Traividya seems to have given the Sanskrit rendering of the TLS Prakrit verses and Manoharlal Shastri has given implications sometimes as bhāvārtha.

Āryikā Viśuddhamatī has, however, with a team of co-workers, Br. Ratancandra Mukhtar and Chetan Prakash Patni, given an exhaustive Hindi commentary with many illustrations and maps, charts and tables, indices etc. It also contains a nine page introduction on the speciality of its mathematics. For research articles on the mathematics and astrnomical contents of the Trilokasāra as well as those of the TPT, the bibliography may be seen.

Mathematical Contents of the TLS

Chapter :1

Loka Sāmānyādhikāra:

This describes the general universe. The whole space is of infinite space-points, and in its very central portion, there is the universe containing innumerate space-points, (v.1.3). The shape of this universe is given as constituted of vertical one and a half drum (of wedge shape), (v.1.6). The cosmological measure is a jagaśreṇī, the seventh part of which is a rāju and

$$\text{jagaśreṇī} = [\text{ghanāṅgula}]^{(\log_2 \text{palya}) \div \text{asaṁkhyāta}} \quad \text{.....(v.1.7)}$$

Similarly,

$$\text{sūcyaṅgula} = [\text{palya}]^{\log_2 \text{palya}}, \text{ where}$$

$$\text{pratarāṅgula} = (\text{sūcyaṅgula})^2, \quad \text{ghanāṅgula} = (\text{sūcyaṅgula})^3. \quad \text{.....(v. 1.8)}$$

There are two types of scales (measures), the universal and postuniversal, (v. 1.9). The universal is of eight types. The postuniversal is of four types: the fluent measure, the quarter measure, the time measure and the phase measure (dravya pramāṇa, kṣetra pramāṇa, kāla pramāṇa and bhāva pramāṇa), (v.1.10). The minimal and maximal measures have been denominated. The fluent measure is of two types, the number measure and the simile measure, (v.1.11-12). The number measure is of the numerate, the innumerate and the inifinite types. These are further classified into the minimal, the intermediate and the maximal, (v.1.13-14). For giving the knowledge of the numerate, the counting rod pit, the counter-counting rod pit, the unstable counting rod pit and the great counting rod pit are imagined. These are cylindrical with a base of one lac yojanas of diameter with a height of one

thousand yojanas. The process is given in terms of filling up and emptying out certain mustard seeds covering certain period of time amounting to maximal numerate. These involve the finding out the rationale for π as $\sqrt{10}$, the aṅgula etc. (vv. 1.15-35).

When unity is added to the maximal numerate, the least innumerate is produced. Further, processes are described, to produce the intermediate, and maximal innumerate, (vv. 1.37-45). The least yoked innumerate raised to the power two, gives the minimal innumerate innumerate, where as the minimal yoked innumerate is obtained by raising the minimal trans-innumerate to itself. The measure of āvalī instant-set is equal to the minimal yoked innumerate. (v.1.37). The maximal yoked innumerate is obtained by subtracting unity from the minimal innumerate innumerate. The latter number is then subjected to the lofty process of spread, give and multiply mutually, (vv.1.38-40). This process is repeated three times. From the result so obtained by squaring over squared (vargaṇa saṁvargaṇa), the minimal infinite infinite is obtained by projecting into the result, ten sets, postulated as really innumerate (but unknown), established in comparability, (and thus known), and the total again being subjected to three times the unified process of spread, give and multiply mutually. This process is called the viralana, deya and guṇana. When one is subtracted from this, the maximal innumerate innumerate is obtained. Thus construction sets are processed again, similarly, to obtain the maximal infinite infinite from the minimal infinite infinite. The latter is subjected to three times the process of spread, give and multiply. The result is added by six infinite sets which are properly infinite, placed in comparability. The sum total is again subjected to three times the process of spread, distribute and multiply. To this result, the infinite set, of indivisible-corresponding-sections of the non-gravity-levity control (guṇa) of the dharma and adharma fluents are added. The sum so obtained is again put to three times the process of spread, give and multiply or that of squaring over the squared. Still the maximal infinite infinite which is equivalent to the omniscience (kevala jñāna) is not obtained. Hence it is instructed to subtract that set from the set of indivisible-corresponding-sections of omniscience and add the set again to it, so that the omniscience set is obtained, (vv.1.48-51).

That is how the logical process has been adopted in framing sequentially ordered numbers or sets of objects for the purpose of giving the idea of comparability established among various postulated cardinal sets which are finite, transfinite and infinite. Here, "ṇāṇaṁ ṇeya pamāṇaṁ" or "knowledge has a measure of the known or the knowable". The power of omniscience is relative to the manifestation. This may be said to be the supreme adaptable set, there being no other number measure greater than this. Further, whatever is simultaneously direct to scriptural (or heard) knowledge, it is called numerate (saṁkhyāta).

Whatever is simultaneously direct to clairvoyance, it is called innumerate (asaṁkhyāta). Whatever is simultaneously direct to omniscience, it is called infinite, (v.1.52). Accordingly, the semi-matter change (ardha pudgala parivartana) is called infinite as it is beyond the range of clairvoyance, but actually, in supreme norm, it is not infinite, because this periodic change is exhaustible. The only set which is not exhaustibly infinite is that which canot be exhausted, even though continually being exhausted without inflow, (v.1.52).

After the above treatment, the number measure is examined for the locations of sets and their sequential terms through fourteen types of sequences which start from one and end in the omniscience or a part or a fractional exponent thereof. The sequences are:

1. The all sequence (sarva dhārā)
2. The even number sequence (sama dhārā)
3. The square sequence (kṛti dhārā)
4. The cube sequence (ghana dhārā)
5. The square generating sequence (kṛti mātṛka dhārā)
6. The cube generating sequence (ghana mātṛka dhārā)
7. The odd number sequence (viṣama dhārā)
8. The non-square sequence (akṛti dhārā)
9. The non-cube sequence (aghana dhārā)
10. The non-square generating sequence (akṛti mātṛka dhārā)
11. The non-cube generating sequence (aghana mātṛka dhārā)
12. The dyadic square sequence (dvirūpa varga dhārā)
13. The dyadic cube sequence (dvirūpa ghana dhārā)
14. The dyadic cube-non-cube sequence (dvirūpa ghanāghana dhārā)

(For details, vide Jain, L. C., Divergent Sequences Locating Transfinite Sets in the Trilokasāra, IJHS, in bibliography), (vv. 1.53-91). This is in brief, taken from the Bṛhaddhārā Parikarma which is in quite a great detail as mentioned by the author. But, this is not available at present. A comparative study can be made out of this topic of transfinite sequences with those dealt with by Georg Cantor in his researches on, "Contributions to the Founding of the Theory of Transfinite Numbers", op. cit. Further studies into such sequences by Hausdorff and others are bringing more and more closer approach to

phenomena like the fractals in nature. The Jaina School studied this data for application to the theory of Karma. These sequences located various types of the sets used in this theory.

Then, the study of eight types of simile measure (upamā pramāṇa) starts with

1. palya, 2. sāgara, 3. sūcyaṅguala, 4. pratarāṅgula, 5. ghanāṅgula, 6. jagaśreṇī, 7. jagapratara and 8. loka, (v.1. 92)

The first two may be translated as the instant-sets, palya as pit and sāgara as sea. The remaining are the point-sets which may be translated as linear-finger, square-finger, cube-finger for three types of aṅgulas. The great point-set may be the world line, world line square, and the universe or the world line-cube. The pit or palya is of three types, the behavioral (vyavahāra) pit, the uddhāra pit and the addhā pit. The vyavahāra pit measures the number, the uddhāra pit measures the islands and seas, whereas the addhā palya measures the life-time of Karma bond etc., (v.1.93)

The instant-set, palya or pit, one yojana in diameter, cylindrical with a height of one yojana, is used to be filled up completely with hairfore parts of born lamb (ram), within seven days of its birth, in the best pleasure land. Here, the rationale for proving the $\pi = \sqrt{10}$ is given by the commentator, Mādhavacandra, (vv. 1.94-96) [vide also the R. C. Gupta's paper in bibliography.]

The contained number of hairfore parts has been given to be

$2^{2^6} \times 2^{2^4} \times 19 \times 18 \times (10)^{18}$

or $413452630382031777495121 92 \times (10)^{18}$ or $N \times (10)^{18}$, (abbr.)

This has also been expressed by the 'Kaṭapayādi system of enumeration, (vv. 1.97-98).

The behavioral (vyavahāra) palya is obtained when the pit is exhausted through the process of taking out of one hairfore part once in every hundred years. This is converted into samayas to get the instant vyavahara palya set for enumeration, (v. 1.99). The uddhāra palya, enumerating the islands and seas, involves an innumerate number of years converted into instants. This seems to be qualitative at first sight. The addhāpalya, enumerating the life-time of karmic bond also, involves innumerate years converted into instants, obtained by cutting the hairfore parts of the uddhārapalya which was similarly obtained by cutting the hairfore parts of the vyavahāra palya into instants of innumerate years. This is being exhausted through hairfore part one by one, per instant or samaya, (vv. 1.100-101). When both of

these palyas are multiplied by $(10)^{14}$, the respective sāgara is produced, (v.1.102).

They are respectively the uddhāra sāgara and the addhā sāgara The verse (1.103) shows the analogy of the sāgaropama denomination. This is shown through various diameters covering the rings of Lavaṇa sāgara. The area is found through a similar rationale for $\sqrt{10}$, (v.1.103). In this case the Lavaṇa sea contains 24 $(10)^{10} \times 1000$ pits, each cylindrical with the diameter of 1 yojana and height as 1 yojana. This is multiplied by the number of hairfore parts in a single pit, which is $N \times 10^{18}$. Thus, it becomes 24 $(10)^{10} \times 1000 \times N \times (10)^{18}$. If 25 samayas or instants lapse in taking out water equivalent to 6 hairforeparts, then what time would it take to evacuate the hairfore-parts of Lavaṇa sea ? This gives the sāgara which when divided by palya hairfore-parts gives the number of palyas. (1.104).

Form v. 1.105 to 1.109, all the rules of logarithms to base 2 (which may be any other base) have been given. With illustrations etc., these continue till v.1.112. Further, $\log_2$ of $\log_2$ gives the varga śalākās, where $\log_2$ gives the ardhacchedas. The $\log_2$ (L) and $\log_2 \log_2$ (L) have been evaluated in terms of the F^3 or cubic finger, (v.1.109), as per relation given earlier.

Then, the description of universe through geometrical figures is given with various divisions and subdivisions : The upper, the middle and the lower universes with various paradises and hellish holes therein, (v.1.114). The general lower universe is equivalent to eight types of lower universes, depicted through geometrical figures and methods adopted to find their volumes in each case. The shapes are ūrdhāyata, tiryagāyata, yavamuraja, yavamadhya, mandāra, dūṣya and girikaṭaka apart from being general, (vv. 1.115-117). Similarly, volumes of the various heavens of the upper universe are found (1.11). The upper universe is also equivalent to five types there of, inclusive itself : The samikṛta, the pratyeka, the ardha stambha, the stambha and the pinaṣṭi. In finding out the volumes, triangle, trapezium and trapezoid or wedge are the targets every where.

After the dimensions of the universe so shown, the measures of the enevelops of air and water surrounding the universe are given, (vv. 1.123-139). These are parallelopipeds and their volumes are calculated according to the scales and measures in rājus and yojanas.

The minimal immersion space of the accomplished beings is determined to be

$\frac{7}{8}$ dhanuṣa $\times \frac{900000}{787500}$ or $\frac{1}{900000}$ th portion of the tanuvātavalaya, as their minimal

inmmersion itself is for each as $\frac{7}{8}$ dhanuṣa, (v. 1.142). The mobile-bios-channel has a

volumes of $1 \times 1 \times 14$ cubic rājus, (v.1.143), written as $L^3 \times \frac{14}{343}$.

Then, various formulas are given for finding the sums of hellish holes in the discs of various hellish earths, situated in sequences radiated round a chief hole and scattered all over the radii-excluded space. These are usually arithmetical progressions (vv.1.151-169). The description is similar to that in the TPT. The widths and thickness of the holes are given and intervals between them are calculated, (vv. 1.170-176). Here, $S = \frac{n}{2}\{2a + (n-1)d\}$ is the general formula.

Chapter :2

This describes the residential deities, living in dwellings which are equivalent to the Jina temples therein, being 7 crore and 72 lac. This describes various types of deities having armies or clases whose contents go on increasing class to class in geometric progression, the formula for it being given by

$$S = a\frac{r^n - 1}{r - 1}.$$

The technical terms are the guṇakāra, mukha, pada, guṇasaṅkalita dhana, gaccha (pada), etc.

Chapter : 3

This describes the vyantara universe, The Jina temples contained in this universe are given by $\frac{L^2}{(300 \text{ yojanas})^2}$. The denominator is to be converted into square aṅgulas. They are $300 \times 300 \times 768000 \times 768000$ as per scale, square aṅgulas. Hence the fraction is $\frac{L^2}{(2^{24})(81)(10)^{10}}$, where L is the world line and L^2 the world area. (v. 3. 250). The verse (3.282) gives the formula for summation of a geometircal progression. The verse (3.301) gives the measure of interval of food-intake as slightly greater than five days and the respiration interval as slightly greater than 5 muhūrtas. This is for those who have 1 palya of

longevity . Those who have longevity of 10000 years, their food-intake interval is 2 days and respiration interval is 7 breaths, (v. 3.301 commentary).

Chapter : 4

This describes the astral universe.

The total number of astral bodies is given to be

$\frac{L^2}{(256 \text{ angulas})^2}$, (v. 4.302). Two types of widths have been defined for the island or sea. One is the width of the ring or ring's diameter and the other is the diameter of the full ring. The former is called valaya vyāsa and the latter is sūcī vyāsa, (v. 4.309). Formulas are given to calculate them. It may be noted that each of the successive rings is of double the width of its preceding ring, (v. 4.309-310). The linear diameter or sūcī vyāsa is of three types: external, middle and inner. Formulas are given to calculate their circumferences and areas, (v. 4.311). For example, the circumference of Jambū island is calcultated using $\pi = \sqrt{10}$, getting it as 316227 yojanas, 3 kośas, 128 dhanuṣas and slightly greater than $13\frac{1}{2}$ aṅgulas, (4.312). The area is calculated similarly to be 7905694150 yojanas and slightly greater than a kośas (v. 4.313).

Further, the formulas are given for finding out the circumferance of arbitrary island and sea when the circumference of Jambū island is given. The formulas for finding gross and fine areas of the ring-islands and ring-seas are also given, (vv. 4.314-315). Then the formula is given to find out the pieces of the arbitray islands and seas in terms of the Jambū-island as a single piece, (v. 4.316). Two alternative formulas are also given, (vv. 4.317-318). There are, then, certain geometrical objects in usual shapes of cylinder and vertical half section. The important solid is the conch's volume which is fairly difficult to understand, (v. 4.327).

The heights of the planets, the sun and the moon have been given above the Citrā plane earth. These have been shown to be angular distances of these astral bodies, between the orbital planes and the ecliptic by s. s. Lishk, (vide, Jaina Astronomy, op. cit.).

This description covers vv. 4.332-335. The interval between the stars at the minimal is $\frac{1}{7}$ kośa and at most 1000 yojanas, (v. 4.335). The diameters of hemispherical bodies of the

moon, the sun and the stars are given as $\frac{56}{61}$ yojanas, (vv. 4.338)

Rāhu and Ketu, having hemispherical shape with diameter slightly less than a yojana , move to cover the moon and the sun and create eclipses every six months at the end of parva, (full moon and new moon) (v. 4.340). The phases of the moon are due to Rāhu moving below the moon in specific ways, (v. 4.342). The moon has 12000 rays which are cool and the sun has 12000 rays which are hot. The intense rays of Venus are 2500. The remaining have mild rays, (v. 4.341). The velocities of the moon, perhaps variable, have been identified with the carriers as lion, elephant, bull, and horse with mane, (v. 5.343). The number of these vary with the planets. constellations and stars. The constellations move in different directions in case of the Abhijit, Mūla, Svāti, Bharaṇī and Kṛttikā.

The astral bodies move leaving a distance of 1121 yojanas from Meru. The number of moons and suns in Jambū etc., islands and seas, are respectively two four, twelve, forty-two and seventy-two. The astral bodies are stationary beyond the Puṣkarārdha, (vv. 4.343-346). Upto Puṣkarārdha, the polar (dhruva) stars are, respectively, 36, 139, 1010, 41120 and 53230, (v. 4-347).

The motion of astral bodies in various islands and seas have been depicted in terms of ring orbits, in succession, and the number of moons and suns, set therein, have been shown, (vv. 4.348-350). The measures thereof and intervals between them is given, (v.4.357).

A very lengthy and important calculation follow for getting the number of moons etc. in innumerate islands and seas, (vv. 4.353-362). Calculation gives the number of all astral bodies as

$$\frac{(736725\,(10)^{14}+1298)\times L^2}{F^2\times 2^{24}\times 5292\times (10)^{16}} \quad \text{or approximately} \quad \frac{L^2}{(256\,F)^2}.$$

Similarly, the numbers of five types of astral bodies are separately calculated, (v. 4.361). In a family of the moon, there are 88 planets, 28 conṣtellations and 66975 $(10)^{14}$ stars, (v. 4.362). The names of the 88 planets are also given, (vv. 4.363-370). The proportionate division of the stars in various regions and mountains has been in accordance with the measures of heights of segments as 1:2:4:8:16:32:64:32:16:8:4:2:1. Thus, Bharata region has 705 $(10)^{14}$ stars, (vv. 4.371-372).

The interval between moons and suns situated from Lavaṇa sea to Puṣkarārdha has

been stated and calculated in details, (v. 4.373). The moon and the sun move upto 180 yojanas of stretch in Jambū island and remaining $330\frac{48}{61}$ yojanas in Lavaṇa sea, (v. 4-375). There are 15 orbits of the moon and 184 orbits of the sun, the movement being one orbit per day, (v. 4-376).

The interval between any two orbits is given by

$$[(510\frac{48}{61} - \frac{184}{1} \times \frac{48}{61}) \div (184-1)] = 2 \text{ yojanas, (v.4.377)}$$

Further, various types of locations from Meru of the sun and the moon have been calculated, (v. 4.378.), so also the circumference of orbits and daily motion etc. (vide Jain, L. C., The Kinetic Motion of Astral Real and Counter Bodies in Trilokasāra, IJHS, op. cit.)

There is mention of the cancer and capricorn rāśis in this text, (v. 4.380). The day of 18 muhūrtas and night of 12 muhūrtas have been described, (v. 4.79). This is due to the motion of sun in various orbits, (v. 4.381). (Vide Jain. L C., Distinct Features of Indian Astronomy upto Āryabhata I, Prāchya Pratibhā, op. cit.). Further verses describe the bright and dark regions into which the Jambū island and the Lavaṇa sea is divided due to motion of the sun in various orbits, (vv. 4. 381-386). The sun sweeps out the equal paths by its variable motion, the year round, moving along sometimes as lion, sometimes as horse and sometimes as an elephant, (vv. 4.387-388).

The range of eye vision for looking at the sun is explained, (v. 4.391). The arc lengths of various regions and mountains are proportionately calculated through the same geometric ratios, 1, 2, ----- 32, 64, 32, -----2, 1, (v. 4.392). Similarly, the lateral sides are calculated, (vv. 4.393-394). The rise stations on the Niṣadha and the Nīla ranges of mountains are 63, on the Hari and Ramyak are two and two, and are 119 in Lavaṇa sea, (v.4. 395). The calculations are given in details in the commentary. Regarding the moon, there are 4 rise-stations in the land regions and 10 in the Lavaṇa sea, (v. 4.396).

Then the bright illuminated region of the sun in the south, north, upper and lower directions are related, (v. 4.397).

The constellations are of minimal, intermediate and maximal extension types, respectively being of 1005, 2010 and 3015 sky-parts (gagana-khaṇḍa). Abhijit is of only 630 sky-parts, (vv. 4.397- 400). From these, the movement of the constellations in muhūrtas can be calculated. Similarly, the moon moves 1768 sky-parts in a muhūrta and the sun moves

1835 sky-parts in a muhūrta, (vv. 4. 401-402). Thus relatively, the moon moves the slowest, the sun faster, the nakṣatra still faster and the stars still faster, (v. 4.403). This measure has been calculated, (v. 4.404). Similarly, conjunction period of Rāhu with constellations has been calculated, (vv. 4.404-405). This is for the sun, constellation and Rāhu, (v. 4.406). The relative periods, of motion round the year, are also calculated, (v. 4.408). These are for different solstices, so also these for the moon are also calcutated, (v.4.409). The intercalary month and year are also described, (v. 4.410). Thus, the yuga of 5 years is described , beginning with conjunction of the moon with Abhijit. The frequencies are also explained, (v. 4.415) each for the southern and northern solstices, (vv. 4. 417-419). In the solstices, the method for finding out the parvas and tithis is also given, (v.4.420), so also in the equinoxes, (v. 4.421). The mutual relations are also given, (vv.4.422-425). Method is given to find out the number of constellations in equinoxes, and getting the total number of days of equinoxes, (v. 4.429), and alternative methods are given for getting the constellation in equinoxes (vv. 4.430-431).

The names of the constellations of the zodiac are also given, (vv. 4.432-433). The names of their ruling planets etc. are also given, (vv. 4.434-435). Location of the constellations, rising and setting, in 15 orbits of the moon are also given, (vv. 4.436-439). The number of stars in 28 constellations are given and the shape of constellations are described, (vv.4.440-444). The family stars (asteroides) of constellations are also given, (v. 4.445). The longevity of the astral bodies, their family deities etc. are described, (vv.4.446-449).

Chapter : 5

This describes the universe of celestial planes which in the upper universe are 8497023 in number, classified as kalpa and kalpātīta (beyond imagery). Their dimensions, in terms of rāju are given, the lower heavens having greater number and the upper heavens having less number of the celestial planes, in gradual succession, starting with 3200000 and ending with 5. The structural limits of these heavens are given, alongwith the dimensions of the planes, chief and others, starting with 4500000 yojanas and ending with 100000 yojanas. They are also arranged as the indraka (central) and those in sequential order. Formulas give method to count their numbers in various heavens. These are planes, scattered also. The extension of some celestial plane is up to innumerete yojanas, (v. 479). The dimensional structures of the cities and the fort-surrounding walls are also given. The description of the royal army, family, servants etc. are given through their numbers . Strucures of cities of Lokapāla deities are illustrated through geometrical figures, (v.506) and houses of their family through extensions etc., (vv. 507-508). The royal throne, the royal court, the

bodyguards etc. are given in details. Facing the temples are the pride-pillars (mānastambha) whose dimensions are given.

The powers of their execution and clairvoyance are given limits, (v.527), the greatest being possessed here in case of Lokapāla who is able to see the whole of universe-nerve or channel. That for the smallest is $\frac{\equiv}{343}\times\frac{3}{2}=1\frac{1}{2}$ cubic rājus. The fluent of the clairvoyance obscuring Karma is $\frac{B\times 7}{7}$, where B is the instant-effective-bond. The longevity is given in arithmetical progression, in sāgaras. Two types of cut-short of life is possible: cut-short in the bond age by the deities and human beings, and cut-short in the longevity by the human beings alone.

The proportion between the maximal age, interval of respiration and interval of food-intake desire is fixed in the heavens, being respectively, say in case of the Saudharmeśāna, maximal longevity is 2 sāgaras, respiration interval is 2 weeks, and food-intake desire interval is 2000 years. This proportion is fixed for all the heavens: 1:1:1000.

The abode of the accomplished is also described for its dimensions.

Chapter : 6

This describes the human and subhuman universe. Various merus, in various regions, are described as Sumeru mountains. The divisions of Jambū island by mountains at proportional intervals are described, for their heights, lengths, breadths and depths in yojanas, naturally in geometrical proportion. The big lakes and their big lotuses are given dimensions in yojanas and kośas, in the same geometrical proportion. The Śrī goddess has seven armies, with number of members in geometrical sequence. Similar geometrical proportion is held between the structures of houses, army-deities, and so on: 1:2:4:4:2:1. The rivers of the Bharata region are described for their movement with various measures of their structures in the way, originating in various mountains, (v.590). The Gaṅgā and the Sindhu rivers are thus described, (vv. 597 et seq.) Exactly symmetric rivers, in the equivalent opposite-segments place regions, the Bharata and Airāvata, the pairs of rivers, seven in number are described for various types of data in yojanas etc. The regions and the mountains are described for their dimensions. The Sumeru's structure is given through frustrums of cones at different heights in yojanas alongwith the diameters as such, (vv.606 et seq.). Formulae for finding diameters at a height are given. The structure of mountains,

regions and rivers is a complex one for the Jambū-island, (vv.665.et seq). The discoidal maps of geography have placed a wonderful symmetry and practically all types of formulas are given for calculations of constitutents of a circle, segments, arcs, diameters, straight lines and so on, (vv.734 et seq.). Here the main use is made of $\pi = \sqrt{10}$ and extraction of square roots of quantities occurs in various formulas. Palya, pūrvakoṭi also occur in defining longevity of the kulakaras etc., (vv.796 et seq.).

There is a proportion between the height and longevity in the kulakaras, tīrthaṅkaras and cakravartīs, given in terms of palya, pūrvas, and so on, (vide table on p. 645). The calendrical details regarding successive chronology of events after Lord Mahāvīra are given, (vv.850 et seq.). This leads us to a study of the Vīra Nirvāṇa era and the Vikramāditya samvat era, sometimes conflicting with the Śaka era. The period of Candragupta Maurya could also be calculated from the details here. Two appendices have been given in the project in this concern. The specific description of the last kalki and other kalkīs is important to note. The kalpa is also defined here, the avasarpiṇī and the utsarpiṇī periods like those of the yuga cycle. But, these are very great, forming a kalpa, constituting cyclic periods of the improvements and the declines in gradual succession, (vv. 779 et seq.).

The description of the under regions (pātālas) is peculiar as they consist of three parts filled with air, air-water and water respectively, causing tides and ebbs in the oceans, as the moon waxes and wanes, (vv. 896. et seq.) It is also important to note how the regions are divided through diameters for the ring islands, beyond the Jambū island, as if they were the spokes of wheels, (vv. 927 et seq.). Other calculations regarding comparability of the rivers, islands and the successively increasing structures therein, form other exercises of calculations, (vv. 929 et seq.).

It is a problem to set up and calculate the structures of the Nandīśvara island temples, where deities go to worship, four times a year, being so important for the Jaina society as well as for the deities. The dimensions are given incomplete and yet in the Rājavārtika certain results are given which are not derivable through $\pi = \sqrt{10}$ formulas, (vv. 966 et. seq.).

Perhaps, the TLS, carries the maximal number of formulas, and its commentary the maximal mumber of rationales. It also contains the topological divergent sequences, in dyadic forms, locating finite, transfinite and infinite sets, needed in the theory of Karma. In these, there has been application of theory of logarithms, indices, exponentiation etc., not

only for the finite sets but also for the infinite sets, numbers etc. It also contains maximal information regarding the Jaina calendar, alongwith formulas needed for calculations of astronomical events. It appeárs to have brought the mathematical manouevre at its peak, for after this work there has not appeared any further advance in the knowledge as it is in it. It appears that patronage of the Jaina knowledge by Cāmuṇḍarāya as a prime minister and by the king of Gaṅga dynasty could bring up the level of mathematical sciences to this end, through the resources of the empire, and through the ancient works they possessed, at the time of the author, Nemicandra Siddhāntacakravartī, most of them being untraceble at present. The texts of the Digambara Jaina karaṇānuyoga group thus retain the same model, as has also been maintained by the Śvetāmbara Gaṇitānuyoga texts. The former, however, lead to the study of the Karma theory, in their own way, what is difterent from the latter's texts.

4. The Lokavibhāga of Siṁhasūrarṣi :

This is a Prakrit text on the Karaṇānuyoga group and it is important from the point of view of history of Jaina cosmography etc., outcoming as a traditional work from the period of Lord Mahāvīra but simply translated by Siṁhasūrarṣi as mentioned by him, (v.11.51).

The Mathematical Contents of the LVG, an Introduction :

The text has been compiled by Siṁhasūrarṣi. At the end of the text there is a colophon but without any introduction to self and his teacher's tradition. He mentions only the tradition of discourses given by Lord Vardhamāna and Sudharma Gaṇadhara etc. Perhaps, he might have belonged to the Bhaṭṭāraka tradition. The present text, 'Lokavibhāga', describes all the divisions of the eternal universe (in limited space). This is classified as a text of the Karaṇānuyoga (Gaṇitānuyoga) group of study. The author asserts that he has only translated the discourses given by his predecessors. It has also been pointed out that this text was compiled actually by Muni Sarvanandi in Śaka era 380 at Pāṭalika village in Pāṇarāṣṭra.

"vaiśve sthite ravisute vṛṣabhe ca jīve rājottaraṣu sitapakṣa mupetya candre /

grāme ca pāṭalikanāmānipāṇarāṣtre śāstraṁ purā likhitavānmuni sarvanandī //11.52 //

saṁvatsare tu dvāviṁśekāñciśaḥ siṁha varmaṇaḥ /

aśityagre śakābdānaṁ siddhametacchatatraye //11-53//

This text is in Sanskrit in Anuṣṭupa vṛtta mostly. At the end occurs the conclusion in different vṛttas: upajāti, drutavilambita, śālinī, mattamayūra, hariṇī, mandākrāntā,

vasantatilakā, śārdūlavikrīḍita, respectively, and pṛthvī prosody in 97th verse of first section.

The text discusses the following eleven topics or divisions.

1. The Jambū island: The whole geography of the island as in the TPT has been described with the same measures of the Meru and so on, (384 verses).
2. The Lavaṇa sea: The width and shape of the ring has been described alongwith its change in height of water in the dark and white halves. The ocean contains under regions with various capacities. It also contains inter-islands, (52 verses).
3. Human region : This describes the Dhātakīkhaṇḍa, Kālodadhi sea and half Puṣkara island surrounded by a circular Mānuṣottara mountain, dividing it into internal and external Puṣkara half. The description of mountain, level regions and rivers is as usual as in TPT. This covers 45 lac yojanas of diameter, and human beings do not exist beyond this mountain. (77 verses).
4: The Seas: Out of innumerate seas and islands, this describes the first and last 16 seas and islands. It also gives the number of logarithm of rāju to the base two, (92 verses).
5. The Time: This describes the hyoserpentine and hyperserpentine (declining and improving) periods of time when heights, food-intake period, number of vertebra elements in backbone column, luxury material, etc., decrease and increase, respectively. This also describes the pleasure and work lands and regions in different periods.(176 verses).
6. The Astral universe: The astral deities of 5 types are described for their locations, intervals in space, velocities of the suns, the moons, stars and constellations, their orbits, the bright and the dark regions due to movement of the suns. The start of yuga of five-year cycle, frequencies, tithi and constellations, the rises etc. of the suns and the moons, the range of eye vision of the suns, then, the number of stars and constellations in different regions are described (236 verses).
7. The Bhavanavāsī universe: This describes the number of the Indras and deities in the universe along with their longevity, height, houses, caitya trees, crown signs, etc. (90 verses).
8. The Lower universe: The seven hellish earths, with their air-envelops and measurements have been described. The number of discs in every earth, and the hellish holes in sequential and scattered orders, have been related with mathematical formulas.

The height, longevity, food, clairvoyance, way-ward stations, cool-hot pains, complex, entrance and exit, frequency, etc. of hellish beings have been detailed. (128verses).

9. The Vyantara universe: Three types of Vyantara deities, their houses, residences, etc. are described. The houses are on Citrā earth; residences are on lakes, mountains and trees, and house-cities are in island-seas. The structures and their dimensions have also been detailed. There is also further description of their various types, with their families of deities, their five types of cities in various cardinal directions, and that of their chief concerts along with their longevity and height etc., (99 verses).

10. The paradise: This describes various types of paradises in the upper universe. The deities on celestial planes are kalpaja and kalpātīta. The kalpaja are of 12 types. Above these, are three types of lower, middle and upper Graiveyaka, nine Anudiśa, five Anuttara celestial planes. Above all these is the abode of the accomplished. Total celestial planes are 8400000. Remaining description is as that in TPT. Alongwith various measurements, the range, height, complex, activity, clairvoyance, etc. have been described for various types of deities and indras. (349 verses).

11. Liberation: The abode of the accomplished, their immersion accomodation, special own forms, happiness, the heights of the universe separately, etc. have been described. (54 verses)

The following are the specialities of the text as compared with other texts:

1. In this fourth section (chapter), the incidence of the logarithms of a rāju to the base two, or the points of bisections have been given at the end of Bharata, one on Niṣadha mountain and two on the Kuru region. This is not found in TPT (p.765), DVL (p.4, p.155 and p. 156) and TLS (vv. 352-358).

2. The fifth chapter does not describe a new type of trees, the dīpāṅga (organ of lamp), which is found in TPT (vv. 4.342; 8-9), TLS (v.787) etc. Similarly, for dīvaṅgehi dumā dasahā in TLS, kalpāgairdaśadhā drumāḥ has been stated in LVG.

3. In the fifth chapter, the periodic change has also been given on the family mountains apart from that on the regions, in vv. 35-37 which is not found elsewhere (TPT, vv. 4.1607, 1744, 2145; and TLS, vv. 882-884).

4. In the sixth chapter, only a few planets have been denominated in vv.165-166, whereas TPT (vv.7.14-22) and TLS (vv. 362-370) give names of all 88 planets. The LVG

directs to consult list on astronomy as "aṣṭāśītya stārakorugrahāṅaṁ cārovākaṁ".

5. The same chapter describes in vv. 197-200 Raudra-śveta etc. names and in the end the types of muhūrtas are perhaps indicated in expression, "muhūrto ṇyo ruṇo mataḥ". This is not available either in TPT or TLS.

6. The female gender in words has been expressed (ch. ix, vv.78-85}as if in male gender or masculine gender, as in "gaṇikāṇāṁ mahattarāh". This is not so in TPT (6.50), nor in TLS (v.275).

7. This is different in number twelve and sixteen of celestial-plates deities with controversial statement of the Saudharma indras in LVG.

8. Some specific words have been used: rukmi for rugmi (v.1.12), nigoda for yugala (v.5.160), iṣupa and viṣupa (v. 6.150,154) and (vv. 6.151-155), caukṣa and acaukṣa for śuci and aśuci (v.1.12), Āyāga for caitya tree (v. 9.57), kāpiṭṭha for kāpiṣṭha (v.10.64), samudgaka for karaṅḍaka, {v. 9.14) and 'Dabhra' for Hṛśva (v. 9.14). It is important to note that the Sanskrit rendering of most of the verses in Prakrit from TPT is of great importance which has been seen in the case of the TLS, and this has been a formidable task for TLS and TPT. The Sanskrit rendering of TLS seems to be that by Mādhavacandra Traividya.

The Metre and Language of the LVG:

The whole text has been written in Anuṣṭupa prosody. Its every single line contains 8 letters, the characteristic being 5th letter short, 6th being long, 7th letter being short in the second and in the 4th line. There have been exceptions. The language is often loose, difficult and sometimes against rules of syntax, (vide vv. 10.179 and 10.182). Some examples may also be seen which are opposed to dictionary and grammar, (vide vv.10.105,10.142) and (vv.10.50, vv.10.117, etc.). Similarly, there has been exceptional union of words and compounding thereof (sandhi and samāsa). For example, (vide, vv.10.131, 213, 7.30, 10.56, etc.)

The period of Compilation of the LVG

It is not known about the author Siṁhasūra Ṛṣi, to what tradition among ascetics or bhaṭṭārakas he belonged. He quotes, some times with reference or some times without reference, from TPT, the Ādipurāṇa and TLS, as well as from Harivaṁsa purāṇa without mentioning it. In the 11th chapter, three verses have been quoted from Svāmī-

Kārtikeyānuprekṣā compiled by Svāmī-kumāra whose period has been assessed to be from 10th century A.D. to 13th century A.D., i.e., before Brahmadeva and after Nemicandra Siddhāntacakravartī. Hence this work appears to be just after or within this interval, or just after the compilation of JPS, a work of 11th century of Vikrama era.

LVG of some Sarvanandī:

At the end of this book, is has been informed (vv.11.52-53) that in the village Pāṭalika of Pāṇa state, earlier Sarvanandī ascetic had compiled a text which was completed in Śaka era 380, during the 22nd year of reign of king Siṁhavermā of Kañcī, but the name and language of the text has not been mentioned, nor it is traceable or available. It may be that, as instructed in this colophon, the text might have been LVG or some other text with another name, perhaps in Sanskrit. Further, the collection in 15-36 verses in Anuṣṭupa prosody, as noted in the present LVG colophon, belongs either to LVG or the text of Sarvanandī, is not certain. The present text contains 1737 verses having 12 other metres, and this also contains 177 verses from TPT etc. The manuscript at Arrah contains about 2141 verses.

The following points have been raised against the present text to be simply a translation of Sarvanandī's work LVG by Siṁhasūra Ṛṣi.

1. If it has been a mere translation, what was the neccessity of quoting various texts by Simhasura Ṛṣi that affected the originality.

2. TPT mentions the dimensions of three air envelops, (v.1.281), as $1\frac{1}{2}$, $1\frac{1}{6}$ and $1\frac{1}{12}$ kośas above the universe. Siṁhasūra mentions these as 2 kośas, 1 kośa and 1575 dhanuṣas respectively.

3. According to TPT, following LVG, the height of Lavaṇa sea over the surface of the earth in space is 11000 yojanas alone. This rises to 16000 yojanas in white half and reduces to 11000 yojanas in dark half. Siṁhasūra does not express this in the same order.

4. Siṁhasūra does not mentions the equality of length and breadth of cities of astral bodies as according to Lokavibhāgācārya in TPT.

5. The present LVG mentions the number of four Laukāntika deities as 14014, 14014, 909, 909, in place of 7007, 7007, 11011, 11011 as mentioned in TPT, (vv. 4.635-39). Moreover, TPT, in accordance with LVG, mentions no distinction in Āgneya, but

present LVG mentions it.

6. The description of 14 kulakaras in present LVG (vv.5.38-134), according to Ādipurāṇa's complete and incomplete verses, does not seem possible in LVG by Sarvanandī.

Balchandra siddhantashastri holds that there might have been several texts on universe (loka), out of which LVG might have been one, which might have been in Prakrit and not available at present. He mentions that the author of TPT mentions only LVG and the word Lokavibhāgācārya, (vv.4.2491,7-115), which must have been prior to him, whereas the present LVG quotes verses of TPT. Thus, Shastri concludes that Siṁhasūrarṣi might have compiled this text on the basis of TPT and TLS.

So for as the mathematical contents of LVG are concerned, they are similar in structure to those in TPT, with the following differences, while TPT quotes from earlier LVG:

1. As mentioned earlier, the thickness of air envelops mentioned in TPT from earlier LVG are $1\frac{1}{2}$, $1\frac{1}{6}$, $1\frac{1}{12}$, totalling to $3\frac{3}{4}$ kośas, respectively, whereas in the present LVG it is 2 kośas, 1 kośa and 1575 dhanuṣas, (TPT, v.1.273, LVG, v. 8.14).
2. There are different styles of exposition of rise of water of Lavaṇa sea in TPT and present LVG where the height above water-top is mentioned to be 700 yojanas above, (v. 2.3).
3. Regarding length and breadth measure of astral cities, TPT (v. 7.115) mentions them to be same, but LVG does not mention this (vv. 6.9,6.11-15) and mentions only the length. The alternative mention in TPT is that the breadth is half of the length which ought to have been expressed as equal by authors of LVG. City is the same as the celestial plane.
4. TPT (v. 9.9) mentions the immersion of all the accomplished souls as slightly less than that of their ultimate bodies. This is also found in LVG (v.11.6), but the occupation of those accomplished has been shown to be one fourth of kośa (or 500 dhanuṣas). It seems to be slightly different and its compatibility is not consistent with the accomplishing souls with 525 dhanuṣas of immersion (avagāhanā).

According to an alternative opinion, the immersion of the accomplished souls is less by 1/3rd of the ultimate body. According to this, the immersion is at most 350 dhanuṣas and

$2\frac{1}{2}$ hathas at the minimum. For example, maximal is $\frac{525}{3}\times 2 = 350$ dhanuṣas, and the minimal is $3\frac{1}{2}$ hāthas = 84 aṅgulas, $\frac{84}{3}\times 2 = 56$ aṅgulas = $2\frac{1}{3}$ hāthas.

5. In TPT (vv. 8.635-39), the description of the Laukāntika deities in TPT is 707; 707; 707; 707; 7007; 7007;11011;11011; respectively. The present LVG mentions them respectively as 707;707;707; 707; 14014; 14014; 909; 909, (vv. 8. 625-626, 8. 639).
6. In vv.5.38-134, the 14 kulakaras have been described from the verses of the Ādipurāṇa.

The above indicates that it is doubtful whether Siṁhasūra had translated the LVG which was present before the author of TPT. It is also apparent from the paraphrasing of the Prakrit verses of TPT into Sanskrit in LVG (compare vv. 3.89 TPT with 7.52 LVG; 3.108 TPT with 7.66 LVG; 8.178 TPT with 10.36 LVG; 8.185 TPT with 10.43 LVG). This shows that Siṁhasūrarṣi has availed of the use of the TPT to a great extent.

The present LVG has also not only followed the Harivaṁśa Purāṇa but also included its several verses without any mention. Similar is the case of LVG with the Ādipurāṇa of Jinasenācārya.

The author of LVG has quoted about 40 verses from TLS. He has also translated several verses from TLS as a Sanskrit paraphrase from Prakrit. (Compare vv. 421 TLS and 6150-51 LVG) and so on. The author has not, however, made any use of the fourteen sequences of the TLS.

Mathematical Contents:

The use of value of π as $\sqrt{10}$ for finding circumference from diameter (v.1.89); chords, arcs and height of segments of circles (vv.1.16-58); geography of rivers, lakes and mountains (vv.1.56-219); frustrums of cones (vv.1.220-329); circles, rings-areas etc. (vv. 2.2-52); internal and external diameters and widths of rings-areas etc., (vv.3.41-43); logarithm to base two, as applied to finding bisection points, etc., (vv. 4.17-23).

Periods of time, kalpa with periodic changes into aeons (vv. 5.2-37); astronomy of the sun and the moon, planets and ascending-descending nodes (vv. 6.2-14); solar, lunar and planetary motion (vv. 6.21-34); interval between stars, their diameter (v.6.7), motion of

constellations, (v. 6. 20), eclipse and phases due to Rāhu, Ketu (v.6. 22); distance of astral bodies from Meru, (v. 6.23); number of suns and moons in Jambū island, (vv. 6.24-27); number of planets etc. in the family of a moon, (v. 6.28); number of orbits of the moon and the sun alongwith orbital region, (vv. 6.29-30); interval between two suns and two moons, (vv. 6.41-45 and 6.61-64); circumferences of various orbits, (vv. 6.49-53); number of orbits of the sun and the moon in Jambū island and Lavaṇa sea, (vv. 6.29-34); distance between two suns in Lavaṇa sea, (v. 6.69) and their distance from Jambū island altar in Lavaṇa sea, (v. 6.70); similar distances etc. between two suns in Dhātakīkhaṇḍa, Kāloda and Puṣkarārdha, (vv. 6.71-76); speciality of motion of the sun in the beginning, middle and end, (v. 6.77); period of the motion of the sun and the moon, (vv. 6.78-83) in muhūrtas; circumferences etc. of day-night and bright-dark areas (when the sun is in various orbits), (vv. 6.88-121); increase-decrease in bright and dark areas per day (v. 6.122); various measures of days in various constellation, (vv. 6.131-134); solstices (vv. 6.135-146) and frequencies, (v. 6.147), parva and tithi, (vv. 6.148-149); equinoxes, (vv.6.150-163) with various calculations with respect to parva and tithi; samaya, āvalī, day-night measures, (vv.6.201-206); range of vision, (vv. 6.207-211); frequencies of planetary conjunctions etc., (vv.6.218); various sequences of holes in hells, (vv.8.15-56); comparison between height, food-intake and respiration period, (v. 9.88); various sequences of celestial planes etc., (vv. 10.22-67); comparison of food-intake and respiration period of deities, (vv.10.213-222); the eight black hole type ranges, (vv.10.321 et seq. as in TPT); dimensions of the universe with location of the abode of the accomplished beings, (vv.11.5-50).

Concluding Remarks

The above details show the mathematical contents in four texts of the Digambara Jaina Karaṇānuyoga group, practically similar in description, formulas and other treatment. Each of them gives mathematical manouevre of Jaina geography, astronomy and cosmography, preparing a base for the theory of Karma. Even having a gap of centuries, the style, methodology, the material, the formulas and the theories have remained in tact, without any change whatsoever, even in presentation but for the language. The commentaries carry a lot of maps, and tables all of which have been included in the project, and in addition, charts as well as latest articles from Gupta, team of Takao Hayashi and other authors have been included making the project uptodate. Many appendices have been given to cover various indices, difficult calculations, tables, research articles published and unpublished, bibliographies and relevant material.

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2. Vide, Desai, P.B., Jainism in South India and Some Jaina Epigraphs, Sholapur, 1957, pp. 1 et seq. Cf. also, K.C. Shastri, op. cit. in Bibliography, Saṁghabheda, pp. 371 et seq.

3. Purudevacampū mentions Brāhmī, Sundarī scripts as follows:

brāhmiṁ tanūjāmatisundarāṅgīṁ

brahmanāthaḥ tasyāmutpādayatsaḥ /

kalānidhāḥ pūrṇakalāṁ manojñāṁ

prācyaṁ diśāyāmiva śuklapakṣaḥ //6-39.40//

Its author Arhadāsa also mentions, "Tadanuvayo vinaśīlādikaṁ vilokya jagadguru vidyā śrīkaraṇa kālo(ś)yaṁ iti matvā brāhmī-sundarībhyāṁ ॐ (oṁ) namaḥ siddhaṁ iti mātṛkopādeśapuraḥsaraṁ gaṇitaṁ svāyambhuvābhidhānaṁ pada vidyā chando vicintyālaṁkāra śastreṇa. (ibid.7, p.142). The mathematical symbolism of the Karma theory again reminds us about a mathematical script apart from the philosophical script as quoted by Jinasenācārya,

"akārādi hakārāntaṁ śudhāṁ muktāvalī miva /

svara vyanjña bhedena dvidhā bheda mupeyuṣīm //106//

ayoga vāhaparyanyaṁ sarvavidyā sugaṅgatāṁ /

saṁyogākṣara saṁbhūtiṁ naika bijākṣaraiśeitām //107//

samavādidadhat brāhmī medhāvinyati sundarī /

sundarī gaṇita-sthānaṁ brāhmī samyagdhārayati //108//

(Mahāpurāṇa, 16th section, vv.104-108)

The Śvetāmbara sect also claim to have 12 upāṅga, 6 cheda sūtra, 10 prakirṇaka and 2 cūlikās.

4. Cf. TPG and GSṢ introductions for details in Hindi.

5. Jain, L. C., IJHS, vol. 11.2,1976, pp. 85-111, op. cit.

6. (1845-1918). For details vide TPG, pp. 55 et seq. Cf. also Abstract Set Theory by A. A. Fraenkel, 1953, Amsterdam.

7. Cantor, G., Contributions to the Founding of the Theory of Transfinite Numbers, Illinois, 1952. Cf. also Zlot. W. L., The Principle of Choice in Pre-Axiomatic Set Theory, Scripta Mathematica, vol. xxv, no.2, 105-123, 1960. (Doctoral Thesis, Columbia Unibersity, 1957).

8. Jain, L. C., IJHS, 8-1, 1973, 1-27.

9. Jain, L. C., IJHS, 12-1, 1977, 57-55

10. Cf. Varṇī Abhinandana Grantha, 1962, pp. 478-484. Vide also Br. Chanda Bai Abhinandana Grantha, 1954, pp. 462-466 (Bibliography).

11. Gupta, R. C., IJHS, 10.1, 38-46, 1975.

12. Jaina Journal, Calcutta, 1978, pp. 79 et seq.

13. Cf. Jain, L. C., IJHS, 13-1, 1978, 42-49.

14. Cf. The Kepler's Laws for comparision: Gorakh Prasad, Spherical Astronomy, Allahabad, 1972, pp. 75 et seq.

15. Jain, L. C., IJHS, 11-1, 1975, 58-74. Vide also Tulsī Prajña, JVB, Ladnu, 1975, (Feb.-Mar.), 60-67, and Jaina Antiquary, vol.29, no.1-2, 1976, 9-16.

✪✪✪

TRANSLATION OF MATHEMATICAL VERSES OF TILOYAPAṆṆTTĪ

Stationed in the very central part of the endlessly endless non-universe sky, pervaded by the five types of fluents, viz. the bios etc., and having the measure (equivalent to) the cube of the universe-line, is this universe-sky (lokākāśa). // 1.91 //

The bios (jīva), the matter (pudgala), the aether (dharma), the anti-aether (adharma) and time (kāla) are the five fluents (dravyas), stationed, pervading the whole universe-sky (lokākāśa).// 1.92 //

Now, ahead of this, definitions are related for deciding the measure of (the universe which is) cube of the universe-line (jagaśreṇī) -

The pit-simile (palyopama), the sea-simile (sāgaropama), the linear finger (sūcyaṅgula), the square finger (pratarāṅgula), the cube finger (ghanāṅgula), the universe-line (jagaśreṇī), the universe line square (loka pratara), the universe [line cube] (ghana loka) are the eight types of the simile measure. //1.93//

pa. 1 /sā. 2 /sū. 3 / pra. 4 / gha. 5 / ja. 6 / loka pra. 7 / lo. 8 /.

There are three types of pit measure -

the practical-pit (vyavahāra palya), the progressive pit (uddhāra palya) and the Karma period pit (addhā palya).

Out of these, number measure is through the first pit, the measure of the island-seas is done through the second, and the measure of the life-time of the Karmas is effected through the third type of pit. // 1.94//

Complete in all respect is called the particle-set (skandha). Half of it is called the half particle-set (deśa) and half of half of it is called the half of half particle-set (pradeśa). The indivisible part of the particle-set is called the ultimate-particle (paramāṇu).// 1.95//

The particle-set, called the uvasannāsanna, is created from various types of endlessly endless ultimate-particle fluents (dravyas). //1.102//

When the uvasannāsanna measure is multiplied by eight, then the particle-set known as sannāsanna is produced. //1.103//

When the sannāsnna is multiplied by eight, the truṭireṇu is obtained and eight truṭireṇu

make a trasareṇu. //1.104//

In this way, from the preceding particle set, on multiplying each by eight, the particle sets as rathareṇu, uttama bhogabhūmi bālāgra (head of hair), madhyama bhogabhūmi bālāgra, jaghanya bhogbhūmi bālāgra, karma bhūmi bālāgra, līkha, Jum̐, Jau, and aṅgula (finger) respectively are obtained. //1.105-106//

Note: Bhogabhūmi means the pleasure-land. Karma bhūmi means the action land. Likha and jum̐ mean respectively the egg of a louse and a louse. Jau means barley.

The finger measure is of three types:

1. the aṅgula proved through the above definition is called the height-finger measure (utsedha-aṅgula pramāṇa).
2. the measure-finger (pramāṇa angula).
3. the self-finger (ātmāṅgula). //1.107//

Five hundred height finger measure make a finger of the first Bharata Emperor of the hypo-serpentine(avasarpiṇī) period, and this very is called the measure finger (pramaṇāṅgula) //1.108//

Self-finger (ātmāṅgula) is the name of the persons of such periods in which those persons happen to be in the Bharata and Airāvata regions.

Through the height-finger (utsedhāṅgula) are determined the measure of the height of the bodies of deities, men, subhuman and the hellish beings, the measure of the dwellings or cities etc., of all the four types of deities. //1.110//

The measure of all of islands, seas, mountains, altars, rivers, ponds or lakes, the earths and the regions of Bharat etc. is determined through the measure-finger (pramaṇāṅgula). //1.111//

The pitcher, hydria, mirror, flute, kettledrum, epoch, bed, van, plough, thrasher, strength, javelin, throne, arrow, stalk of lotus, axis, whisker, large kettledrum, pedestal, parasol, dwelling of human beings, cities and the number of gardens etc. are to be understood to be measured through the self-finger (ātmāṅgula). //1.112-113//

Six fingers make a foot (pāda), two feet make a span (vilasti), two spans make a hand, two hands make a rikkū, two rikkūs make a rod (daṇḍa), rod is equal to four hands which make a bow (dhanuṣa), a thrasher (mūsala) and a tube (nāli). Two thousand rods or bows

make a krośa. //1.114-115//

Four krośas make a yojana. Those who are clever in mathematics should find out the volume (khetta-phala) of the right circular cylinder (samavattam) pit of the same dimension (which has one yojana diameter and one yojana depth). //1.116//

The measure of circumference is obtained on finding out the square root of the product obtained on multiplication of the square of the diameter of the right circular-cylinder by ten. Its area is obtained on multiplying its circumference by the fourth part of the diameter (vistāra or vyāsa). //1.117//

On dividing the nineteen yojanas by twenty four, each of the three kinds of palyas yield its own volumes (ghana khetta phala). //1.118//

$$19 \mid$$
$$24 \mid$$

In the best pleasure land, crores of the fine hair of the new born ram of one to seven days are cut into indivisible parts through which that first pit be filled extremely compact. //1.119-120//

Whatever amount $\frac{19}{24}$ as the volume obtained above is converted into rods (dandas) and then into measure-fingers (pramāṇa aṅgulas). The measure fingers are then converted into height-fingers, (utsedha aṅgulas). They are then converted into barley, louse, hair heads of the worst pleasure land, those of the medium pleasure land thereof the best pleasure land, through multiplication by eight relative to every one of these, getting ultimately the number of the fine hair of the practical pit (vyavahāra palya). //1.121-122//

S0 | 96 | 500 |8 | 8 | 8 | 8 | 8 | 8 | 8 |8 | 8 |
S0 | 96 | 500 |8 | 8 | 8 | 8 | 8 | 8 | 8 |8 | 8 | hair's pit
S0 | 96 | 500 |8 | 8 | 8 | 8 | 8 | 8 | 8 |8 | 8 | (roma's palya)

The numerals of pit (palya), respectively are, 18 zeros at the end, two, nine, one, two, one, five, four, seven, seven, seven, one, three, zero, two, eight, zero, three, zero, three, six, two, five, four, three, one, and four. //1.123-124//

Thus ends the practical pit (vyavahāra palya). From the hair set of the practical pit (vyavahāra palya), every part of the hair is divided or cut into as many pieces, as are the instants (samayas) in the innumerate crore of years, and filling up the next pit (palya) through them, the hair parts are taken out one by one, instant by instant (samaya). In this way, the time taken in exhausting the second pit, that period is called progressive pit simile (uddhāra

palyopama). //1.126-127//

Thus ends the progressive pit (uddhārapalya). Through this progressive-pit, the measure of the islands and seas is known. Out of the hair set of the progressive-pit, every hair part is cut into as many pieces as are the instants (samayas) in innumerate years, and through them the third pit is filled up. As already done before, its every hair part is taken out one by one, instant after instant (samaya). The time taken in exhausting the third pit is called the karma-period-pit (addhā palya). Through this karma-period-pit, the measure of the life-time of karma and longevity of the hellish, the subhuman, the human and the deities (superhuman) are known. //1.128-129//

Thus ends the Karma-period-pit (addhā palya). Thus ends the pit (palya).

A sea-simile (sāgaropama) is equal to the measure of ten crore squared pits (palyas), respectively. //1.130//

Thus ends the sea-simile (sāgaropama). Pit (palya) is placed in as many places as is the number of the logarithm to base two of karma-period-pit (addhā palya) and mutually multiplied, the product is called the linear finger (sūcyaṅgula). Cube finger (ghanāṅgula) is placed in as many places as is the number obtained by dividing the logarithm of the karma-period-pit (addhā palya) to the base two by the innumerate. When these are mutually multiplied, the product set is called the (world) or universe line. //1.131//

Universe line –		linear finger	2
(Jagaśre.)	–	sū. aṁ.	2

On squaring the above linear finger (sūcyaṅgula) the square finger (pratarāṅgula) is obtained, and on squaring the universe-line (Jagaśreṇī), the universe-square (Jagapratara) is obtained. Similarly, on cubing the linear-finger (sūcyaṅgula) the cube finger (ghanāṅgula) is obtained and on cubing the universe-line the universe (cube) is obtained. The seventh part of the universe-line is called a rāju (the rope). //1.132//

pra. aṁ. 4;

ja. pra. = ;

gha. aṁ. 6 ;

gha. lo. ≡

rā –

7

square-finger 4;

universe-square = ;

cube-finger 6 ;

cube-universe ≡ ;

rāju –

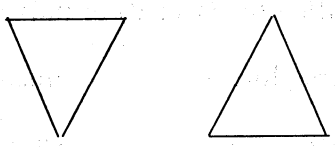
7

Thus ends the definition.

Consisting of six fluents (dravyas) this universe space station is definitely self-preeminent. In all its directions there is stationed the whole of non-universe space by law. // 1.135//

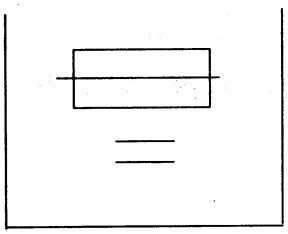
Being the cube of the universe-line, this whole universe is of three types: the lower universe, the middle universe and the upper universe.//1.136//

Out of these, the shape of the lower universe is naturally, like the cane seat (vetrāsana) and the shape of middle universe is similar to the upper part of the standing semidrum. //1.137//



The shape of the upper universe is like the standing taber. Now the structure of all these three universes is related. //1.138//

symbolism-roughly



Just as from the middle of that whole universe, the mouth or top (mukha) is one rāju, the base (bhūmi) is seven rajus. Similarly, on cutting it in the middle the shape of the lower universe is obtained. //1.139//

Place the extended regions both the sides separate, and let them be joined in reverse

order, then the extension and height are respectively seven and seven rājus. //1.140//

Just as, in the middle five rājus, below and above one rāju in order, and height is seven rajus, cutting it in this way the shape of the joint lower and upper regions, there results the shape of the ultimate or the upper universe. When this is placed above the already mentioned lower universe, there results the shape in the natural form like a standing drum of that whole universe. When this is joined, then the extension of the universe is seven rājus and its height is fourteen rājus. //1.141-143//

Relative to the east-west, the base and top of this universe on one side is seven , one, five and one rāju respectively only, and there is decrease-increase in the middle. //1.144//

Taking the four parts of similar shapes placed in space, they should be joined in reverse order on both sides with due consideration. Similarly. taking the remaining regions, as before, the extension be joined with extension making it a measure of square (pratara pramana). In this way, until the remaining region is exhausted, the each of the square measue be taken as one, one point in extension form. //1.145-147//

In this way we describe the length, breadth and height of the proved tri-universe region in the similar way as is derived from the Drstivāda anga. //1.148//

The length of the universe in the south and north is a universe-line or seven rājus The base and the top in the east and west are respectively seven , one, five, and one rāju.

rāju 7 | 7 | 1 | 5 | 1

or $-\left|-\right|\frac{-1}{7}\left|\frac{-5}{7}\right|\frac{-1}{7}\left|\right.$ symbolically

The height of the whole univese is fourteen rājus. Half the drum similar in shape , has the same height as the lower drum, (that is seven rājus).

14 | − | − |

Respectively, the height of the lower universe is seven rājus, that of the middle universe is one lac yojanas, and that of the upper universe is seven rājus as reduced by one lac yojanas. //1.151//

7 | jo. 100000 | 7 riṇa jo. 100000.

Among these three universes, there are seven earths known as Ratna prabhā, Śarkarā prabhā, Bālukā prabhā, Paṅka prabhā, Dhūma prabhā, Tamaḥ prabhā and Mahātamaḥ prabhā, each at the interval of one rāju, in the lower universe which is in the shape of half the drum. //1.152

The first rāju begins from the lower part of the middle universe and ends in the lower part of the Śarkarā prabhā earth. //7.154//

$$\begin{array}{|c} -1 \\ 7 \end{array}$$

Beyond this, the second rāju begins and ends in the lower port of the Bālukā prabhā, and the third rāju ends in the lower part of the Paṅka prabhā. //1.155//

$$\begin{array}{|c|c|} -2 & -3 \\ 7 & 7 \end{array}$$

After this the fourth rāju ends in the lower part of the Dhūmā prabhā and the fifth rāju ends in the lower part of the Tamaḥ prabhā. //1.156//

$$\begin{array}{|c|c|} -4 & -5 \\ 7 & 7 \end{array}$$

The sixth rāju ends in the Mahātamaḥ prabhā and ahead of this the seventh rāju ends at the bottom of the universe. //1.157//

$$\begin{array}{|c|c|} -6 & -7 \\ 7 & 7 \end{array}$$

From the upper part of the Saudharma celestial plane upto its flag-rod the height is one and a half rājus as reduced by one lac yojanas. //1.158 //

$$\begin{array}{|c|l|} -3 & \text{ri. yo. } 100000 \\ 14 & \end{array}$$

Ahead of this, one and a half rājus end in the upper part of the Māhendra and Sānatkumāra heaven After this, half rāju ends in the upper portion of the Brahmottara paradise. //1.159//

$$\begin{array}{|c|c|} -3 & - \\ 14 & 14 \end{array}$$

After this, half rāju ends in the upper portion of the Kapiṣṭha, half rāju ends in the upper part of the Mahāśukra, and half a rāju ends in the upper part of the Sahasrāra. //1.160//

$$\left|\begin{array}{c|c|c} - & - & - \\ 14 & 14 & 14 \end{array}\right|$$

After this, half rāju ends in the upper part of the Ānata paradise and half rāju ends in the upper part of Ārana paradise later on, these are nine graiveyakas, nine anudiśas, and five anuttaras celestial planes in the height of a rāju. In this way, the division in rāju has been mentioned in the upper universe. //1.161-162//

$$\left|\begin{array}{c|c|c} - & - & -\ 2 \\ 14 & 14 & 14 \end{array}\right|$$

The ends, each of those heavens, be understood to be upto the top of the flag-rod corresponding to their own last indraka celestial plane. The end of the Kalpātita land is the end of the universe. //1.163//

The width of the top (mukha) of the lower u niverse is seventh part of the universe-line (jaga-śreṇi), the width of the bottom is a universe-line, and the height also upto the end of the lower universe measures a universe-line. //1.164//

$$\left|\begin{array}{c|c|c} - & - & - \\ 7 & & \end{array}\right|$$

The top and the base are summed up and halved, and on multiplying it by the height again, the product is known to be the area of the (lower) trapezoid like universe. //1.165//

Volume of the lower universe is obtained by multiplying the volume of the universe by four and dividing it by seven, and volume of half of the lower universe is obtained by multiplying the whole universe by two and dividing it by seven. //1.166//

$$\left|\begin{array}{c|c} \equiv\ 4 & \equiv\ 2 \\ 7 & 7 \end{array}\right|$$

The volume of the trasa-tube of the lower universe is found out first by extracting out the Trasa tube (trasa nālī) and placing it separate, The measure of this volume is obtained by dividing the volume of the universe by forty nine. //1.167//

$$\left|\begin{array}{c} \equiv \\ 49 \end{array}\right|$$

The remaining volume of the hower universe (after removal of the Trasa-tube) is

understood to be obtained on multiplying the volume of the universe by twenty-seven and dividing the product by forty-nine. The total volume of the lower universe (inclusive of the trasa-tube) is obtained on multiplying the universe by four and dividing the product by four. //1.168//

$$\equiv \frac{27}{49} \quad \equiv \frac{4}{7}$$

When the whole upper universe in the shape of drum (mṛdaṅga) is cut and joined, then the shape of the lower universe occurs similar to the trapezoid from east-west. //1.169//

The diameter of the top (mukha) of the universe is the seventh part of the universe-line (jaga-śreṇī) and the diameter of its bottom is five times this. The height is one universe-line. //1.170//

$$\frac{-}{7} \quad \frac{-5}{7}$$

The volume of the upper universe is obtained on multiplying the volume of the universe by three and dividing it by seven. The volume of the half of the upper universe which is similar in measure to that of that obtained by multiplying the volume of the universe by three and dividing it by fourteen. //1.171//

$$\equiv \frac{3}{7} \quad \equiv \frac{3}{14}$$

The Trasa-tube (trasa nālī) is cut out form the upper-universe and is placed separate. Its volume is calculated. The volume of this Trasa-tube will be found to be the volume of universe as divided by forty-nine. //1.172//

$$\equiv \frac{1}{49}$$

The volume of the remaining upper umiverse, apart form that of trasa nālī is found by multiplying the volume of the universe by twenty and dividing by forty nine. When the universe- volume is multiplied by three and divided by seven, then volume of the total upper universe including that of the trasa-tube is obtained. //1.173//

$$\equiv \frac{20}{49} \quad \equiv \frac{3}{7}$$

When the volumes of the upper and lower universes are mixed then the sum is equal to cube of universe-line. In order to explain the enthusiast pupils, the volumes will by related

in details through alternative methods. //1.174//

The diameter of the top (mukha) of the lower universe is one seventh part of the universe line of a rāju and the width of the base (bhūmi) is a universe line or seven rājus, and it height is also a universe-line. //1.175//

$$\frac{-}{7}\,|\,-\,|\,-\,|$$

Whatever is obtained on subtracting the measure of the top (mukha) form the measure of the base and dividing the remainder by the height, that becomes the measure of the increase relative to the top (mukha) and decrease relative to the base (bhumi) for every earth region out of all the bases. //1.176//

The measure of diameter at an arbitrary place is obtained first by multiplying the measures of that increase and decrease by its own height, and then by subtracting the product from the base or by adding the top to the product. //1.177//

$$\frac{-}{49}\ 6\,|$$

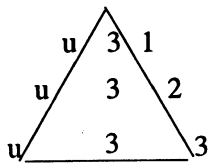
Whatever is obtained on division of the universe-line by forty-nine, it is placed respectively in eight places. For the diameter, initially the multiplier is seven. Ahead of this the multiplier increases by six respectively. //1.178//

$$\frac{-7}{49}\,|\,\frac{-13}{49}\,|\,\frac{-19}{49}\,|\,\frac{-25}{49}\,|\,\frac{-31}{49}\,|\,\frac{-37}{49}\,|\,\frac{-43}{49}\,|\,\frac{-49}{49}\,|$$

The universe as divided by the cube of seven (or three hundred and forty-three) is placed at seven places respectively. For finding out the volume of every one of the regions of seven regions of the lower universe, initially the multiplier is ten and after this there is increase of six respectively (in the successive multipliers) //1.179//

$$\frac{\equiv 10}{343}\,|\,\frac{\equiv 16}{343}\,|\,\frac{\equiv 22}{343}\,|\,\frac{\equiv 28}{343}\,|\,\frac{\equiv 34}{343}\,|\,\frac{\equiv 40}{343}\,|\,\frac{\equiv 46}{343}\,|$$

On entrance into the universe from east nad west, by three, two and one raju respectively, into both sides of its end, the height is respectively one universe line, two third part of the universe line, and one third part of the universe line.



What ever diameter (vāsa) is obtained on halving the sum of the side and counter side, it is multiplied by the height and the depth, resulting in the volume of the (prism which is) triangular. //1.180//

When one of the longer sides is multiplied by half of the diameter, and again multiplied by the depth, then the volume of the (rectangular) cuboid, having one long side, is obtained. //1.181//

When the universe is divided respectively by forty-two, as also by fourteen, and further when the universe is multiplied by five and divided by forty-two, then there is oblained the volumes of each of the three interior regions. //1.182//

$$\equiv \Big| \equiv \Big| \equiv \frac{5}{42} \Big|$$

The volumes of the (above mentioned three) regions are summed up and then multiplied by two, as also added up, there results the total volume of the lower universe which is equal to the (volume of) the universe as multiplied by four and divided by seven. //1.183//

$$\equiv \frac{4}{7} \Big|$$

When the seventh part of rāju is multiplied by three, six, two, five, one, four and seven respectively, the measures of extension of small sides projected out of the columns are obtained. //1.184//

$$\frac{-3}{49} \Big| \frac{-6}{49} \Big| \frac{-2}{49} \Big| \frac{-5}{49} \Big| \frac{-1}{49} \Big| \frac{-4}{49} \Big| \frac{-7}{49} \Big|$$

The volume upto the end of the universe is five and a half cubic rājus and that upto the seventh earth is two and a half cubic rājus. //1.185//

$$\equiv \frac{11}{343 \mid 2} \qquad \equiv \frac{5}{343 \mid 2}$$

The mixed volume of both the exterior and interior regions, upto the sixth earth is thirteen cubic rājus as divided by two. //1.186//

$$\equiv \frac{13}{343 \mid 2}$$

When the volume, one by six cubic rāju of the exterior region upto the sixth earth, is subtracted from the above mentiond joint volume, (thirteen by two cubic rājus) of both the regions, the remainder volume, six and one by three, cubic rājus should be understood to be that of the interior region. //1.187//

$$\equiv \frac{1}{343 \mid 6} \qquad \equiv \frac{38}{343 \mid 6}$$

The volume upto the Dhūmaprabhā sums is three cubic rājus, and the volume upto the last part of the Paṅkaprabhā is a cubic rāju as reduced by one third part. //1.188//

$$\equiv \frac{7}{343 \mid 2} \qquad \equiv \frac{2}{343 \mid 3}$$

The volume in the interior part upto the fourth earth is seven cubic rājus as reduced by one divided by six. //1.189//

$$\equiv \frac{41}{343 \mid 6}$$

The volume upto the third earth is obtained on multiplying half a cubic rāju by nine, and that upto the second eath is one and a half cubic rājus. All these volumes are summed up and the sum is doubled to get the volume of both sides. //1.190//

$$\equiv \frac{9}{343 \mid 2} \qquad \equiv \frac{3}{343 \mid 2}$$

On being doubled

$$\equiv \frac{63}{343}$$

When the volume is doubled, total volume of both (east and west) sides is sixty-three cubic rājus. When in this, the volume, one hundred and thirty three cubic rājus of all the (nineteen) regions with width of one rāju, is added then the total volume of the lower

universe, two hundred as reduced by four cubic rājus is obtained. //1.191//

added to	≡ 133 / 343	gives	≡ 196 / 343

The width of the top below and above, the upper universe is one rāju each, the width of the base is five rājus, and height (from the top to the base) is half of the universe-line. //1.192//

– / 7	– / 7	bhu	– / 7	– / 5	– / 2	– / 2

The top is subtracted from the base and the remainder ~~is divided~~ by height. Whatever is obtained becomes the measure of increase relative to top and that of decrease relative to base at every rāju. The measure is eight divided by seven. //1.193//

8 / 7

The measure of diameter at an anbitrary place is obtained by multiplying the decrease and increase by own arbitrarily chosen heights and on subtracting the product from base or adding the product to mouth (top). //1.194//

Whatever is obtained by multiplying the universe-line by eight and dividing by forty-nine, is the measure of increase and decrease in the diameter of the upper universe. //1.195//

The seventh part of rāju is placed respectively in ten places and multiplied respectively by seven, nineteen, thirty-one, thirty-five, thirty -one, twenty-seven, twenty-three, nineteen, fifteen and seven. This gives the diameters of the regions. //1.196-197//

– 7 / 49	– 19 / 49	– 31 / 49	– 35 / 49	– 31 / 49

– 27 / 49	– 23 / 49	– 19 / 49	– 15 / 49	– 7 / 49

The volumes of the upper layers above and above the bottom of meru are obtained on multiplication of thirty-nine, seventy-five, thirty-three, thirty-three again, twenty-nine, twenty-five, twenty-one, seventeen and twenty-two by half of a cubic rāju respectively. // 198-199//

$\equiv \frac{39}{343 \mid 2}$		$\equiv \frac{75}{343 \mid 2}$		$\equiv \frac{33}{343 \mid 2}$		$\equiv \frac{33}{343 \mid 2}$		$\equiv \frac{29}{343 \mid 2}$	
$\equiv \frac{25}{343 \mid 2}$		$\equiv \frac{21}{343 \mid 2}$		$\equiv \frac{17}{343 \mid 2}$		$\equiv \frac{22}{343 \mid 2}$			

On entering through one and two rājus in the east-west portion near the Brahma-paradise the heights of the columns are a universe-line as divided by four and two respectively. //1.200//

$\frac{-}{4}$	$\frac{-}{2}$

The volumes of the above interior regions is obtained by placing the universe as divided by fifly-six in two places and on multiplying them by one and three respectively. //1.201//

Both the volumes are summed up and the sum is multiplied by four. In the product the volume of the middle region is added up to yield the volume of the total upper universe. This volume amounts to the universe as multiplied by three and divided by seven. //1.202//

$\equiv \frac{1}{56}$	$\equiv \frac{3}{56}$	$\equiv \frac{3}{7}$

The length of the small side of the universe above the Saudharma and Iśāna paradise is six divided by seven rāju. //1.203 //

$\frac{-}{49}\ 6$

The length of the small side in the end, above the Māhendra paradise is five divided by seven rāju and that near the Brahma paradise is a universe-line as divided by forty-nine and mutiplied by seven. //1.204 //

$\frac{-}{49}\ 5$	$\frac{-}{49}\ 7$

The length of the small side in the end, above the Kāpiṣṭha paradise is five divided by seven rāju as divided by seven and multiplied by three. //1.205//

$$-\frac{5}{49} \quad \Big| \quad -\frac{3}{49}$$

The length of the small side in the end above the Sahasrāra is one divided by seven rāju and that above the the Prānata is six divided by seven rāju. //1.206 //

$$-\frac{1}{49} \quad \Big| \quad -\frac{6}{49}$$

The length of the small side near the flag-pole of the last indraka celestial plane near the Ārana and Acyuta paradise is four divided by seven rāju. //1. 207//

$$-\frac{4}{49}$$

The volume of the triangular region up to the Saudharma couple is five cubic rājus as reduced by half rāju. (The mixed volume of exterior and interior regions upto Sānat kumāra couple is thirteen and a half cubic rājus). When from this mixed volume, the volume $[\frac{25}{8}]$ of exterior triangular region is reduced then the (remainder) volume of the interior is obtained as eighty three cubic rājus as divided by eight. //1.208 //

$$\equiv \frac{9}{343 \mid 2} \quad \Big| \quad \equiv \frac{25}{343 \mid 8} \quad \Big| \quad \equiv \frac{83}{343 \mid 8}$$

The volume of every region below and above the Brahmottara paradise is three cubic rājus and that up to the Śukra kalpa is one cubic rāju. //1.209//

$$\equiv \frac{3}{343} \quad \Big| \quad \equiv \frac{3}{343} \quad \Big| \quad \equiv \frac{2}{343} \quad \Big| \quad \equiv \frac{1}{343}$$

The mixed volume of the both, interior and exterior regions up to the Śatāra paradise is the universe as divided by ninety-eight. The volume of its exterior region is the eighth part of a cubic rāju. //1.210//

$$\equiv \frac{7}{343 \mid 2} \quad \Big| \quad \equiv \frac{1}{343 \mid 8}$$

On subtracting the volume of the exterior region from the volume of the above two regions, the remainder becomes the volume of the interior region. It is a cubic rāju as multiplied by twenty-seven and divided by eight. //1.211 //

$$\equiv \quad 27$$
$$343 \mid 8$$

Whatever is the product obtained on multiplying the cubic rāju respectively, by two and a half and two, that becomes the volume of remaining two places. On adding all these volumes and making their sum double, it should be kept as a total sum. //1.212//

$\equiv$	5	$\equiv$	2	$\equiv$	70
343	2	343		343	

Besides this, the volume of half rājus is twenty-eight ghana rājus, and the volume of the medium region (trasa nālī) is a cubic rāju as multiplied by forty-nine. //1.213//

$\equiv$	28	$\equiv$	49
343		343	

The volume of already described earths is seventy cubic rājus. Thus the sum of these three sets is one hundred and forty-seven cubic rājus, which is the volume of the total upper universe. //1.214//

$\equiv$	70	$\equiv$	147
343		343	

The whole universe is of eight types: the general, the cubic (ūrdhvāyata caturasra) the cuboid (tiryak āyata caturasra), the barley tabour (yavamuraja), the barley middle (yavamadhya), the trapezohedraon (mandara), the deformed (dūṣya), the mountain ridge (girikaṭaka). //1.215//

The general universe is cube of universe-line in measure. The height, width and side of the cuboid are a universe-line, half a universe-line, twice the universe-line respectively. //1.216//

$$1 - 1 - 1\ 7\ 1\ 7\ 1$$

The measure of barley in the barley-tabour region is obtained by multiplying the universe, by twenty five, as divided by seventy. (incomplete verse). //1.217//

$\equiv$	25	$\equiv$	2
70		14	

Note: *The complete verses are as follows*[1]

bhujakoḍī vedesuṁ pattekkaṁ ekka seḍhi parimāṇaṁ /

samacaurass khidīe logā donhaṁ pi viṁdaphalaṁ // 1.218 //

The side, width and height of the cuboid (cubic) universe are each a universe line, so that the volume of the universe is cube of the universe-line, which should be placed at two places.

$$|- |- |\equiv |\equiv|$$

Sattari hida-seḍhi-ghaṇā ekkāe javakhidīe viṁdaphalaṁ /taṁ pañcavīsa pahaḍam javamuraya mahīe java khettaṁ. //1.219//

The universe placed at first place is divided by seventy, resulting in the volume of a barley region. When the universe placed at second place, is divided by seventy and multiplied by twenty-five, the volume of barley region in barley-tabour is obtained. //1.220//

$$\left|\begin{matrix}\equiv\\ 70\end{matrix}\right| \left|\begin{matrix}\equiv & 25\\ 70\end{matrix}\right| \quad \text{or} \quad \left|\begin{matrix}\equiv\\ 70\end{matrix}\right| \left|\begin{matrix}\equiv & 5\\ 14\end{matrix}\right|$$

The universe when multiplied by nine and divided by fourteen gives the volume of the tabour region. When both these volumes are added, the volume of barley-tabour region as a whole is obtained as the volume of the universe which is cube of universe-line. //1.218//

$$\left|\begin{matrix}\equiv & 9\\ 14\end{matrix}\right| \left|\equiv\right|$$

In the barley-middle region the volume of a barley is the universe as divided by half of thirty five. When this is multiplied by half of thirty five, the total volume of the barley-middle region as the cube of universe line is obtained. //1.219//

$$\left|\begin{matrix}\equiv & 35\\ 35\end{matrix}\right|$$

Note: *Actually this should be*

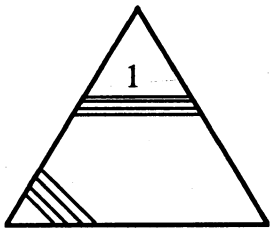
$$\left|\begin{matrix}\equiv & 2\\ 35\end{matrix}\right| \left|\equiv\right|$$

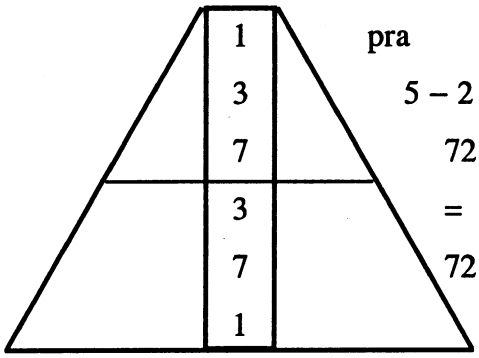
1. cf. TPT (V). p.74, vol.1.

The order of the height of the trapezohedron region is four, two, three, thirty-one, three and twenty-three, as multipliers of a rāju as divided respectively by three, three, two, six, two and six. //1.220//

3 −15

14 392





pra

5 − 2 / 1

72 72

= −

72 7/ 0

1111 1111

2222 2222

The width of enery one of the edges of the peaks is a rāju as multiplied by fifteen and divided by fifty six. The peak is proved through that every interior hypotenuse shaped cut region.//1. 221//

− 15

392

The width of the peak is a rāju as multiplied by forty-five and divided by fifty-six. The height of the same peak is one and a half rājus, and the width of the top is one-third part of the width of the base. //1.222//

On dividing the difference between the base and the top by height, whatever is obtained gives the measure of increase relative to the top and the measure of decrease relative to the base. Here the base is six rājus, the top is one rāju, and the height is twice the universe-line. //1.223//

The measure of that decrease and increase is five by fourteenth part of a rāju. The width of arbitrarily chosen earth is obtained by multiplying this measure of decrease- increase by own height (of the individual). //1.224//

Now, I relate the multipliers and divisors for obtaining the width by establishing the rāju in successively upper and upper places, in the universe similar to trapezohedron (meru). //1.225//

In the three places from below, the multipliers are one hundred and twenty-six as divided by twenty-one, one hundred and sixteen as divided by twenty-one, and one hundred and eleven as divided by twenty-one. //1. 226//

$-\frac{126}{147}$	$-\frac{116}{147}$	$-\frac{111}{147}$

In the four places ahead of this, there are four multipliers, one less four hundred, two hundred and forty-four, one less two hundred and eighty-four, each divided by eighty-four. //1.227//

$-\frac{399}{588}$	$-\frac{244}{588}$	$-\frac{199}{588}$	$-\frac{84}{588}$

For finding out the volume of the universe in shape of the trapezohedron, the cubic rāju is placed at seven places from below (for being multiplied and divided), for which the mulitpliers and divisors are related (as follows).. //1.228//

Four hundred eighty four, two hundred twenty-seven, four hundred as reduced by unity, twenty thousand as reduced by sixty-seven, two hundred as reduced by unity, sixty five hundred as increased by nine, and forty-five are, respectively, the seven multipliers at seven places. //1.229-230//

The seven divisors at seven places are, respectively, nine, nine, eight, twelve squared, eight, one hundred and forty-four, as well as eight. //1.231//

$\equiv \frac{484}{343\ 9}$	$\equiv \frac{227}{343\ 9}$	$\equiv \frac{399}{343\ 8}$	$\equiv \frac{19933}{343\ 144}$	$\equiv \frac{199}{343\ 8}$	$\equiv \frac{6509}{343\ 144}$	$\equiv \frac{45}{343\ 8}$

The volume of outer both sides of the deformed (dūṣya) region is the universe measure as divided by five and multiplied by two. //1.232//

In the same region the volume of its smaller arm is the universe measure as multiplied by six and as divided by thirty-five, The volume of the barley region is the universe measure as divided by seven. //1.233//

[When the above is multiplied by thirty-five, the mixed volume of the total mountain-ridge {girikaṭaka} region is obtained as cube of the (world or) universe-line.]

When the above universe-region is divided by seven, and the quotient so obtained is multiplied by four, the volume of the general lower universe is obtained. In the cuboid region, the arm is of universe-line or seven rājus, the width is of four rājus and similar (seven rājus) is the height, In the tabour-region full of many barleys, there exist both, the barley region and the tabour-region by rule. In that barley-tabour region the volume of barley

shaped region is of universe measure as divided by fourteen and multipled by three. The volume of the tabour region is of universe measure as divided by fourteen and multiplied by five. // 1.234-1.236//

In the barley shaped region the volume of a barley is the universe measure as divided by forty-two. When it is multiplied by twenty-four, then the volume of total barley middle region is obtained equal to universe measure as divided by seven and multiplied by four. // 1.237//

In the region similar to trapezohedron shape, the upper and upper height is given respectively as three by four parts of a rāju, seven parts out of twelve parts, forty three rājus as divided by twelve, seven parts out of twelve parts of a rāju, and, one and a half rāju only. // 1.238-239//

In the trapezohedron region, out of the extension of the ridge part, the peak, as formed from four edge-placed hypotenuse shaped cut regions, measures a universe-line as divided by twenty-eight. // 1.240//

The extension of the top (mukha) of this peak is a universe-line as divided by twenty-eight, the extension of the base is three times that of the former, and its height is a universe-line as divided by twelve. // 1.241//

The universe-line as divided by ninety-eight is placed at upper and upper successive seven places and for obtaining the extension the multipliers are related (by me as follows). // 1.242//

The seven multipliers at the above mentioned seven places are ninety-eight, ninety-two, eighty-two, thirty-nine, thirty-two and fourteen. // 1.243//

(Now), I relate the multipliers for finding out the volume by placing cubic rāju in seven places, upper and upper from below. // 1.244//

In the above mentioned seven places the seven multipliers are ninety-five, one hundred and eighty-one, two hundred and eighty-seven, five thousand two hundred three, twenty-eight, sixty-nine. and forty-nine. The seven divisors are four, square of four, twelve, forty-eight, three, four, and twenty-four. // 1.245-246//

In the deformed (dūṣya) region, the volume of the external both arms is the universe-measure as divided by fourteen and multiplied by three, and the volume of the both internal arms is the universe measure as divided by five. // 1.247//

About this very region, the volume of the small arms is the universe measure as

multiplied by three and divided by thirty-five, and further, the volume of the barley region is the universe-measure as divided by fourteen. // 1.248//

The volume of one mountain-ridge region (girikaṭaka kṣetra) is a universe- measure as divided by eighty-four. When this is multiplied by forty-eight, the volume of total mountain-region is obtained. // 1.249 //

In this way the description of the lower universe of eight types has been described. Now, the upper universe of eight types is described ahead. // 1.250//

The volume of the general upper universe is the universe measure as divided by seven and multiplied by three. In the second (vertical-rectangular) cuboid, the height and arm are each a universe-line and width is three rājus alone. // 1.251//

In the third (oblique-rectangular) cuboid, the arm and width are each a universe-line, and the height is three rājus alone. Constituted of several barleys with tabours that region is in the form of barley and tabour. Out of these, the volume of the barley region is a universe measure as divided by seven, and the volume of the tabour region is a universe measure as divided by seven and multiplied by two. // 1.252-253//

In the barley-middle region, volume of a barley is a universe-measure as divided by twenty-eight. When this is multiplied by twelve, the volume of total barley-middle region is obtained. //1.254//

In the trapezoidhedron shaped vertical region the upper and upper heights are respectively, two rājus as divided by three, one rāju as divided by three, three rājus as divided by four, thirty-one rājus as divided by twelve, three rājus as divided by four, and twenty-three rājus as divided by twelve.//1.255-256//

The extension of the edges is a universe-line measure as divided by ninety-eight and multiplied by three, from such four edged hypotenuse shaped cut regions, the peak is formed. // 1.257//

The extension of the base of that peak measures three edges, the extension of the top is its third part, and the height is a rāju as divided by four and multiplied by three.// 1.258//

I relate the multipliers as are needed for finding out the extension after placing a rāju as divided by twenty at seven places, one above the other. // 1.259//

The seven multipliers at seven places above are one hundred and five, ninety-seven, ninety-three, eighty-four, fifty-three, forty-four, and twenty-one.//1.260//

I relate the multipliers and divisors for knowing the volumes on having placed the cubic rāju at seven places from below to the upper and upper. // 1.261 //

In the seven places the seven multipliers are respectively, two hundred two, ninety-five, twenty-one, forty-two, hundred and forty-seven, eleven, fourteen hundred ninety-five and nine. The divisors here are nine, nine, one, seventy-two, one, seventy-two and four.// 1.262-263//

The volume of external both arms of the deformed (dūṣya) region is the universe measure as divided by fourteen and multiplied by three, and the volume of the internal both arms is the universe measure as divided by fourteen and multiplied by two.// 1.264//

The volume of the barley-regions of this deformed region is the universe measure as divided by fourteen. Ahead of this, now I relate the mountain-ridge part in succession. //1.265//

The volume of a mountain-ridge is universe measure as divided by fifty-six. When this is multiplied by twenty-four, then the total volume of the whole mountain-ridge region is obtained to be the universe measure as multiplied by twenty-four and divided by seven.// 1.266//

After having described the three types of universe, the general, the lower and the upper, now I describe the separate shapes of the air-envelops (vātavalayas).//1.267//

There are three envelops like the barks of a tree (enveloping the universe), the first being the dense-water envelop with colour of cow-urine, the second being the dense air with colour of the green grain (mūṅga) and the third being the thin-air with several colours. // 1.268//

Out of these the first, dense-water air-envelop, is the basic support. After this is the dense-air envelop, after which is the thin-air envelop, and then in the end is the self supported space. // 1.269//

Below the eight earths, at the bottom part of the universe, for one rāju height, these air envelops have the thickness, each being twenty thousand yojanas.// 1.270//

20000 | 20000 | 20000

In the seventh hell, by the side of the earth, the thickness of these three air-envelops is respectively, seven, five and four yojanas, and above this by the side of the oblique (or middle) universe the thickness is respectively five, four and three yojanas. // 1.271//

7 | 5 | 4 | 5 | 4 | 3 |

Above this, the thickness of the three air-envelops, by the side of the Brahma heaven, is respectively, seven, five and four yojanas. At the end, by the side of the upper universe, the thickness is respectively, five, four and three yojanas.// 1.272//

7 I 5 I 4 I 5 I 4 I 3

At the top of the universe, the extension (bāhalya) of the three air-envelops is respectively, two kośa, one kośa and slightly less than one kośa. This slightly less amount is four hundred bows (dhanuṣa) or daṇḍas. //1.273//

ko 2 I ko 1 I daṁḍa 1575 I

From the seventh earth upto the middle universe, through every point-succession, there is decrease and increase at every rāju, obtained by dividing the difference between the sum of the extension of the three envelops standing by the side of the obliqne universe, and the sum of the extensions of the three envelops by the side of the seventh earth by six rājus measure. // 1.274-275//

12 I 4 I 6

The extension of the air-envelops, by the side of all the (seven) earths respectively, from the bottom is forty-eight, forty-two, forty-four, forty-two, forty, thirty-eight and thirty-six, as each divided by three. //1.276//

48	46	44	42	40	38	36
3	3	3	3	3	3	

In the upper universe, deterministically the increase is eight yojanas as divided by a universe-line. This increase is multiplied by the requisition (icchā), the product is subtracted from the base and added to the top. (This gives the thickness of the air-envelops at the desired place of the upper universe.) // 1.277//

Above the bottom of the meru and by the side of the accomplished region, eighty-four, ninety-six, one hundred eight, one hundred twelve, and ahead of this in seven places, the numbers beginning with one hundred twelve, as reduced in succession by four, are each divided by seven. The quotients give the thickness of those air-envelops. //1.278-279//

84	96	108	112	108	104	100	96	92	88	84
7	7	7	7	7	7	7	7	7	7	7

By the side of the seventh earth and the Brahma couple, the thickness of the three air-envelops are respectively, thirty, half of forty-one and forty-nine kośas as divided by

three.//1.280//

gha	gha	tanu
30	41	49
	2	3

The thickness of the three envelops above the top of the universe is, respectively, one kośa as in excess of its half part, one kośa as in excess of its sixth part, and one kośa as in excess of its twelfth part. Such is related in the "Loka Vibhāga" (classification of the universe).// 1.281//

1	1	1
1	1	1
2	6	12

The volumes of the regions restricted by air, the eight earths and the volume of the pure space point (regions) will be related in brief. //1.282//

Now, the process of finding out the regions restricted by the air-evelops located with the limits of the universe is being related:-

The extension of every air-envelop out of the three air- envelops below the universe is twenty thousand yojanas.

When the extensions of these three air-envelops are summed up, sixty thousand yojanas of extension measure becomes the world-surface (jaga pratara) or universe-surface. Here, the speciality is this much alone that although upto the height of sixty thousand yojanas, in the last ends of the east-west, the universe is in decreasing form, however, it is not added up, and it is abstractedly cut and established separately through the statement, "The universe-surface is with sixty thousand yojanas of universe-surface", without adding it up.

$$| = 60000 |$$

Afterwards, relative to air-envelop with extensions or (dimensions) as height one rāju, length seven rājus, arm sixty thousand yojanas, the air-envelop stationed in both sides is separated through intellect, and adjoining it with universe-square measure, we get one lac twenty thousand yojanas extension measure as divided by seven and multiplied by universe-square.

$$= \left| \frac{120000}{7} \right|$$

When this is established above the earlier mentioned region, we get the seventh part of five lac forty thousand yojanas extension-measure as multiplied by universe-square.

$$= \begin{vmatrix} 540000 \\ 7 \end{vmatrix}$$

Ahead of this relative to other two directions (south and north), on multiplying by universe square-measure, the stationed air region relative to one rāju in height, seven rājus lengthwise at the bottom part, a rāju in excess of its seventh part widthwise at the top, and sixty thousand extension (bāhalya) wise air-envelop, we get universe-square measure of fifty one lac twenty thousand yojanas as divided by three hundred forty-three extension measure.

$$= \begin{vmatrix} 5520000 \\ 343 \end{vmatrix}$$

The measure of the above volume when placed above the earlier mentioned region, we get the universe-measure of three crore nineteen lac eighty thousand yojanas as divided by three hundred and forty-three of extension.

$$= \begin{vmatrix} 31980000 \\ 343 \end{vmatrix}$$

Again, when the air region stationed at both the sides relative to air-envelop in form of seven rājus width, thirteen rājus length, and sixteen, twelve yojanas extension (that is sixteen by the side of seventh earth, twelve by the side of middle universe, sixteen by the side of Brahma heaven and twelve yojanas by the side of the universe of the accomplished souls) is multiplied by measure of universe square, we get eighteen thousand of extension measure as reduced by one hundred sixty-four yojanas, divided by three hundred and forty-three and then multiplied by the universe-square.

$$= \begin{vmatrix} 17836 \\ 343 \end{vmatrix}$$

Again, when the air-region, stationed in both the sides relative to air-envelops, given by six rājus as increased by its seventh part at the bottom length wise, six rājus heightwise, one rāju at the top lengthwise, and sixteen-twelve extension wise (in the side parts of the seventh earth and middle universe) is multiplied by universe square measure, we get forty-two hundred yojanas as divided by three hundred forty-three and multiplied by universe-square extension measure.

$$= \begin{array}{|l} 4200 \\ 343 \end{array}$$

Afterwards, when the air-region, stationed in both the sides above relative to air-envelop, given by one, five and one rāju width wise (respectively, at middle universe Brahma heaven, accomplished region by the side), seven rājus height wise, and by the side of the middle universe, Brahma heaven and accomplished universe, given as twelve, sixteen and twelve yojanas extension-wise is multiplied by universe square measure, we get five hundred eighty-eight yojanas, as divided by fifty as reduced by unity and multiplied by universe-square measure.

$$= \begin{array}{|l} 588 \\ 49 \end{array}$$

When the air region, stationd relative to air-envelop given by one rāju width wise above, seven rājus length wise and slightly less than a yojana extension-wise, is multiplied by universe-measure, we get three hundred and three yojanas as divided by two thousand and two hundred forty and multiplied by universe-square.

$$= \begin{array}{|l} 303 \\ 2240 \end{array}$$

Collecting all these we get one thousand twenty four crore nineteen lac eighty-three thousand four hundred eighty-seven yojanas as divided by one lac nine thousand seven hundred sixty extension measure of universe square.

$$= \begin{array}{|l} 10241983487 \\ 109760 \end{array}$$

Now, the volume of the region occupied by air in the lower part of these eight earths is stated.

The volume of the air-occupied region in the lower part of the first earth out of these eight earths is related - The air occupied region of the first earth is having one raju of width, seven rājus of length and sixty thousand of extension. Its volume is seventh part of sixty thousand yojanas extension as multiplied by universe square.

$$= \begin{array}{|l} 60000 \\ 7 \end{array}$$

The volume of air-occupied region in the lower part of the second earth is related- The air-occupied region of second earth is of two rājus width as reduced by seventh part, seven rājus of length, sixty thousand yojanas of extension. Its volume is fortyninth part of seven lac eighty thousand yojanas extension measure as multiplied by universe-square.

$$= \left| \begin{array}{r} 780000 \\ \hline 49 \end{array} \right.$$

The volume of the air, occupied region in the lower part of the third earth is related- The air-occupied region of the third earth is of three rājus width as reduced by two by seventh part, seven rājus long and with sixty thousand yojanas of extension. Its volume is fortyninth part of eleven lac forty thousand yojanas extension measure as multipled by universe-square.

$$= \left| \begin{array}{r} 1140000 \\ \hline 49 \end{array} \right.$$

The volume of air-occupied region in the lower part of the fourth earth is related- The air-occupied region of the fourth earth is of four rājus width as reduced by three upon seventh part, seven rājus long and of sixty thousand thickness in yojanas. Its volume is fortyninth part of fifteen lac yojanas in extension as multiplied by universe square.

$$= \left| \begin{array}{r} 1500000 \\ \hline 49 \end{array} \right.$$

The volume of the air-occupied region in the lower part of the fifth earth is related- The air occupied region in the lower part of the fifth earth is five rājus in width as reduced by four upon seventh part, seven rājus long and sixty thousand yojanas thick. Its volume is eighteen lac sixty thousand yojanas divided by forty-nine as multiplied by universe square extension measure.

$$= \left| \begin{array}{r} 1860000 \\ \hline 49 \end{array} \right.$$

The volume of air-occupied region in the lower part of the sixth earth is related- The air-occupied region below the sixth earth is of six rājus width as reduced by five upon seventh part, seven rajus long and sixty thousand yojanas is extension. Its volume is fortyninth part of twenty-two lac twenty thousand yojanas extension measure of universe-square.

$$= \frac{2220000}{49}$$

The volume of air-occupied region in the lower part of the seventh earth is related- The air-occupied region below the seventh earth is of seven rājus width as reduced by six upon seventh part, seven rājus long and sixty thousand thick. Its volume is fortyninth part of twenty-five lac eighty thousand yojanas in extension measure as multiplied by universe-square.

$$= \frac{2580000}{49}$$

The volume of air-occupied region in the lower part of the eighth earth is related - The air-occupied region in the lower part of eighth earth is seven rājus long, one rāju wide and sixty thousand yojanas extended. Its volume is seventh part of its extension as multiplied by universe-square.

$$= \frac{60000}{7}$$

Collecting all these eight regions, the total volume is as follows -

$$= \frac{1090000}{49}$$

Thus ends the description of volume of air-occupied region.

Now, the volume of each of the eight earths is related in brief. Out of these the first earth is one rāju wide, seven rājus long, and two lac as reduced by twenty thousand yojanas thick. Its volume is seventh part of its own extension, as multiplied by universe-square extension measure.

$$= \frac{180000}{7}$$

The second earth is two rājus wide as reduced by its seventh part, seven rājus long , and thirty-two thousand yojanas thick. Its volume is fortyninth part of extension measure of four lac sixteen thousand yojanas as multiplied by universe-square measure.

$$= \frac{416000}{49} \Big|$$

The third earth is three rājus wide as reduced by its two upon seventh part, seven rājus long and twenty-eight thousand yojanas thick. Its volume is five lac thirty-two thousand yojanas as divided by forty-nine and multiplied by the universe-square extension measure.

$$= \frac{532000}{49} \Big|$$

The fourth earth is four rājus wide as reduced by three upon seventh part, seven rājus long and twenty-four thousand yojanas thick. Its volume is forty-ninth part of six lac yojanas as multiplied by universe-square extension measure.

$$= \frac{600000}{49} \Big|$$

The fifth earth is five rājus wide as reduced by its four upon seventh part, seven rājus long and twenty thousand yojanas thick. Its volume is fortyninth part of six lac twenty thousand yojanas as multiplied by universe-square extension measure.

$$= \frac{620000}{49} \Big|$$

The sixth earth is six rājus wide as reduced by its five upon seventh part, seven rāujs long and sixteen thousand yojanas thick. Its volume is five lac ninety-two thousand yojanas as divided by forty-nine and multiplied by universe-square extension measure.

$$= \frac{592000}{49} \Big|$$

The seventh earth is seven rājus wide as reduced by its six upon seventh part, seven rājus long and eight thousand yojanas thick. Its volume is fortyninth part of three lac forty-four thousand yojanas as multiplied by universe-square extension measure.

$$= \frac{344000}{49} \Big|$$

The eighth earth is seven rājus long, one rāju wide and eight yojanas thick. Its volume is seventh part of a yojana and a yojana as multiplied by the universe-square.

$$= \begin{array}{r|} 8 \\ 7 \end{array}$$

On adding all the above (volumes), the following amount is obtained.

$$= \begin{array}{r|} 4364056 \\ 49 \end{array}$$

On adding the volume of both these regions (i.e. of the air-occupied regions and eight earths) and subtracting the sum from the whole universe, the measure of remaining pure space is obtained. Its representation is



✪✪✪

II . A. T.

Just as essence resides in the very central part of a tree, similarly, there is the mobile trasa organism channel (trasa nālī) one rāju long , one rāju wide and thirteen rājus high as slightly reduced in the very central portion of the universe. //2.6//

The mobile trasa organism channel has been shown to be slightly less than thirteen rājus, that deficit is three crore, twenty-one lac, sixty-two thousand, two hundred forty-one bow dhanuṣa and two by three part of a bow. //2.7//

$$32162241 \mid \begin{matrix} 2 \\ \\ 3 \end{matrix}$$

Or,

If the mobile trasa organism transformed to transmigration and death ending extrication as well as the omniscient universe-filling extrication is considered then the whole universe is the mobile trasa organism channel (trāsa nālī) // 2.8 //

In the lower universe, the first earth is the Ratna prabhā. It has three portions:

the hard part (khara bhāga),

the mud part (paṅka bhāga) and

the plenty-water part (abbahula bhāga).

The thickness of these three parts is respectively sixteen thousand, eighty-four thousand, and eighty thousand yojanas. // 2. 9//

16000 I 84000 I 80000 I

Out of these three parts, the hard part consists of sixteen types by rule. These sixteen types are in the form of sixteen earths as Citrā etc. Out of these again, the Citrā earth is of several types. // 2. 10 //

The thickness of this Citrā earth is one thousand yojanas. Below it, there stand fourteen other earths in succession. // 2.15 //

The above mentioned earths are in the shape similar to trapezohedron in the interval of the east and west. They are equally long and ab aeterno in the north and south.// 2. 25//

There are in all eighty-four lac hellish holes in all the earths. Now, description is being given about the measure of those holes in relation to every earth. // 2. 26 //

8400000 /

There are thirty lac, twenty-five lac, fifteen lac, ten lac, three lac, five less one lac and five alone hellish holes in Ratnaprabhā etc. earths. // 2. 27 //

3000000 । 2500000 । 1500000 । 1000000 । 300000 । 99995 । 5 ।

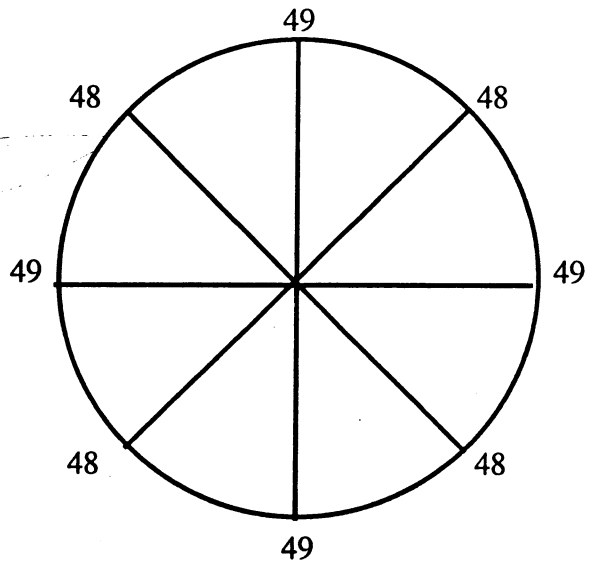
The seventh earth has hellish holes in the very central portion of the seventh earth, but up to the plenty-water part, in the remaining six earths, leaving one thousand yojanas below and above, there are hellish holes in successive discs. // 2.28//

Those hellish holes are of three types, called indraka (central or the lord), śreṇībaddha (sequence ordered), prakīrṇaka (miscellaneous). All these hellish holes give dreadful torture to the hellish. //2.36//

There are thirteen, eleven, nine, seven, five, three and one central holes, respectively, in the Ratnaprabhā etc. // 2. 37 //

13 । 11 । 9 । 7 । 5 । 3 । 1 ।

In the supporting directions of the central hole, there are forty-nine and in the subdirections there are forty-eight sequence ordered hellish holes. Ahead of this, in the second etc. central holes, the sequence ordered holes in their supportive relative directions, go on decreasing by one successively. // 2. 38 //



In those mentioned earths, there are forty-nine central (indraka) helllish holes, in all,

beginning with thirteen, ending in one . //2.39//

There are in all, three hundred eighty eight sequence-ordered holes for directional and subdirectional holes. When the simanta central hole is added to this, there become in all three hundred eighty-nine holes. //2.55//

388 | 389

In this way, there are three hundred eighty-nine sequence, ordered holes including the central (indraka) in the first disc of the first earth. Ahead of this in the second, etc. earths, due to gradual reduction, ultimately there remain only five central and sequence-ordered holes in the Māghavī earth.//2.56//

389 |

In all the eight directions, holes get reduced in proper succession. In this way, on reduction of holes one by one at the total reduction,only five holes remain in the end //2.57//

When one is subtracted from the arbitrarily chosen central measure, the remainder is multiplied by eight, the product when subtracted from three hundred eighty-nine, the remainder, by rule, gives the measure of the central including the sequence-ordered holes of the arbitrarily chosen lamella. //2.58//

Or,

The arbitrarily chosen lamella's measure is subtracted from forty-nine, remainder is multiplied by eight and added by five by rule. In this way, whatever number is obtained in the end, that becomes the measure of the sequence-ordered holes including the central one of the arbitrarily chosen lamella.//2.59//

From the chosen number as measure of the sequence-ordered, including the central hole of any arbitarily chosen lamella, five is subtracted, the remainder so obtained is divided by eight, the quotient is subtracted from forty-nine, the remainder gives the measure of the central there. // 2.60 //

The measure of the central ultimate of its own, has been called the first term (ādi), everywhere the common difference (uttara) is eight, and the measure of the lamellae is the number of terms (gaccha). // 2.61 //

The measure of the first term of the six earths Ratna prabha etc. are, respectively, two hundred ninety-three, two hundred five, one hundred thirty-three, seventy-seven, thirty-seven, thirteen. //2.62//

293 । 205 । 133 । 77 । 13 ।

In the earths, Ratna prabhā etc., the number of terms are respectively, thirteen, eleven, nine, seven, five and three. The common difference is eight everywhere.//2.63//

13 । 11 । 9 । 7 । 5 । 3 । savvaṭṭhuttara 8 ।

The number of terms (padas) as reduced by the requsition (icchā) is multiplied by the common difference (caya). The product is multiplied by the requisition as reduced by unity. To this product is added the common difference. To the sum is added twice the first term (vadana) and the result is multiplied by half of the number of terms. This gives the amount of the sum.//2.64//

cayahadamicchūṇapadaṁ $\frac{1}{13}$ । 8 । rūvūṇicchāe guṇida

cayaṁ $\frac{1}{1}$ । 8 । judaṁ 96 । duguṇidavadanādi sugamaṁ ।

The measure of the central hole of the chosen earth as reduced by unity is halved and then squared. To the amount so obtained is added the root and then after multiplying it by eight and adding five, the result is multipled by measure of the central of the chosen earth. This gives the measure of the central and the sequence ordered holes of the chosen earth.// 2.65//

In the first earth, there are forty-four hundred thirty-three central and sequence-ordered holes. In the second earth, there are two thousand six hundred and ninety-five central and sequence-ordered holes.//2.66//

4433 । 2695

In the third earth, there are fourteen hundred eighty-five central and sequence-ordered holes, and in the fourth earth there are seven hundred and seven holes. //2.67//

1485 । 707 ।

In the fifth earth, there are two hundred sixty-five, in the sixth, there are sixty-three, and in the last seventh earth, there are only five central and sequence-ordered holes, such is to be known.//2.68//

265 । 63 । 5 ।

In order to find out the measure of the central and sequence-ordered holes of all the

earths, five is the first term, eight is the common difference, and forty-nine is the number of terms. This is to be understood well.//2.69//

The requisition in excess of the number of terms is multiplied by the common difference. Out of the product, the requisition in excess of unity as multiplied by common difference is subracted. Whatever is the remainder, to it is added the twice the first term,and then it is multiplied by half of the number of terms. This gives the amount of the sum.//2.70//

Or,

Half of forty-eight is multiplied by eight and added by five. The set so obtained is multiplied by forty-nine. In this way, the total sum for the earths is obtained.//2.71//

In all the earths, there are nine thousand six hundred fifty-three central and sequence-ordered holes.//2.72//

9653 I

(For finding out the sum of the series of every earth) the measure etc. of its own last central hole as reduced by unity, the measure of its own lamina, number of terms, and the common difference everywhere is eight alone.//2.73//

The measures of the first terms in the six earths, Ratnaprabhā etc., are two hundred ninety-two, two hundred four, one hundred thirty-two, seventy-six, thirty-six and twelve. //2.74//

292 I 204 I132 I 76 I 36 I 12 I

The measure of number of terms for finding out the sequential sum of all the earths (separately) is thirteen, eleven, nine, seven, five and three; the common difference, is eight alone everywhere.//2.75//

The square of the number of terms is multiplied by the common difference. In this product is added the twice the number of terms as multiplied by the first term. From the obtained set is subtracted the number of terms as multiplied by common difference. The half of this remainder should be known to be the amount of sum. //2.76//

In the first earth, there are four thousand four hundred twenty, and in the second earth there are two thousand six hundred eighty-four sequence-ordered holes.//2.77//

4420 I 2684 I

In the third earth, there are fourteen hundred seventy-six; in the fourth earth, there are

seven hundred, and in the fifth earth there are two hundred sixty sequence-ordered holes. //2.78//

1476 | 700 | 260 |

There are sixty in the Tamaḥ prabhā earth and there are four sequence-ordered holes in the last, Mahātamaḥ prabhā, earth. In this way, the measure of the sequence-ordered holes be known in every one of the seven earths. //2.79//

60 | 4 |

In order to find out the measure of all the sequence-ordered holes in the Ratna-prabhā etc. earths, the measure of first term is four, the measure of common difference is eight, and the measure of number of terms is fifty as reduced by unity. //2.80//

4 | 8 | 49 |

The number of terms is squared and reduced by the number of terms. The remainder amount is multiplied by the common difference. In this is added the first term as multiplied by the number of terms. This is halved and to it is added the half of first term as multiplied by the number of terms. This gives the amount of the sum. //2.81//

In the Ratna-prbhā etc. earths, the measure of all the sequence-ordered holes is nine thousand six hundred four. //2.82//

9604 |

In the calculated sum as divided by half the number of terms, the common difference as multiplied by the requisition is added. From this is subtracted the number of terms in excess of the requisition less unity, as multiplied by the common difference. The remainder is halved, giving the measure of the first term. //2.83//

By the number of terms reduced by unity as multiplied by half the number of terms is divided the calculated sum. From the quotients is subtracted the half the number of terms reduced by unity, as divided by the first term. The remainder gives the measure of the common difference. //2.84//

apavartite $\frac{49}{6}$ *| asmin vekapadaddheṇaṁ* $\frac{49}{2}$ *|*

hidaṁ ādi $\frac{4}{24}$ *| sohejja śodhita śeṣa midaṁ* $\frac{48}{6}$ *48 | apavartite 8 |*

The sum is multiplied by half the common difference and is added by the square of

half of the first term as reduced by half the common difference. Its square root is taken out and from it is subtracted half the first term as reduced by half the common difference. Whatever is the remainder is multiplied by half the common difference. This gives the number of terms. //2.85 //

cayadalahadasaṅkalidaṁ 4420 । 4 । caya dala rahidādi 258 ।

addha 144 । kadi 20736 । juttaṁ 38416 । mūlaṁ 38416 ।

purimūla 144 । uṇaṁ 52 । pacayaddha 4 । hidam 13 ।

Or, To the product of the sum of the series and twice the common difference is added the square of first term as reduced by half of common difference. Square root of this is taken out and reduced by the first term as reduced by half of common difference. The remainder when divided by the common difference gives the number of terms of the desired earth. // 2.86 //

ducaya 2 । 8 । ducayahadaṁ saṅkalidaṁ 4420 । 16 । cayadala 4 । vadana 292 । antarassa 288 । vagga = / 392 । mūlaṁ 392 । purimūla 288 । uṇaṁ 104 caya bhajidaṁ 104/8 padaṁ 13 ।

When the number of all the holes of every one of the Ratna-prabhā etc. earths is placed and subtracted by its own sequence-ordered and central holes, the remainder gives the number of the miscellaneous (prakṓrṇaka) holes of that particular earth. // 2.87 //

The diameter of the first central hole is forty-five lac of yojanas and diameter of last central hole is one lac yojanas. Out of these, the diameter of the last central hole is subtracted from that of the first central hole, the remainder is divided by the number of central holes as reduced by unity. This gives the measure of decrease and increase (for finding out the diameters of second and other central holes). //2.105//

4500000 । 100000 ।

The measure of this increase-decrease is ninety-one thousand six hundred sixty six yojanas and two by three part.//2.106//

91666 । 2 ।
3 ।

For finding out the diameters of second etc. central holes, that decrease and increase is multiplied by the number of central holes as reduced by unity. This amount is subtracted from the diameter of the Sīmanta *central or added to the diameter of the clairvoyance place*

central. This gives the diameter of the desired central hole. //2.107//

The number of the earth as increased by unity, is multiplied by three, four and seven and divided by six. The quotient in kośa measure gives the diameters of the central, sequence-ordered and miscellaneous holes. //2.157//

Or,

Here the measures of the first term are respectively six, eight and fourteen. In this rule, the very half of the first trem is added in succession to measure of the first term, from the second earth to the seventh earth. The obtained number is divided by six, giving the diameter of the central, the sequence-ordered, and the miscellaneous holes of the chosen earth, respectively. //2.158//

1	3	2	5	3	7	4	4	2	8	10	4	14	16	7	7	14	35	7	49	28
	2		2		2		3		3	3		3	3	3	2	3	6		6	3

Beginning with the Ratna-prabhā upto the sixth earth, two thousand yojanas are to be reduced from every one of is earth's extension, and the remaining yojanas should be converted into kosas.//2.159//

The diameters of its own central, sequence-ordered and miscellaneous holes of the earth as multiplied by its own lamina's number, are reduced from the earlier mentioned amount (i.e., from the remaining kośas obtained on reducing the diameters of chosen earth by two thousand yojanas). Every remainder so obtained is multiplied by its own central holes measure as reduced by unity and divided by four. Whatever is obtained gives the vertical interval in yojanas of the central etc. holes of its own earth. Besides this in the other place (i.e., between the last central etc. holes of the one earth and the beginning central etc. holes of the next earth), the interval should be known to be a rāju as slightly less. //2.160-162//

From the diameter of the seventh earth, the diameters of the central and the sequence-ordered holes are subtracted and the remainder is halved respectively giving the measure of the thickness of the earth above and below the central and the sequence-ordered holes.// 2.163//

When one rāju is subtracted by the diameters of the first and the second earth, and the remainder is increased by adding three thousand yojanas, this gives the measure of the interval at other-station (parasthana) between the last hole of the first earth and first hole of the second earth.//2.164//

When the diameter of the earths, third etc., is subtracted from own rāju and two thousand yojanas, the remainder is said to be the other-place interval between them upto the sixth earth. //2.165//

Hundred is squared, reduced by unity, the remaider is halved and added by own rāju. This sum is subtracted by the diameter of the last earth. Thus we get the interval at other-place between the last central hole of the Maghavī earth and the central hole of the avadhi place. //2.166//

The interval between the holes of central type (indraka) of Gharmā earth is six thousand four hundred ninety-nine yojanas, two and eleven upon twelve kośas. //2. 167//

$$6499 \left| \text{ko } 2 \right| \frac{11}{12}$$

The interval between the last central holes of the Ratna prabhā earth and the initial central holes of the Śarkarā prabhā is two lac nine thousand yojanas less out of one rāju. //2.168//

$$\frac{-}{7} \left| \text{riṇa jo } 209000 \right|$$

The interval of eleven central holes of the Vaṁśā earth is three tnousand yojanas as reduced by unity and four thousand seven hundred dhanuṣas (bows) measure. //2.169//

$$2999 \left| \text{daṇḍa } 4700 \right|$$

The interval of the first central tapta of the Meghā earth from the last central Stanalolupa of the Vaṁśā earth is twenty-six thousand yojanas less out of a rāju. //2.170//

$$\frac{-}{7} \left| \text{riṇa } 26000 \right|$$

The interval between every central hole of the third earth is three thousand two hundred forty-nine yojanas and thirty-five hundred daṇḍas. //2.171//

$$3249 \left| \text{daṇḍa } 3500 \right|$$

In the Gharmā earth, the hellish beings have finite longevity. For finding out their number, the multiplier is slightly less than second square root of the cube-finger. [The multiplicand is the universe-line]. //2.195//

$$-12\ (?)$$

$$12$$

Note- In TPT (V), the notation is given as

− 2 +	//2.196//
1	
12	

In the Vaṁśā earth, the hellish beings are allthough innumerate part alone of the universe-line, yet the measure of their set is the universe-line as divided by the twelfth root of the universe-line. //2.196//

$$\overline{12}|$$

In the Rauruka central hole, the maximal longevity is innumerate pūrva koṭi; and in the Bhrānta central hole, the maximal longevity is the tenth part of the sāgaropama.//2.205//

puvva | 2 | sā | 1 | 10 |

Note: Here the symbol for innumerate appears to be 2.

In the last central hole of the Gharmā earth, the height of the body of the hellish beings is seven dhanuṣas, three hands (hāthas), and six fingers (aṅgulas). Ahead of this, the measure of the heights of the body of the hellish, living in the last central holes of the remaining earth, is doubled successively. //2.216//

daṁ 7, ha 3, aṁ 6 | daṁ 15, ha 2, aṁ 12 | daṁ 31, ha 1 | daṁ 62 | ha 2 | daṁ 125 | daṁ 250 | daṁ 500 |

The height of the bios in Sīmanta paṭala of the Ratnaprabhā earth is three hands (hāthas). Ahead of this, in the remaining laminae, the height of bodies has decrease-increase. //2.217//

$$\text{ha } 3$$

The first term is subtracted from the last term, and the remainder is divided by the measure of own central holes as reduced by unity. This gives the measure of decrease-increase in the first earth. When this is added, successively, to the top or subtracted, successively, from the base, one gets the measure of the heights in each of its own laminae. //2.218//

In the Gharmā earth, the measure of this decrease-increase is two hands (hāthas), eight aṅgulas, and half the part of an aṅgula. //2.219//

$$\text{ha } 2 \mid \text{aṁ } 8 \mid \text{bhā } \frac{1}{2} \mid$$

In the Saṁjvalita central hole of the third earth, height of the body is twenty-nine dhanuṣa, two hands (hastas), and four divided by three fingers (aṅgulas). //2.250//

$$\text{dha } 29, \text{ ha } 2, \text{ aṁ } \frac{4}{3} \mid$$

III. A. T.

The hard (khara) part is sixteen thousand yojanas thick and the mud-plenty (paṅka bahula) part is eighty-four thousand yojanas thick. The total thickness of both is one lac yojanas. //3.8//

16000 | 84000 |

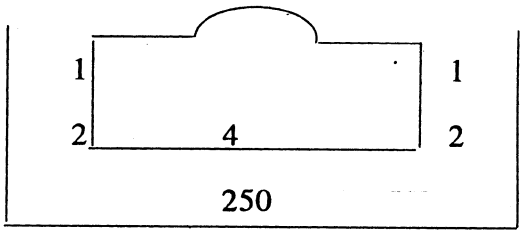
The number of the residential mansions in ten places is respectively, sixty-four lac, eighty-four lac, seventy-two lac, seventy-six lac in six places, and ninety-six lac. // 3.11//

6400000 | 8400000 | 7200000 | 76000000 | 7600000 |

7600000 | 7600000 | 7600000 | 7600000 | 9600000 |

The width of the caitya trees tract is two hundred fifty yojanas, and height in the middle is four yojanas, and in the end it is half a kośa. //3.32//

rā



The altars have the base with six yojanas of length, two yojanas of the top, and four yojanas of the height. Above these altars, there are pleasing chaitya trees in the very central portion. // 3.33//

6 | 2 | 4 |

The range (avagāḍha) of every tree is one kośa, the height of the trunk is one yojana, and the length of the branches is four yojanas. //3.34//

ko 1 | jo1 | 4 |

The mansions are three handred yojanas in extension (height), and have widths given by numerate and innumerate yojanas. Inside the mansion with finite yojanas of width, there reside finite number of deities, whereas in the remaining mansions with innumerate yojanas of width, there reside inumerate (?) Bhavanavāsī deities. Such is the form and the width to be known. // 3.36-3.37//

Those Jaina temples, being with beginning and end, are seven crore seventy-two lac as beautiful and are in the same number as that of the residences of the Bhavanavāsī deity-class. //3.53//

77200000

Out of the seven arrows, every arrow has seven classes. Out of them, the measure of the first class is equal to their own sāmānika deities, and ahead of this upto the ultimate class, the measure goes on doubling from the first class. // 3.77//

The multiplier, equal to number of terms, is mutually multiplied. The product so obtained is reduced by unity and then divided by the multiplier as reduced by unity. When the quotient is multiplied by the first term, the measure of the geometric progression (is obtained). //3.80//

The number of the mahiṣa (buffalo) army of the Cāmarendra is eighty-one lac twenty-eight thousand, and the horses etc. are also the name in number. //3.81//

8128000 |

Zeros at three places, six., nine, eight, six and five, in this order of the digits, is the total sum of the seven arrays of the Cāmarendra. //3.82//

56896000 |

The measure of the ten types of Bhavanavāsī (residential) deities is inumerate universe-line. Its measure is a universe-line as multiplied by the first square-root of the cube-finger. //3.143//

The measure of the longevity of Cāmarendra and Vairocana is one sāgaropama, that of Bhūtānanda and Dharaṇānanda couple is three palyopamas, that of Pūrṇa and Vaśiṣṭha is two palyopamas and that of the remaining twelve indras, Jalprabhā, etc., is one and a half

palyopamas for each. // 3.144-145//

$$\text{sā } 1 \mid \text{pa } 3 \mid \text{pa } \frac{5}{2} \mid \text{pa } 2 \mid \text{pa } \frac{3}{2} \mid \text{upto } 12 \mid$$

The longevity of body-guard deities of Cāmarendra is one palyopama, that of body-guard deities of Vairocana indra is greater than a palyopama and that of body-guards of Bhūtānanda is one pūrvakoṭi. //3.147//

$$\text{pa } 1 \mid \text{pa } 1 \mid \text{pū ko } 1 \mid$$

The longevity of body guards of Dharaṇānanda is greater than one pūrvakoṭi, that of body-guards of Veṇu is one crore years, and that of body-guards of Veṇudhārī is greater than one crore years. //3.148//

$$\text{pū ko } 1 \mid \text{va ko } 1 \mid \text{va ko } 1 \mid$$

In an instant, bios measuring an innumerate part of a universe-line as multiplied by first square-root of a cube-finger take birth in the Bhavanavāsīs and die in the same number. //3.194//

IV . A. T.

At the very central part of the trasa-channel, in the upper portion of the Citrā earth, there is an extreme-spherical human universe with a diameter of forty-five lac yojanas. //4.6//

$$\text{joyaṇa lakkha } 4500000 \mid$$

From the central part of the universe, the diameter (extension) of that human universe is one lac yojanas, and the circumference is in order of the digits nine, four, two, zero, three, two, four and one.//4.7//

$$100000 \mid 14230249 \mid$$

The area of the human universe is given by the order of the digits zero, zero, zero, five, two, one, zero, three, zero, nine, zero, zero, six and one. //4.8//

$$16009030125000 \mid$$

The diameter is squared and multiplied by ten. The square-root of the product gives the circumference of the circular area. When this circumference is multiplied by one-fourth of the diameter, the product gives the area of the circle. //4.9//

The volume (vimda phalaṁ) of the human universe is given by putting the following

digits in order: zero at eight places, five, two, one, zero, three, zero, nine, zero, zero, six and one. //4.10//

1600903012500000000 |

In the very central portion of the human region, there is the first island, famous as Jambūdvīpa which is like a circle (sarisa vaṭṭo) with one lac yojana as diameter. // 4.11//

The circumference of that Jambūdvīpa is three lac sixteen thousand two hundred twenty-seven yojanas, a foot less than a yojana (three kośas), one hundred twenty-eight dhanuṣas, zero in the kiṣkū and hand measure place, one vitasti, zero in place of pāda, one aṅgula, five jau, one yūka, one līkha, six hair of Karma-land, zero in place of the jaghanya bhogabhūmi hair, seven fine-hair (bālāgras) of middle pleasure-land, five fine-hair of the best pleasure-land, one ratharenu, three trasarenu, zero in place of truṭarenu, two sannāsanna, three avasannāsanna and infinite-infinite atoms (ultimate particles). I tell its measure as found in the Dṛṣṭivāda. // 4.50-55//

316227 | 3 | dam 128 | 0 | 0 | 1 | 0 | am 1 | ja 5 | ju 1 | li 1 | ka 6 | 0 | 7 | 5 | 1 | 3 | 0 | 2 | 3 |
4 |

Twenty-three thousand two hundred thirteen is the numerator, and one lac five thousand four hundred nine is the denominator. // 4.56//

23213 |
105409 |

"Kha kha padassaṁsassa puḍhaṁ (?)" is the multiplier of that measure whose endlesslyendless quantity has been poduced from the definitional order.// 4.57//

Note: In TPT ($\overline{\vee}$), the symbol in v. 4.56 appear as

23213 |
105409 | kha kha //vv.4.57-58//

The expression in v. 4.57 is then "edassaṁsassapuḍhaṁ". When the digits zero, five, one, four, nine, six, five, zero, nine and seven are kept in succession, the number so arranged gives the area of the Jambūdvīpa in yojanas.// 4.58//

7 9 0 5 6 9 4 1 5 0 |

Besides the above, the area of the Jambū island is one kośa, one thousand five hundred fifty-three dhanuṣas, zero in place of kiṣku and hand (hātha), one vitasti, zero in

place of pāda, one aṅgula, six jaus, three yūkas, three līkhas, two-fine hair of action-land (Karma bhūmi), seven fine-hair of minimal pleasure-land (bhoga-bhūmi), three fine-hair of medium pleasure-land, seven sannāsanna, one avasannāsanna and infinte-infinite ultimate particles (paramāṇus). // 4.59-62//

ko 1 | daṁḍa 1553 | 0 | 0 | 1 0 | 1 | 6 | 3 | 3 | 2 | 7 | 3 | 7 | 1 |

Forty-eight thousand four hundred fifty-five is the numerator and one lac five thousand four hundred nine is the denominator. // 4.63//

$$\frac{48455}{105409}$$

"Khakha padasṁsassapuḍhaṁ"(?) is the multiplier of that amount whose endlessly endless amount has been produced from the definitional order. // 4.64//

Note: In TPT (V), v.4.65, the quantity has been shown as

$$\left.\begin{matrix}48455\\105490\end{matrix}\right| \text{ kha kha}$$

with the expression in // v. 4. 66// as "edassaṁsassa puḍhaṁ".

The interval between the doors is obtained on subtracting sixteen yojanas from the circumference of Jambū island and dividing the remainder by four. //4.65//

In the external portion of the earth, the interval of the doors is seventy-nine thousand fifty-two yojanas and a bit more. // 4.66//

79034 |

The above mentioned interval of the doors is in excess of seven thousand five hundred thirty-two dhanuṣas, three aṅgulas and slightly greater than three jaus. // 4.67//

79052 | dha 7532 | aṁ 3 | ja 3 |

In the internal portion of the earth, the circumference of the Jambūdvīpa is three lac sixteen thousand one hundred fifty-two yojanas as slightly less. // 4.68//

316152 |

In the internal portion of the doors, the interval is slightly less than seventy-nine thousand thirty-four yojanas. //4.69//

79034 |

The square of chord of the bow (arc) (dhanuṣa), in the form of one fourth part of the cirumference of the circular island as also, is twice the square of half of the diameter. When this square is multiplied by five and divided by four, the square of the bow (arc) is obtained and its square root gives the measure of the arc (dhanuṣa). //4.70//

The direct interval of the doors in the internal portion of the earth is seventy thousand ten yojanas as slightly greater. //4.71//

70710 |

The interval of the doors Vijaya etc., as mentioned is seventy-nine thousand fifty-six yojanas, and slightly less than seven thousand five hundred thirty-two dhanuṣas. // 4.72//

79056 | dam̐ 7532 |

The family of six mountains, Himavān, Mahāhimavān, Niṣadha, Nīla, Rukmī and Śikharī, are of equal extension in the root as well as above and attached with the former (earlier) and latter seas. //4.94//

These families of six mountains are of golden silvern, purified with fire, baryl gem, silvern and golden colours and have height of one hundred, two hundred, four hundred, four hundred, two humdred as well as one hundred yojanas, respectively. //4.95//

100 | 200 | 400 | 400 | 200 | 100 |

All the seven regions east west wise, built up ab aeterno (and) bounded by family of mountains, are extended in the south north. //4.101//

In the Bharata region, there is one counting rod, the counting rods of small Himavān mountain are twice as many as that of the Bharata region. Similarly, the counting rods upto the Videha region are twice and twice (successively). //4.102//

1 | 2 | 4 | 8 | 16 | 32 | 64 |

In the Nīla mountain, the counting rods are half of those in the Videha. In the Ramyaka region the counting rods are half as those of the Nīla mountaim. Similarly, upto the Airāvata region the counting rods are half and half successively. //4.103//

32 | 16 | 8 | 4 | 2 | 1 |

Note: Bharata 1, Hima 2, Haima 4, Mahā 8, Hari 16, Niṣadha 32, Videha 64, Nīla 32, Ramyaka 16, Rukmī 8, Hairanya 4, Śikharī 2, Airā 1. The counting rods of the regions

etc. are one hundred ninety in all. In this way, this is the method through succession.//4.104//

Through the above method the diameter of the Jambū island is divided by one hundred ninety, giving the quotient as five hundred twenty-six yojanas and six parts (by nineteen) which is the width of the Bharata region. //4.105//

$$526\frac{6}{19}$$

The family mountain is double the region, the successive region is double the mountain. Similarly, the doubling increase is upto the Videha region. Afterwards, the extension decreases in half of the succession. //4.106//

$$1052\frac{12}{19} \quad 2105\frac{5}{19} \quad 4210\frac{10}{19} \quad 8421\frac{1}{19} \quad 16842\frac{2}{19} \quad 33684\frac{4}{19} \quad 16842\frac{2}{19}$$

$$8421\frac{1}{19} \quad 4210\frac{10}{19} \quad 2105\frac{5}{19} \quad 1052\frac{12}{19} \quad 526\frac{6}{19}$$

The width of the Vijayārdha mountain is fifty yojanas at the base. This is subracted from the width of the Bharata region. half of this remainder gives the width of the half southern Bharata region. //4.178//

The southern half Bharata has width given by two hundred thirty-eight yojanas and three parts out of nineteen parts of a yojana. Similar width is of the northern Bharata by rule. //4.179//

$$238\frac{3}{19}$$

Half the width as reduced by height of the segment (arrow) is squared and subracted from the square of half the width. The remaining quantity is multiplied by four, and when the square root of the product is taken out, it gives the measure of chord. //4.180//

From the square of the sum of the arrow and the diameter, is subtracted the square of diameter. The remainder is doubled, giving the square of the arc (dhanuṣa) and its square root gives the measure of the arc. //4.181//

From the square of half the diameter, is subtracted the fourth part of the square of the chord (jīva). When the square root of the remainder is subtracted from half of diameter, the remaining amount is the measures of arrow. //4.182//

The chord in the south of Vijayārdha measures nine thousand seven hundred forty

eight yojanas and twelve upon nineteen of a yojana. //4.183//

$$9748\ \frac{12}{19}$$

The arc of that chord measures nine thousand seven hundred sixty-six yojanas and one by nineteenth part of a yojana as slightly greater. //4.184//

$$9766\ \frac{1}{9}$$

In the north of Vijayārdha the chord measures ten thousand seven hundred twenty yojanas and eleven parts out of nineteen parts of a yojana. //4.185//

$$10720\ \frac{11}{19}$$

The arc of this chord is ten thousand seven hundred forty-three yojanas and fifteen out of nineteen parts of a yojana. //4.186//

$$10743\ \frac{15}{19}$$

The least chord is subtracted from the maximum chord. The half of the remainder gives the measure of the peak in the description of the regions and mountains. //4.187//

The measure of the peak is four hundred eighty-five yojanas and half of thirty-seven parts out of nineteen parts of a yojana. //4.188//

$$485\ \frac{37}{2 \cdot 19}$$

The smaller arc is subtracted from the maximal arc. The remaining is halved. This gives the measure of the side arm of the concerned region or mountain. //4.189//

In the east-west of the Vijayārdha the side arm measures four hundred eighty-eight yojanas and half of thirty-three parts out of nineteen parts of a yojana //4.190//

488 | 33
2
19

In the north of the Bharata region, the chord measures fourteen thousand four hundred and seventy one yojanas and five parts out of nineteen parts of a yojana. //4.191//

14471 | 5
19

The arc of the Bharata region measures fourteen thousand five hundred twenty-eight yojanas and eleven parts out of nineteen parts of a yojana. //4.192//

14528 | 11
19

This peak of the Bharata region is one thousand eight hundred seventy-five and half of thirteen parts out of nineteen parts of a yojana. //4.193//

1875 | 13
2
19

The side arm of the Bharata region is one thousand eight hundred and ninety-two yojanas and half of fifteen parts out of nineteen parts of a yojana. //4.194//

1892 | 15
2
19

From the width of the small Himavān, the width of the river is subtracted, the remainder when halved becomes the length of the river in the upper southern part of the mountain. //4.211//

The Gaṅgā comes from the south in the measure given by five hundred twenty-three yojanas, and reaches the tongue situated at the bank of the mountain. //4.212//

523 | 29
19 | 8

This river rises from the Vijyārdha mountain and comes in the south of Bharata slightly greater than one hundred and nineteen yojanas. //4.243//

119	3	
	19	

The affectionless God has denoted the behavioral time of various types, as instant (samaya), trail (āvalī), breath (ucchavāsa), or energy (prāṇa), and drop (stoka), etc. //4.284//

The transgression of neighbouring space-point (pradeśa) stationed near a material ultimate particle (pudgala-paramāṇu) is indivisible time and the same is called the instant (samaya). //4.285//

A trail (āvalī) is of innumerate instants (samayas), and similarly, breath (ucchvāsa) is a collection of finite trails (āvalīs). This very period of a breath is called energy (prāṇa). //4.286//

1	1	1
2	6	

Note - In TPT(V), v.4.289, the symbols are as

1	1	1	
ri	7	1	

Actually ri is रि denoting innumerate and 7 is written as ७ which is numerate.

A drop (stoka) is of seven breaths (ucchavāsas), and a lava is of seven stokas. A nālī is of thirty-eight and a half lavas. A muhūrta is of two nālīs. //4.287//

7	7	7 7	2
1	1	2	

Bhinna muhūrta is an instant (samaya) less than a muhūrta. A day is of thirty muhūrtas, and a fortnight (pakṣa) is of fifteen days (divasas). //4.288//

A month (māsa) is of two fortnights (pakṣas). A season (ṛtu) is of two months. An ayana (solstice) is of three seasons. A year (varṣa) is of two ayanas. A yuga is of five years. //4.289//

The seasons from Māgha month are called śiśira, vasanta, nidāgha, pravṛṣa, śarada, and hemanta, and known to be as such. //4.290//

Ten years period is of two yugas. On multiplying this period by ten, there is a period of hundred years. On multiplying hundred years by ten, period of a thousand years is obtained.//4.291//

On multiplying thousand years by ten, period of ten thousand years is obtained. When this is multiplied by ten, period of a lac years is produced. //4.292//

A pūrvāṅga is a lac years as multiplied by eighty-four. A pūrva is a pūrvāṅga as multiplied by eighty-four lac. //4.293// [1]

A niyutāṅga is a pūrva as multiplied by eighty-four, and a niyuta is a niyutāṅga as multiplied by eighty-four lac. //4.294//

A kumudāṅga is a niyuta as multiplied by eighty-four and a kumuda is obtained by multiplying it by eighty-four lac. //4.295//

A padmāṅga is eighty-four times a kumuda. A padma is eighty-four lac years times a padmāṅga. //4.296//

A nalināṅga is eighty-four times a padma. A nalina is eighty-four lac years times a nalināṅga. //4.297//

A kamalāṅga is eighty-four times a nalina. A kamala is eighty-four lac times a kamalāṅga. //4.298//

A truṭitāṅga is eighty-four times a kamala. A truṭita is eighty-four lac times a truṭitāṅga. //4.299//

An aṭaṭāṅga is eighty-four times a truṭita. An aṭaṭa is eighty-four lac times an aṭaṭāṅga. //4.300//

An amamāṅga is eighty-four times an aṭaṭa. An amama is eighty-four lac times an amamāṅga. //4.301//

A hāhāṅga is eighty-four times an amama and eighty-four lac times a hāhāṅga is called hāhā. //4.302//

.....

1. In TPT (V), v. 4.296, different value is given for the pūrva, as the square of pūrvāṅga. Then parvāṅga is eighty-four times a pūrva. A parva is eighty-four lac times this parvāṅga. A nayutāṅga is eighty-four times a parva, and eighty-four lac times a nayutāṅga is a nayuta. // 4.297- 298// TPT(V).

A hūhāṅga is eighty-four times a hāhā. A hūhū is eighty-four lac times the hūhāṅga. //4.303//

A latāṅga is eighty-four times a hūhū. A latā is eighty-four lac times the latāṅga. //4.304//

A mahālatāṅga is eighty-four times a latā. A mahālatā is eighty-four lac times the mahālatāṅga. //4.305//

A śrīkalpa is eighty-four lac times the mahālatā. A hastaprahelita is eighty-four lac times the śrīkalpa. //4.306//

An acalātma period is eighty-four lac years times the hastaprahelita. Such has been denoted by the knower of the time-particles. //4.307//

The acalātma is obtained on multiplying eighty-four at thirty-one places, separately and mutually, which is in form of ninety zeros as digits. //4.308//

$$84 \mid 31 \mid 90 \mid$$

This finite-time years may be carried on to maximum numerate through calculations. //4.309//

Passage (Vacana)

Here, in order to know the miximal finite (utkṛṣṭa-saṁkhyāta), four pits (in cylindrical form) having diameter of one lac yojanas as that of the Jambūdvīpa, and having depth of one thousand yojanas are dug (in abstraction). Out of these, the three stable pits are the counting-rod (śalākā), counter-counting-rod (pratiśalākā), great-counting-rod (mahāśalākā), and the fourth pit is unstable (anvasthita). All these have been established through intellect. Out of these, two mustard-seeds are dropped into the fourth pit, which is the least or minimal finite. This is the first abstraction (vikalpa) of the numerate (saṁkhyāta). On dropping three mustard seeds, it becomes non-minimal-non-maximal (ajaghanyānutkṛṣṭa) or intermediate (madhyama) numerate (saṁkhyāta). Similarly, on dropping mustard-seeds one by one, till the pit is filled up, all these above three are abstractions of the intermediate numerate (madhyama saṁkhyāta). Again, a deity or a giant may take out these mustard-seeds out of this pit, and go on dropping them one by one into islands and seas successively. Thus, as soon as that pit has been exhausted, then at that instant a mustard seed is dropped into that counting-rod pit (śalākā kuṇḍa). Where the counting-rods of the first pit are exhausted, at that instant that unstable pit in diameter be increased to the diameter (width) of the ring shaped island or sea

with linear measure of width.

Again it is filled up with mustard-seeds as shown before, they are taken up and dropped gradually one by one into successive islands and seas till completly exhausted. The width of the unstable pit is again increased to that of the island or sea which is the last into which the last mustard-seed is dropped. Now here, one more mustard-seed is dropped into counting-rod (śalākā) pit. [In this way, when the counting-rod be completely filled up while dropping the mustard-seeds, then one mustard-seed be dropped into the counter-counting-rod (pratiśalākā) pit. Through this process, when the whole of the counter-counting-rod (pratiśalākā) pit be filled up, then a mustard seed be dropped into great-counting-rod (mahāśalākā) pit. In this way, on dropping mustard seeds] the counting-rod pit is filled up, the counter-counting-rod pit is filled up and the great-counting-rod pit has been filled up.

When all these three counting-rod, counter-counting-rod, and great-counting-rod pits be filled up at the end of an island or a sea, that width of the island or sea is taken for the last unstable pit with one thousand yojanas of depth and it is completely filled up with mustard seeds. This measure is called minimal-peripheral-innumerate(jaghanya-parīta-asaṁkhyāta), while transgressing the maximal-numerate which can be obtained on subtracting unity from the preceding.

Where ever one wishes to seek the numerate, one should grasp from the non-minimal-non-maximal numerate. Whose subject is it ? It is the subject of the omniscript (śrutakevalī) who has the knowledge of fourteen pūrvas.

On adding one instant to the maximal-numerate (utkṛṣṭa-saṁkhyāta), the minimal-innumerate (jaghanya-asaṁkhyāta) is produced. After this, till maximal-innumerate (utkṛṣṭa-asaṁkhyāta) is obtained, it is the innumerate period. //4.310//

Now this innumerate is of three types -

1. peripheral-innumerate (parītāsaṁkhyāta),
2. proper (yoked)-innumerate (yuktāsaṁkhyāta), and
3. innumerate-innumerate(asaṁkhyātāsaṁkhyāta).

This peripheral-innumerate is of three types -

1. minimal peripheral innumerate
2. intermediate (non-minimal non-maximal) peripheral innumerate and
3. maximal peripheral innumerate

Similarly, yoked-innumerate (yuktāsaṁkhyāta) is of three types -

1. minimal-yoked-innumerate

2. intermediate-yoked-innumerate

3. maximal-yoked-innumerate

That this innumerate-innumerate is also of three types -

1. minimal innumerate-innumerate

2. intermediate innumerate-innumerate

3. maximal innumerate-innumerate.

The minimal-peripheral-innumerate (jaghanya-parīta-asaṁkhyāta) is spread and to each unit form is given the same minimal-peripheral-innumerate and mutually multiplied. The product gives the minimal-yoked-innumerate (jaghanya-yukṭāsaṁkhyāta), transgressing the maximal-peripheral-innumerate, which could be obtained by reducing the former by unity. (Where ever there is innumerate) related as such, there the minimal-yoked-innumerate should be understood.

When this minimal-yoked-innumerate is squared once, the minimal-innumerate-innumerate is obtained, transgressing the maximal-yoked-innumerate (utkṛṣṭa-yukta-asaṁkhyāta) which could be obtained by reducing the former through unity.

Now the minimal-innumerate-innumerate is taken as two counter-sets. The first set is established as measure of counting-rod, and the other set is spread, and to its every element is given the same set and mutually multiplied, and (for counting such processes) one is reduced from the counting-rod-set already established. In this process whet ever set is produced, it is again spread and to its every unit is given the set and mutually multiplied and another unity is reduced from the counting-rod-set.

Continuing this process, the whole counting-rod set is exhausted. The ultimate set so produced after the completion of the process is taken as two counter-sets. Out of them one is taken, as before, the counting-rod-set and the other counter-set is spread and to its every unit

it is given and mutually multiplied, and at the end of this process one is reduced from the counting-rod-set. Continuing this process, this second counting-rod-set is exhausted. At the exhaustion, the produced set is again taken as measure of two counter sets. One counter-set is established again as counting-rod set and the other counter-set is spread and to its every unit is given the same set and all mutually multiplied and one is reduced from the counting-rod-set. Continuing this process of spread, give, multiply, the third counting rod set is exhausted. Even then, the maximal-innumerate-innumerate is not obtained. Then in the above set produced through three times squared-resquared (vargita-saṁvargita) process, six innumerate sets are added: the points of dharma fluent, the points of adharma fluent, universe-space-points (lokākāśa pradeśas) and points of a bios, each of which is the set of points equivalent to the points (pradeśas) of universe-space. Further, to this sum are added the every-body (pratyeka śarīra) and gross-established (bādara pratiṣṭhita), [or non-established every-set and established every-set], each of which is innumerate times the set of points in universe.

After having added these innumerate-type of six sets to the already obtained set, the sum is again squared-resquared (vargita-saṁvargita) three times, still the maximal innumerate-innumerate set is not produced. Then again in this set, the (four) sets more are added, known as the set of life-time-bonding-impure phase stations (sthiti bandhādhyavasāya sthānas), recoil-energy-bonding-impure-phase stations (anubhāga bandhādhyavasāya sthānas), indivisible-corresponding-sections of yogas (yoga avibhāga praticchedas) and instants of hyper-serpentine-hypo-serpentine periods (utsarpiṇī-avasarpiṇī kāla samayas). The set so abtained is again squared-resquared (vargita-saṁvargita) three times as before, producing the minimal-peripheral infinite (jaghanya parīta ananta), transgressing the maximal innumerate-innumerate (utkṛṣṭa asaṁkhyāta asaṁkhyāta) which can be obtained by reducing the former by unity. Wherever innumeate-innumerate is to be searched for, there non-minimal non-maximal (ajaghanyānutkṛṣṭa)-innumerate-innumerate is to be understood. Whose subject is this ? It is the subject of the clairvoyant.

When unity is added to maximal-innumerate-innumerate, minmal-infinte is produced. Beyond it, time-set goes on increasing upto ommiscience-set (kevala jñāna rāśi). //4.311//

That which is infinite (ananta) is of three types -

peripheral-infinite (parītānanta),

yoked-infinite (yuktānanta) and

infinite-infinite (anantānanta).

Out of these, that which is peripheral infinite, is of three types-

minimal-peripheral-infinite

non-minimal-non-maximal-peripheral-infinite, and

maximal-peripheral-infinite.

Similarly, the yoked-infinite is of three types-

minimal-yoked-infinite,

non-minimal-non-maximal-yoked-infinte and

maximal-yoked-infinite,

infinte-infinite is also of three types-

minimal-infinite-infinite,

non-minimal-non-maximal-infinite-infinite and

maximal-infinite-infinite.

Whatever is this minimal-peripheral-infinite it is spread and to its every unity is given the same minimal peripheral-infinite and all mutually multiplied. Thus, minimal-yoked-infinite is produced transgressing the maximal-peripheral-infinite which can be obtained by reducing the former through unity. This very minimal-yoked-infimite is the measure of the set of the unaccomplishable proved set (abhavya-siddha-rāśi) when minimal-yoked-infinite is squared once, the minimal-infinite-infinite is abtained trangressing the maximal-yoked-infinite which can be obtained by subtracting the former by unity.

Afterwards, minimal infinite-infinite is squared-resquared (vargita-saṁvargita) as before, still the maximal infinite-infinite is not produced. Then in this set the following infinite projection (prakṣepa) sets are added: the set of the accomplished (siddha), the set of nigoda bios (nigoda), the set of vegetable bios (vanaspati), the set of instants in all time (past present and future), the set of all material {ultimate particles}(pudgala) and the set of all points in whole of the non-universe space (sarva alokākāśa).

These six sets are added to the set produced earlier and the total sum is squared-resquared (vargita-saṁvargita) three times as before, still the maximal infinite-infinite is not obtained. Then in this set, the (indivisible-corresponding-sections) of the non-gravity-levity control of the dharma fluent, those of the adharma fluent and those of a bios are added and the sum is squared-resquared three thimes as before still the maximal-infinite-infinite is not produced. Then the infinite multiple part or infinite major part (ananta bahubhāga) of either (set of indivisible-corresponding-sections of) omniscience or omnivision (minus the set obtained in the above process) is added to the earlier mentioned set, producing the maximal-infinite-infinite (utkṛṣṭa anantānanta). That is divisional (bhājana) and not the fluent, so it is mentioned. The reason is that by so squaring, the set of all square-sets is only infinitesimal part of the omniscience or omnivision, hence it is a fraction and not a fluent. Where ever infinite-infinite is to be admitted, there non-minimal-non-maximal infinite-infinite is to be understood. Whose subject is this? This is the subject of the omniscient.

These are the divisions of time in the Āryakhaṇḍa of the Bharata region. Here, there happen to be events (paryāyas) of both the periods, the hypo-serpentime and the hyper-serpentine, separately.// 4.313//

In the hypo-serpentine period (avasarpiṇī kāla), there is decrease in the longevity, height of the body, and glory etc., whereas all these increase in the hyper-serpentine period (utsarpiṇī kāla). //4.314//

The hypo-serpentine period measures ten crore-squared sāgaropama as constituted of the addhāpalyas. // 4.315//

On adding up these two, there results a kapla kāla measuring twenty crore-squared sāgaropama. Each of the hypo-serpentine and hyper-serpentine periods is of six types: pleasant-pleasant (suṣamā-suṣamā), pleasant (suṣamā), pleasant-painful (suṣamā-duṣṣamā), painful-pleasant (duṣṣamā-suṣamā), painful (duṣṣamā), and extreme painful (atiduṣṣamā). Out of these six types, the first pleasant-pleasant contains four crore-squared sāgaropama (sea-simile), the pleasant period measures three crore-squared sāgaropama, the measure of the third is two crore-squared sāgaropama, the fourth measures one crore-squared sāgaropama as reduced by forty two thousand years, the fifth painful period measures twenty-one thousand years and the extreme painful period measures the same (twenty-one thousand years). //4.316-319//

After the death of this manu, there is the birth of the seventh manu called Vimala vāhana, after a lapse of palya period as divided by eighty lac. //4.457//

$$\frac{1}{800000}$$

This manu was seven hundred dhanuṣas high having age of a palya as divided by one crore and had colour as gold. He had a mahādevī called Samatī. //4.458//

$$\text{danḍa } 700 \;\Big|\; \text{pa } \frac{1}{10000000} \;\Big|$$

These counting-rod males (heros) are known as the tīrthaṅkara, cakravartī, balabhadra, nārāyaṇa and pratiśatru. Out of these, their numbers are as follows: twelve into two are tīrthaṅkaras, cakravartīs are twelve, balbhadras are nine (padārthas), nārāyaṇas are nine (nidhi), and the pratiśatrus are also nine (randhra). //4.511//

24 | 12 | 9 | 9 | 9 |

In the pleasant-painful period, when eighty-four lac pūrvas, three years, eight months and one fortnight had remained, Lord Ṛṣabhadeva was incarnated. //4.553//

puvva 8400000 | va 3 | mā 8 | di 15 |

After the birth of Lord Ṛṣabha and at the lapse of fifty lac-crore sāgaropamas and twelve lac years of pūrvas, fordfounder Ajitanātha was incarnated. //4.554//

sāgaropama 50000000000000 puvva dhaṇa 1200000 |

After the birth of Ajitanātha, at a lapse of thirty lac-crore sāgaropamas and twelve lac

years of pūrvas, there was birth of Lord Sambhavanātha. //4.555//

sā 30000000000000 dhaṇa puvva 1200000 |

After the birth of Śitalanātha, at the lapse of a hundred sāgaropamas and one crore fifty lac twenty-six thousand years as subtracted from one lac pūrva plus a crore sāgaropamas, there was birth of Śreyānsa Jinendra. //4.563-564//

sā 10000000 puvva 100000 riṇa sāgaropama 100 va 15026000 |

After the birth of Dharmanātha, at the lapse of three sāgaropamas as reduced by three upon four palya and added by nine lac years, there was birth of Śāntinātha Lord. //4.569//

sā 3 vassa dhaṇa 900000 riṇa pa $\frac{3}{4}$ |

After the birth of Ara Jinendra, at the lapse of one thousand-crore years as increased by twenty-nine thousand years, there was birth of Lord Mallinātha. //4.572//

va 10000029000 |

The height of lord Ṛṣabhanātha was five hundred dhanuṣas. After this, upto Puṣpadanta, the height has been decreasing by fifty dhaṇuṣas as per rule. //4.585//

u 500 | a 450 | saṁ 400 | a 350 | su 300 | pa 250 | su 200 | canda 150 | puppha 100 |

The measure of the kingdom period of Lord Sambhava has been related by the Lord Omniscient to be forty-four lac purvas as increased by four pūrvaṅgas. //4.591//

puvva 4400000 aṁ 4 |

In the occasional structure (samavaśaraṇa) of Lord Pārśvanātha, the diameter of the orbits was one hundred five kośas as divided by forty-eight and that of the orbits at the time of Lord Vardhamāna was ninety-two kośas as divided by forty-eight. //4.727//

$\frac{115}{48}$ | $\frac{92}{48}$ |

After this, at the lapse of three sāgaropamas as reduced by three upon four palya, Lord Śāntinātha Jinendra got emancipation, and at the lapse of palyopama, Lord Kunthunātha got liberated. //4.1246//

sā 3 riṇa प $\frac{3}{4}$ | kuṁ pa $\frac{1}{2}$ |

Then, after the lapse of one upon four palyopama as reduced by one thousand-crore years, Lord Aranātha was emancipated and then after one thousand crore years, Mallinātha Jina got liberated. //4.1247//

$$\text{a pa } 1 \quad \text{riṇa vassa } 10000000000 \mid \text{malli } 10000000000 \mid$$
$$4$$

Ten zeros, five nārāyaṇas, six zeros, nārāyaṇa, zero, nārāyaṇa, three zeros, one nārāyaṇa, two zeros, one nārāyaṇa, and three zeros in the end. [In this way the order of the symbolism is to be known]. //4.1417//

| | | |

, massively, is sixty-two years. //4.1478//

The last of the omniscients was Śrīdhara who became accomplished from Kuṇḍalagiri and the last among the cāraṇa ascetics was Supārśva candra ascetic. //4.1479//

The last among the superintelligent ascetics (prajñaśramaṇa) was Vajrayaśa and the last among the clairvoyant was an ascetic called Śrī who was well-versed in scripture, and full of courtesy and good character etc. //4.1480//

The last among the crowned emperors, Candragupta, took Jina initiation. After him, no crowned one takes up the intiation. //4.1481//

Five excellent personalities (puruṣottama), viz. Nandī, second Nandimitra, third Aprarājita, fourth Govardhana, and fifth Bhadrabāhu became noted as "caudahapūrvī". These five omniscripts, having knowledge of the twelve organs of Jina āgama, happened to be in the ford (tīrtha) of Vardhamāna svāmī. //4.1482-1483//

The total period of these five omniscripts is of one hundred years. There became no omniscript then in Bharata region, after the fifth omniscript. //4.1484//

Thus ends the description of the fourteen pūrvadharas.

There have been eleven preceptors who had knowledge of ten pūrvas. They are Viśākhā, Proṣṭhila, Kṣatriya, Jaya, Nāga, Siddhārtha, Dhṛtiseṇa, Vijaya, Buddhila, Gaṅgadeva and Sudharma. Their total period, as known from tradition, is one hundred and eighty-three years. //4.1485-1486//

183 |

Time alone, after passing away of those all omniscripts, there did not remain any sun-like ascetic having knowledge of ten pūrvas, who used to bloom the lotuses like the accomplishable (bhavya). //4.1487//

Thus ends the description of those, the knower of ten pūrvas.

In the ford (tīrtha) of Lord Vīra, there were five preceptors: Nakṣatra, Jaipāla, Pāṇḍu, Dhruvasena, and Kaṁsa, who were knower of eleven organs of the script. //4.1488//

Their massive period is two hundred twenty years. After they passed away, there remained no knower of the eleven organs (ekādaśa aṅga). //4.1489//

220 |

Thus ends the statement about those who knew eleven aṅga. First Subhadra, and

then Yaśobhadra, Yaśobāhu and fourth Lohārya, these four preceptors knew the disposition organ (ācārāṅga). //4.1490//

The above mentioned four preceptors also knew a part of the remaining eleven aṅgas and fourteen pūrvas besides the ācārāṅga. //4.1491//

118 |

Thus ends the description of the knowers of the ācārāṅga.

After they pass away, there happens to be no other knower of the ācārāṅga or disposition organ of scripture. The measure of the period of Gautama ascetic, etc., is six hundred and eighty-three years. //4.1492//

683 |

That which is the cause of the scripture ford religion propagation, will get terminated at the end of twenty thousand three hundred seventeen years owing to time factor evil. //4.1493//

20317 |

During this period alone, the four kinds of organization will be taking birth. Yet the universe (world) will be almost discourteous, of evil intellect, intolerant, full of seven fears and eight vanities, heartrending and proud, quarrelsome, affectionate, cruel and angry. //4.1494-1495//

Thus ends the description of the scripture-ford.

After liberation of Lord Vīra, at the lapse of four hundred and sixty-one years, a king Śaka took birth. //4.1496//

461 |

Or else, after the accomplishment of Lord Vīra, at the lapse of nine thousand seven hundred and eighty-five years and five months, a king Śaka took (takes or shall take) birth. //4.1497//

9785 māsa 5 |

Or, after the liberation of Lord Vīra, at the lapse of fourteen thousand seven hundred ninety-three years, Śaka king took birth. //4.1498//

14793 |

Or after the liberation of Lord Vīra, at the lapse of six hundred five years and five months, Śaka king took birth. //4.1499//

605 mā 5 |

The amount of loss and gain in longevity is obtained on subtracting twenty years from one hundred twenty years and on dividing the remainder by twenty-one thousand. //4.1500//

$$\begin{array}{|c} 1 \\ \hline 210 \end{array}$$

Four hundred sixty-one, etc., combined with the years of the Śaka kings, are divided by two hundred ten. The quotient so obtained is subtracted from one hundred twenty. The remainder denotes the measure of the prevalent maximal longevity at his period. This method is to be known for the time of every other king. //4.1501-1502//

After the liberation of Lord Vīra, at the lapse of four hundred sixty-one years, Śaka king was born. The duration of this dynasty is two hundred forty-two years. //4.1503//

461 | 242

The amount of the dynasty period of the Guptas is two hundred and fifty-five years, and the duration of the dynasty period of Caturmukha is forty-two years. When all these are combined, one thousand years are obtained. Such is the description given by many preceptors. //4.1504//

255 | 42 |

The Time when Lord Vīra got salvation fulfilment, at that very time there was coronation of son of Avanti, called Pālaka. //4.1505//

There was monarchy of Pālaka for sixty years, that of Vijaya dynasts for one hundred and fifty-five years, that of Muruṇḍa dynasts for forty years, and that of Puṣyamitra for thirty years. //4.1506//

60 | 155 | 40 | 30 |

After this, (the king) Vasumitra-Agnimitra ruled for sixty years, (the dynast) Gandharva ruled for one hundred years, and Naravāhana ruled for forty years. Afterwards the Bhratya-Āndhras were born. //4.1507//

60 | 100 | 40

The period of these Bhratya-Āndhras is two hundred forty-two years. After this,again,

there were Gupta dynasts whose dynasty period is two hundred thirty-one years. //4.1508//

242 | 231 |

Again, after this the Kalkī, the son of Indra, was born. His name was Caturmukha, age seventy years, and his dynasty period was twice of twenty-one (forty-two) years. //4.1509//

70 | 42 |

After the possessor of (knowledge of) the Ācārāṅga, at the lapse of two hundred seventy-five years, royal turban was bound to Kalkī king. //4.1510//

275 |

In the Bharata and Airavata regions, there are endlesslyendless hyposerpentine and hyperserpentine periods according to syllogism of the water-wheel time recording-instrument. //4.1614//

The northern chord of the Himavān mountain, in all, is twenty-four thousand nine hundred thirty-two yojanas and nineteenth part of a yojana. //4.1625//

$$\begin{array}{|l|l|} \hline 24932 & 1 \\ \hline & 19 \\ \hline \end{array}$$

The arc of the small Himavan mountain is twenty-five thousand two hundred thirty yojanas and four out of a nineteenth part of a yojana. //4.1626//

$$\begin{array}{|l|l|} \hline 25230 & 4 \\ \hline & 19 \\ \hline \end{array}$$

The measure of the peak of this mountain is five thousand two hundred thirty yojanas and fifteen out of thirty-eight parts of a yojana. //4.1627//

$$\begin{array}{|l|l|} \hline 5230 & 15 \\ \hline & 38 \\ \hline \end{array}$$

The side arm of small Himavān mountain is five thousand three hundred fifty and thirty-one parts out of thirty-eight parts of a yojana. //4.1628//

$$\begin{array}{|l|l|} \hline 5350 & 31 \\ \hline & 38 \\ \hline \end{array}$$

The width of Haimavata region is forty thousand as divided by nineteen yojanas, and its northern arrow is seven times the counting-rods of Bharata region. //4.1698//

$$\begin{array}{|c} 40000 \\ \hline 19 \end{array}$$

In the northern part of the Haimavata region, the chord is thirty-seven thausand six hundred seventy-four yojanas and slightly less than sixteen out of nineteen parts of a yojana. //4.1699//

$$\begin{array}{|c|c|} 37674 & 16 \\ \hline & 19 \end{array}$$

The northern arc of the Haimavata region is thirty-eight thousand seven hundred forty yojanas and ten out of nineteen parts of a yojana. //4.1700//

$$\begin{array}{|c|c|} 38740 & 10 \\ \hline & 19 \end{array}$$

The measure of its peak is six thousand three hundred seventy-one yojanas and seven and a half parts (out of ninteen parts of a yojana.) //4.1701//

$$\begin{array}{|l} \text{yo. } 6371 \mid \text{ka } 15 \\ \hline 38 \end{array}$$

The measure of its side arm is six thousand seven hundred fifty-five yojanas and three parts (out of nineteen parts) of a yojana. //4.1702//

$$\begin{array}{|l} 6755 \mid \text{ka } 3 \\ \hline 19 \end{array}$$

The width of the Mahāhimavān mountain is eight times that of the Bharata region and its height is two hundred yojanas and it is splendid due to forests as the Himavanta.//4.1717//

$$\begin{array}{|l} \text{rum } 80000 \mid \text{u } 200 \\ \hline 19 \end{array}$$

The measure of the arrow of this mountain from the Bharata region upto the north is one hundred fifty thousand yojanas as divided by nineteen. //4.1718//

$$\begin{array}{|c} [\,150000 \mid] \\ \hline 19 \end{array}$$

In the mountain's northern part, the chord measures fifty-three thousand nine hundred thirty-one yojanas and six parts out of nineteen parts of a yojana. //4.1719//

53931 16
19

The arc of the chord of the Mahāhimavān mountain is fifty-seven thousand two hundred ninety-three yojanas and ten out of nineteen parts of a yojana. //4.1720//

57293 10
19

The side arm of the Mahāhimavān mountain is nine thousand seventy-six yojanas and nineteen parts out of thirty-eight parts of a yojana. //4.1721//

9276 | 19
38

The measure of the peak of that mountain is eight thousand one hundred twenty-eight yojanas and five parts out of nineteen parts of a yojana. //4.1722//

8128 | 5
19

On multiplying the arrow of the Bharata region by thirty-one, the product gives the arrow of Harivarṣa region from the sea-shore. //4.1738//

310000
19

The width of the Harivarṣa region is one lac sixty thousand yojanas as divided by nineteen. //4.1739//

160000
19

The northern chord of the Harivarṣa region is seventy-three thousand nine hundred and one yojana in excess of seventeen parts out of nineteen parts of a yojana. //4.1740//

$$73901 \mid 17 \Big| \quad 19 \Big|$$

The arc of this chord of the Harivarṣa region is eighty-four thousand sixteen yojanas and four parts (out of nineteen parts) of a yojana. //4.1741//

$$84016 \mid 4 \Big| \quad 19 \Big|$$

The measure of the peak of Harivarṣa region is ninety hundred eighty-five yojanas and in excess of eleven parts divided by thirty-eight parts of a yojana. //4.1742//

$$9985 \mid 11 \Big| \quad 38 \Big|$$

The side arm of the Harivarṣa region is thirteen thousand three hundred and sixty-one yojanas and thirteen parts as divided by thirty-eight parts. //4.1743//

$$13361 \mid 13 \Big| \quad 38 \Big|$$

The width of the Niṣadha mountain is sixteen thousand eight hundred forty-two yojanas and two parts (out of nineteen parts) of a yojana. The linear (length) is six lac thirty thousand yojanas as divided by nineteen. //4.1750//

$$16842 \Big| \quad 2 \Big| \quad 630000 \Big| \quad 19 \Big| \quad 19 \Big|$$

Or,

On reducing the measure of the arrow corresponding to Bharata region from twice the width of the mountain and region, whatever remains becomes the measure of the arrows of every one of them. //4.1751//

The measure of the northern chord of the Niṣadha mountain is ninety-four thousand one hundred fifty-six yojanas and two parts (out of nineteen parts of a yojana). //4.1752//

$$94156 \Big| \quad 2 \Big| \quad 19 \Big|$$

The arc of the chord of the Niṣadha mountain is one lac twenty-four thousand three

hundred forty-six yojanas and nine parts (out of nineteen parts of a yojana). //4.1753//

$$124346\left|\begin{array}{c} 9 \\ \\ 19 \end{array}\right|$$

The measure of the peak of the Niṣadha mountain is square of hundred (or ten thousand), one hundred twenty-seven and two parts (out of nineteen parts of a yojana). //4.1754//

$$10127\left|\begin{array}{c} 2 \\ \\ 19 \end{array}\right|$$

The side arm of the Niṣadha mountain is twenty thousand one hundred sixty-five yojanas and two and a half parts (out of nineteen parts of a yojana). //4.1755//

$$20165\left|\begin{array}{c} 5 \\ \\ 38 \end{array}\right|$$

In the north of Niṣadha mountain and in the southern part of the Nīla mountain, separated by the Mandara mountain is the Mahāvideha region. //4.1774//

The width of that Mahāvideha region is thirty-three thousand six hundred eighty-four yojanas and four parts out of nineteen parts of a yojana. The medial chord is one lac yojanas. //4.1775//

$$33684\left|\begin{array}{c} 4 \\ \\ 19 \end{array}\right| \quad 100000$$

On multiplying the arrow measure of the Bharata region by ninety-five, the product becomes the arrow measure of the Videha region, which is half the measure of arrow of the sea. //4.1776//

The arc of the Mahāvideha (region) is one lac fifty-eight thousand one hundred thirteen yojanas and half of the seven kośas. //4.1777//

$$158113\,|\,7\left|\begin{array}{c} \\ \\ 2 \end{array}\right.$$

The measure of the peak of Mahāvideha region is twenty-nine hundred twenty-one yojanas and eighteen parts out of nineteen parts of a yojana. //4.1778//

2921 | 18 |
19 |

The side arm of Mahāvideha is sixteen thousand eight hundred eighty-three yojanas and eight and a half parts (out of nineteen parts of a yojana) alone. //4.1779//

16883 | 17 |
38 |

In the very central portion of the Mahāvideha region there is a great mountain, called Mandara, as in form of a seat for the birth-bathing ceremony of all the ford-founders.

This great mountain is a thousand yojanas deep, ninety-nine thousand yojanas high, full of many kinds of forest portions and is entertaining with several good gems. //4.1781//

1000 | 99000 |

The width of this right circular body of the Meru mountain at the bottom-most level (pātāla tala) is ten thousand ninety yojanas and ten parts out of eleven parts of a yojana. //4.1782//

10090 | 10 |
11 |

Then decreasing gradually, its width on the earth is ten thousand yojanas, and on the top earth it is only one thousand yojanas. //4.1783//

10000 | 1000 |

This Meru mountain decreasing gradually, has contracted by five hundred yojanas simultaneously along with, at a height of five hundred yojanas above the earth. //4.1788//

Afterwards, the width is equal upto a height of eleven thousand yojanas above this. From there, again decreasing, the mountain has contracted all around again simultaneously, by hundred yojanas , on reaching the height of fifty-one thousand five hundred yojanas about it. Beyond this, upto a height of eleven thousand yojanas its width is the same. //4.1789-1790//

11000 | 51500 | 500 | 11000 |

Again decreasing gradually, on reaching the height of twenty-five thousand yojanas above it, that mountain has contracted simultaneously all around by four hundred ninety-four

yojanas. //4.1791//

25000 | 494 |

In this way, the lord of all the mountains and as residential form of good deities, that aeternal Meru mountain has a height of one lac yojanas. //4.1792//

The top (mukha) is subtracted from the bottom (bhūmi), and halved and then squared and then added by the square of the height. The square root of the result gives the measure of the side arm of that mountain-lord. //4.1793//

The measure of this side arm of the Mandara mountain is slightly greater ($\frac{1}{5}$) than ninety thousand one hundred two yojanas. //4.1794//

99102 |

The measure of the peak of the Meru mountain is forty yojanas, its bottom width is twelve yojanas, and the top-width is four yojanas. //4.1795//

40 | 12 | 4 |

The top is subtracted from the base and then divided by the height. The quotient gives the measure of decrease relative to base and increase relative to top. The measure of that decrease-increase is one fifth part of a yojana. //4.1796//

$$\frac{1}{5}$$

While descending down from the top of the peak, at what so ever yojanas it may be desired to measure the diameter, that number of yojanas is divided by five and then added by four, giving the diameter there. //4.1797//

The circumference of that peak, full of lapis-lazuli gems, at the base is thirty-seven yojanas, at the middle is twenty-five yojanas, and at the top it is greater than twelve yojanas. //4.1798//

37 | 25 | 12

While descending down from the top of the Sumeru mountain, at what so ever yojanas it may be desired to measure the width, that number of yojanas be divided by eleven. When the quotient is added by one thousand yojanas more, the width at that point is

obtained. //4.1799//

Where so ever the width of the Meru above the base is required to be known, the yojanas at that base-point spot be divided by eleven. The quotient when subtracted from the width of the earth, gives the width required at the desired spot. //4.1800//

There has been the loss of a point (pradeśa) on eleven points above the base, in the width of the Meru. Similarly, this should also be known automatically at the heights of the pāda, hasta, aṅgula, and kośa etc. //4.1801//

Among these six circumferences of the Mandara mountain, every circumference measures sixteen thousand five hundred yojanas. //4.1803//

16500 |

That Sumeru mountain is one thousand yojanas at the base, sixty one thousand yojanas in the middle, and thirty-eight thousand yojanas at the top. It is full of diamonds at the base, full of gems in the middle and full of gold at the top. There is a forest, named Pāṅḍu, beautiful at the top. //4.1807-1808//

1000 | 61000 | 38000 |

The diameter of the peak of the Meru great mountain is one thousand yojanas and its circumference is slightly greater than thirty-one hundred sixty-two. //4.1810//

1000 | 3162 |

[Without the width of the Vakṣāra mountain], when the width of the Meru mountain is added to twice the width of the Bhadrasāla forest, one gets fifty-three thousand yojanas as the measure of the chord at the middle of both the forests. //4.2020//

53000 |

The width of Videha is halved and then reduced by five thousand. This gives the arrow of the chord of two Vakṣāra mountains. //4.2021//

The measure of the above arrow is two lac twenty-five thousand as divided by nineteen. //4.2022//

$$\begin{array}{r|} 225000 \\ \hline 19 \end{array}$$

The arc of the Vakṣāra mountains is sixty thousand four hundred eighteen and twelve parts out of nineteen parts of a yojana. //4.2023//

$$60418 \mid 12 \Big| 19$$

The length of those similar rectangular Vakṣāra mountains is thirty thousand two hundred nine yojanas and six parts out of nineteen parts of a yojana. //4.2024//

$$30209 \mid 6 \Big| 19$$

The diameter of the inscribed region (antarvṛtta kṣetra) is obtained on adding the arrow to the quotient obtained on dividing the square of the chord by four times the arrow. //4.2025//

The diameter of this circle is seventy-one thousand one hundred forty-three yojanas and is thirty-seven parts out of nineteen into nine parts of a yojana //4.2026//

$$71143 \mid 37 \Big| 171$$

When top is subtracted from the base and divided by rise (udaya), the quotient becomes the decrease relative to base and increase relative to top. Here, the measure of base is one hundred yojanas, the measure of base is cube of five and rise is the number of summits (kūṭa) as reduced by unity. //4.2033//

$$100 \mid 125 \mid 6 \mid$$

The measure of the decrease, increase is twenty-five yojanas as divided by six. When it is reduced from the base and added to the top, the height of the summits (is obtained). //4.2034//

$$25 \Big| 6$$

Or, the height of the summits is obtained on reducing the decrease-increase, as multiplied by requisition (icchā), from the base and on adding it to the (mukha). Out of these, the height of the first summit is cube of five (or one hundred and twenty five) yojanas. //4.2035//

$$125$$

The instruction concerning the length and width of those summits is lost now. Out of

these, the height of the first summit is one hundred yojanas. The measure of the decrease-increase is obtained on reducing the height of the last summit from that of the first summit and on dividing the remainder, by square of five as divided by eight. //4.2047-2048//

The height of summits is obtained, respectively, on reducing the decrease-increase as multiplied by requisition from the base or on adding it to the top. //4.2049//

The height of the first summit should be known to be one hundred twenty-five yojanas. And, in order to know the height of the remaining summits, twenty-five yojanas as divided by eight should be continued to be reduced successively from the produced measure. //4.2050//

The world famous Sītodā great river flows out through the north door of Tigiṁcha lake above the Niṣadha mountain. //4.2065//

Their circumferences are greater than three times of the diameter. Above those mountains, there are divine palaces full of gold and gems. //4.2106//

Above the Nīla mountain there is a famous divine lake called Kesarī. From its southern door, a good river Sītā flows out. //4.2116//

Width and depth etc. of the Sītā river, its altar, and gardens etc. should be known to be similar to all those of the Sītodā. //4.2122//

The Gaṅgā, Rohit, Harit, Sītā, Nārī, Suvarṇakūlā and Raktā, these seven rivers flow towards the east. //4.2372//

The Sindhu river, Rohitāsyā, Harikāntā, Sītodā, Narakāntā, Rūpyakūlā and the seventh river Raktodā, these seven rivers flow towards the western direction. //4.2373//

Thus ends the description of the Airāvata region .

Whatever is the square of the chord as multiplied by the fourth part of the arrow, it is multiplied by ten, and the square root of the product gives the fine area of the region in form of an arc. //4.2374//

Whatever number is formed on writing the digits five, three, three, one, two, zero and six in order, as many yojanas and two hundred ninety-four parts out of three hundred sixty-one parts of a yojana is the fine area of the Bharata region. //4.2375//

$$6021335 \mid \frac{249}{361}$$

Whatever number is formed on writing digits three, one, zero, nine, two , nine, four, one, five, and one in order, as many yojanas and three hundred twelve parts as divided by three hundred sixty-one parts of a yojana is the area of the Niṣadha mountain. //4.2376//

$$1514929013 \mid \frac{312}{361} \mid$$

Whatever number is formed by placing the digits, two, zero, nine, nine, four, three, nine, six, nine, and two in a line, as many yojanas and three hundred parts as divided by three hundred sixty-one of a yojana is the area of the Videha. //4.2377//

$$2969349902 \mid \frac{300}{361} \mid$$

Whatever area is from the Bharata region to the Niṣadha mountain, that all should also be stated from the Airāvata region to the Nīla mountain. //4.2378//.

Whatever is the number formed from placing the digits zero, five, one, four, nine, six, five, zero, nine and seven, in order, as many yojanas measure the area of the Jambū island. //4.2379//

$$7905694150 \mid$$

In this way, the total number of rivers in the Jambū island is seventeen lac ninety-two thousand ninety. //4.2385//

$$1792090 \mid$$

The number of rivers: 2 Sītā Sītodā in Videha, along with regional rivers 64, tributories 12, Sītā Sītodā family 168000, regional river-family 896000, tributory-family 336000. Total: 1400078. In Bharata etc. remaining six regions: 392012.

Grand Total: 1792090.

The family mountains of the Jambū island, in all, are six, the Vijayārdhas are thirty-four, the Vakṣāragiris are sixteen, and the Gajadanta are four. //4.2394//

$$6 \mid 34 \mid 16 \mid 4 \mid$$

Further, there are eight Diggajendra mountains, four Nābhigirīndra, thirty-four Vṛṣabha śailas, and two hundred Kāñcana śailas. //4.2395//

$$8 \mid 4 \mid 34 \mid 200$$

There are one Meru, five hundred sixty-eight summits, seven great regions, and thirty-four Karma lands. //4.2396//

1 | 568 | 7 | 34 |

There are one hundred non-āryana portions, six pleasure lands and four Yamaka moutains (as restraints), in the Jambū island. //4.2397//

Thus ends the description of the Jambū island.

The Lavaṇa sea is circular in the shape of a ditch of the Jambū island. Its width is two lac yojanas. //4.2398//

200000 |

Whatever shape happens to be on placing an inverted boat over another boat, similarly, that sea is situated in the sky all around in the shape of a ring. //4.2399//

This sea stands seven yojanas high in the sky, in the shape of upper summit, above the upper level of the Citrā earth. //4.2400//

700 |

The width of the sea at the top is ten thousand yojanas, and two lac yojanas in the situation of the Citrā earth. //4.2401//

10000 | 200000 |

The width of the level is ten thousand yojanas alone, at the depth of one thousand yojanas, on entry from both sides from both the shores for ninety-five thousand yojanas from every shore. //4.2402//

95000 | 95000 |

On dividing the base, as reduced by the top, by the height, the measure of decrease from base and increase from mouth is obtained. Here, the measure of the top is ayuta or ten thousand yojanas, and the measure of the base is two lac yojanas, and the measure of height is one thousand yojanas alone. //4.2403//

10000 | 200000 | 1000 |

The measure of that decrease-increase is one hundred ninety yojanas alone. The measure of the width at an arbitrarily chosen place is obtained on reducing the product of decrease-increase into the requisition from the base or on adding the product of decrease-increase into the requisition to the top. //4.2404//

190 |

The measure of decrease-increase of water in the upper portion (of levelled base) is nineteen hundred as divided by seven yojanas. //4.2405//

1900|
7|

On entering ninety-five thousand yojanas from every one out of the two shores, its depth is one thousand yojanas alone. Similarly, fingers (aṅgulas) etc. be searched out. // 4.2406//

95000 | 1000 | 1 |
95 |

On entering ninety five thousand yojanas in the middle of water from both the shores, the height is seven hundred yojanas. Similarly, fingers (aṅgulas) etc. be searched out. //4.2407//

95000 | 7000 | 7 |
950 |

In the very central portion of the Lavaṇa sea, there are one thousand eight underworlds (pātālas) all around, which are maximal, medium and minimal. //4.2408//

1008 |

The maximal under worlds are four, the medium are four and the minimal underworlds are one thousand. These all underworlds are in the shape of pots (rāñjana or ghaḍā). //4.2409//

4 | 4 1000 |

In the eastern etc. directions, in the centre of the sea, there are four maximal underworlds, named as Pātāla, Kadambaka, Baḍavāmukha, and Yūpakeśarī. //4.2410//

On entering ninety-five thousand yojanas into the water of Lavaṇa sea, from both the shores, there stand separate four maximal underworlds. //4.2411//

95000 | 95000 |

The width of these underworlds, separately in the base or top is ten thousand yojanas, height is one lac yojanas and the middle width is also one lac yojanas. //4.2412//

10000 | 10000 | 100000 | 100000 |

Those maximal underworlds are attached with the upper part of the Sīmanta hole. Its adamant walls are five hundred yojanas thick. //4.2413//

500 |

In the centre of these maximal underworlds, there are seated medium underworlds in the sub-directions (vidiśas). Their width etc. are tenth part of those relative to the maximal underworlds. //4.2414//

1000 | 1000 | 10000 | 10000 | 50 |

On entering into water separately from both shores for ninety-nine thousand five hundred yojanas, there are medium underworlds (pātālas). //4.2415//

99500 |

The minimal underworlds are situated in between the maximal and medium underworlds. In every interval their separate measure is 125-125. Relative to medium underworlds their width etc. are tenth part of the medium underworlds (pātāla). //4.2446// TPT (V)//

On entering (into water) from separte both shores for ninety-nine thousand nine hundred fifty yojanas, there are situated minimal underworlds. //4.2447// TPT (V)//

Out of the medium circumference of the Lavaṇa sea, the top-diameter of the maximal under worlds and that of the medium underworlds are subtracted. The remainder is divided by four, and whatever quotients are obtained, they give the measure of the interval between the underworlds, one after one. //4.2448// TPT (V)

The medium circumference of the Lavaṇa sea is nine lac forty-eight thousand six hundred eighty-three yojanas.//4.2449//

948683 |

The interval between the maximal under worlds is two lac twenty-seven thousand one hundred seventy, and three parts out of four parts of a yojana. //4.2450 (TPT) (V)//

$$227170 \mid \frac{3}{4} \mid$$

The interval of the medium under worlds (pātāla) is two lac thirty-six thousand one hundred seventy and three parts out of four parts of a yojana. //4.2451//(TPT)(V)//

The interval between the maximal and medium underworlds (is obtained) by reducing the interval between the maximal underworlds by one thousand (and) halving the remainder. //4.2426//

That measure of the interval is one lac thirteen thousand eighty-five yojanas and in excess of one and a half kosa. //4.2427//

$$113085 \mid \text{ko} \quad \begin{vmatrix} 3 \\ 2 \end{vmatrix}$$

The width of top of the minimal underworlds is subtracted from the interval measures of the maximal and medium underworlds. The remainder is divided by twice the sixty-three. The quotient gives the interval of the minimal underworlds. Its measure is greater than seven hundred ninety-eight yojanas. //4.2428-2429//

$$798 \begin{vmatrix} 37 \\ 126 \end{vmatrix} \begin{vmatrix} 1 \\ 336 \end{vmatrix}$$

Those underworlds are gradually decreasing and of three types in accordance as air, water-air, and water from below. //4.2430//

Out of the maximal underworlds, the third part of every underworld is thirty-three thousand three hundred thirty-three yojanas and third part of a yojana. //4.2431//

$$33333 \begin{vmatrix} 1 \\ 3 \end{vmatrix}$$

Out of the medium underworlds, the third part of every underworld measures three thousand three hundred thirty-three yojanas and third part of a yojana. //4.2432//

$$3333 \begin{vmatrix} 1 \\ 3 \end{vmatrix}$$

Out of the minimal underworlds, the third part of every underworld measures three hundred thirty-three yojanas and a third part of a yojana. //4.2433//

$$333 \begin{vmatrix} 1 \\ 3 \end{vmatrix}$$

In the third part of the bottom there is air alone, there is water-air in the middle part and there is water in the upper part. //4.2434//

Out of them, the first part is full of air, the middle part is full of water and air, and this is full of decrease-increase of variable-invariable (calācala), i.e., full of water and air. As there is no air above, hence there is water alone. //4.2435//

The air of the underworlds naturally increases in the white fortnight always and decreases in lthe black fortnight. //4.2436//

In the white fortnight, upto the fifteenth (pūrṇimā) or full moon, there is increase of air in excess of twenty-two hundred twenty-two yojanas every day. //4.2437//

2 2 2 2 | 2

9

On the full moon day, out of the three parts of their own underworlds, there is situated air in two lower parts and there is water alone in the upper third part.//4.2438//

On the dark fifteenth day, there is situated water in upper two parts out of their own three parts, and there is situated only air in the lower third part. //4.2439//

The sea is stimulated by air and extends upto the end of its boundary and reaches the sky upto four thousand dhanuṣas. //4.2440//

daṁ 4000 |

In the white fortnight everyday at the earlier mentioned period, there is increase by eight hundred dhanuṣas as divided by three and in the dark fortnight everyday there is decrease by the same amount. //4.2441//

800

3

On entering from both the shores, separately by ninety-five thousand yojanas, there is two kośas of height in the water of Lavaṇa sea, and there is decrease-increase in the remainder. //4.2442//

On the dark fifteenth, the sea remains like the land. Again in the white fortnight, it gradually advances towards the sky and grows up for two kośas on the white fifteenth (pūrṇimā). //4.2443//

That very sea decreases in the same sequence in the dark fortnight by the same amount as much as it got increased gradually, such has been shown in the grand text Logāiṇī. //4.2444//

The height of the sea, in stable form, from the earth towards the sky is eleven thousand yojanas. //4.2445//

11000 |

In the white fortnight, the sea water increases gradually by five thousand yojanas above this. Further, in the dark fortnight it gets decreased by the same amount. //4.2446//

5000 |

Whatever is obtained on multiplying the width of the own top at the end of the underworlds by five, that product measure gives the amount in the sky by their own side portions, upto which the water particles move. //4.2447//

50000 | 5000 | 500 |

At the water-peak, the width of the sea is ten thousand yojanas. Such has been shown in the Saṁgāiṇī in the Loyavibhāye (Loka vibhāga). //4.2448//

10000 | variant

The earth of the Lavaṇa sea is like the earth of the Jambū island. In the interior part of this earth there is rock-slab and there is forest in the outer part. //4.2519//

bhū 12 | ma 8 | mu 4 | u 8 |

The measure of the external circumference of this sea-earth is fifteen lac eighty-one thousand one hundred thirty-nine yojanas. //4.2520//

1581139 |

From twice the total outer diameter (sūcī), twice the width of the desired ring-shaped regions is subtracted. The remainder is squared and multiplied by the half of the square of the width, whatever is obtained is multiplied by ten and the square root of the product is calculated in digits. This gives the fine area of the desired ring-shaped region. //4.2521-2522//

Whatever number is formed on writing the digits zero, one, six, nine, five, six, six, three, seven, nine, eight and one in sequence, it gives the area of the Lavaṇa sea in yojanas. //4.2523//

189736659610 |

Whatever number is formed on writing the digits zero, six, seven, three, five, three, two, four, six, seven, nine and one in sequence, it gives the combined area of the Jambū

island and the Lavaṇa sea in yojanas. //4.2524//

197642353760 |

From the square of the outer diameter, the square of the inner diameter is subtracted. When the remainder is divided by the square of one lac, the quotient number gives the number of equal parts of the Jambū island. //4.2525//

There are twenty four parts of the Lavaṇa sea, each equal to the Jambū island. //4.2526//

Thus ends the description of the Lavaṇa sea.

In the south and north part of the Dhātakīkhaṇḍa island, there is the Iṣvākāra mountain, each one dividing this island, and extending south-north. //4.2532//

Both of the mountains, are attached with the Lavaṇa and Kāloda sea, equal in height as the Niṣadha mountain. They have the shape of (aṅkamuha ?) in the interior part and that of hoof (khurappa) in the outer part. //4.2533//

The width or extension (ruṁda) of every one of both the mountains all around is one thousand yojanas. Those golden mountains are situated with one hundred yojanas of immersion (avagāha). //4.2534//

In the Dhātakīkhaṇḍa island, all the regions, situated in the interval of both the Iṣvākāra mountains or of the arrow-shaped mountains and twelve kula or family mountains, are like the holes in the central portions of the spokes of a wheel (aravivara). //4.2553//

All those regions are in the shape of digit (aṅka) in the interior portion and power-mouth (śakti mukha) in the exterior portion. Their side arms are like the constituent (uddhi) of a cart. //4.2554//

Now the attention of the internal, middle and external portions of the Dhātakīkhaṇḍa island regions is related. //4.2555//

The extension of the Himavān mountain should be understood to be two thousand one hundred five yojanas and five parts as divided by nineteen parts of a yojana. //4.2556//

$$2105\frac{5}{19}$$

The width of the Mahāhimavān mountain is four times that of the Himavān mountain. The width of the Niṣadha mountain is four times that of the Mahāhimavān mountain.

//4.2557//

8421 | 1		33684 | 4
19		19

When the sum of all these three widths of the three mountains is multiplied by four, the total length of all the family-mountains (kula parvatas) is obtained. //4.2558//

The width of the both Iṣvākāra mountains is two thousand yojanas. When this is also added to the width of the family-mountains (kula parvatas), the measure of the whole region occupied by the mountains in the Dhātakīkhaṇḍa island is obtained. //4.2559//

2000 |

The number formed by placing the digits two, four, eight, eight, seven and one in a sequence, as many yojanas as well as two parts divided by nineteen parts of a yojana gives the region occupied by the mountains in the Dhātakīkhaṇḍa. //4.2560//

178842 2
19

When the width of the Lavaṇa sea etc. is multiplied by two, three and four, and the product is reduced by three lac, then the measure of the initial, middle and ultimate diameters is obtained, respectively. //4.2561//

The square of the initial, middle and external diameter is multiplied by ten. When the square root of the product is calculated, it gives the circumference of the chosen diameter. //4.2562//

The measure of the internal circumference of the Dhātakīkhaṇḍa is fifteen lac, eighty-one thousand one hundred and thirty-nine yojanas. //4.2563//

1581139 |

The measure of the circumference in the middle of the Dhātakīkhaṇḍa island should be known to be twenty-eight lac forty-six thousand fifty yojanas as reduced a bit. //4.2564//

2846050 |

The measure of the outer circumference of the Dhātakīkhaṇḍa is obtained by placing the digits one, six, nine, zero, one, one and four in a sequence and the number of yojanas so formed as slightly less. //4.2565//

4110961 |

Owing to good and various gems the consequential every mountain has immersion amounting to one thousand yojanas and has height of eighty-four thousand yojanas. //4.2577//

1000 | 84000 |

The diameter of the Meru or the bottom is ten thousand yojanas and is ninety-four hundred yojanas on the surface of the earth. //4.2578//

10000 | 9400 |

On the top, the diameter of the Meru is only one thousand yojanas. The decrease relative to base and the increase relative to top is obtained on reducing the top from the base and on dividing the remainder by the height. //4.2579//

The measure of that decrease-increase in the one thousand yojanas of immersion is six parts out of ten parts of a yojana and is one part out of ten parts of a yojana above the earth. //4.2580//

$$\frac{6}{10} \mid \frac{1}{10} \mid$$

There are many other preceptors who having recognized the diameter of the bottom as nine thousand five hundred yojanas, recognized the measure of the decrease-increase every where as the tenth part. //4.2581//

$$\frac{1}{10} \mid$$

If it is desired to know the diameter of the small Meru, at certain yojanas below, that number of yojanas is divided by ten. The quotient, added by one thousand, gives the diameter of the Meru at the place of choice. //4.2582//

In the Dhātakīkhaṇḍa island, the arc of both the Kurus is nine lac twenty-five thousand four hundred eighty-six yojanas. //4.2593//

925486 |

In the Dhātakīkhaṇḍa island, the chord of both the Kurus is two lac twenty-three thousand one hundred fifty-eight yojanas. //4.2594//

223158 |

In that island, the straight arrow of Kuru kṣetras (regions) should be known to be three lac sixty-six thousnad six hundred eighty yojanas. //4.2595//

366680 |

The circular width of each of the Kuru regions of both the Mandara mountains is four lac six hundred thirty-three yojanas. //4.2596//

400633 |

Square root of the difference between the squares of the chord and diameter is taken out. Afterwards the diameter is added to it and the sum is halved. This gives the measure of the straight arrow in the Dhātakīkhaṇḍa island. //2597//

In the square of the chord, is added the four times square of the arrow. Then, the sum is divided by four-times the arrow. Whatever is obtained gives the diameter of the circular area. //4.2598//

The curved arrow of Kuru region in the Dhātakīkhaṇḍa island is given by number of yojanas produced by writing digits seven, nine, eight, seven, nine and three in sequence, and ninety-two parts in excess. //4.2599//

397897 | 92

212

The diameter of the Kacchā and Gandhamālinī country is obtained on adding middle diameter to the sum of twice the width of the Bhadraśāla forest and the width of the Mandara mountain. //4.2615//

The diameter of the Kacchā country is eleven lac twenty-five thousand and one hundred fifty-eight yojanas. //4.2616//

1125158 |

Square-root of the square of diameter as multiplied by ten is taken out, giving the measure of circumference. Here, the measure of the circumference of diameter, corresponding to the Kacchā country, is two, six, zero, eight, five, five and three digits placed in sequence. //4.2617//

3558062 |

The measure of the region occupied by fourteen mountains is one lac seventy-eight thousand eight hundred forty-two yojanas. //4.2618//

178842 |

From the above mentioned circumference measure, the region occupied by mountain is subtracted. The remainder is multiplied by sixty-four, the product is then divided by two hundred twelve. The quotient gives the length of the Videha region. //4.2619//

The length of that Videha region is ten lac twenty thouand one hundred forty-one yojanas and one hundred eighty-eight parts of two hundred twelve parts of a yojana. //4.2620//

10200141 | 188 |
212 |

The increase of regions in the Dhātakīkhaṇḍa should be known to be four thousand five hundred eighty-four yojanas. //4.2625//

4584 |

In this island the increase of the Vakṣāra mountains is four hundred seventy-seven yojanas and in excess of sixty parts. //4.2626//

477 | 60 |
212 |

There is increase in the places of Vibhaṅga rivers by one hundred nineteen yojanas and fifty-two parts alone. //4.2627//

119 | 52
212

The measure of increase in places of deity forests is two thousand seven hundred eighty-nine yojanas and in excess of ninety-two parts. //4.2628//

2789 | 92 |
212 |

This increase should be known for finding out the medium length on adding it to the initial length of the region etc., and for finding out the ultimate length on adding it to the medium length. //4.2629//

vi 4584 | va 477 | 60 | vibhaṁ 119 | 52 | de 2789 | 92 |
212 | 212 | 212 |

When the width of the Meru mountain and twice the width of the Bhadraśāla forest is subtracted from the middle diameter of the Dhātakīkhaṇḍa, then it becomes the diameter from the Śeṣapadmā upto the Maṅgalāvatī country. //4.2665//

Whatever number is produced on writing the digits two, four, eight, four, seven, and six in sequence (right to left), that number of yojanas is the diameter mentioned before. The diameter is squared, multiplied by ten, and the square-root of the product is calculated. It gives the circumference of that diameter. This is in sequence of the digits eight, three, zero, four, three, one and two. //4.2666//

sūī 674842 | pari 2134038 |

The area of the Kāloda sea is given by digits in sequence two, eight, zero, nine, six, four, six, two, six, two, one, three, and five (right to left), measuring in yojanas. //4.2737//

5312626469082 |

On comparing area of the Kālodaka sea with that of Jambū island it is six hundred seventy times the latter. //4.2738//

672 |

The external circumference of that Kāloda sea is slightly less than ninety-one lac seventy thousand six hundred five yojanas. //4.2739//

9170605 |

When forty-five lac yojanas are added to twice the width of this mountain, its external diameter is obtained. //4.2757//

4502044 |

The external circumference of this mountain is one crore forty-two lac thirty-six thousand seven hundred thirteen yojanas as a bit in excess. //4.2758//

14236713 |

This external circumference is in excess of the above amount by one thousand three hundred thirty daṇḍas, one hasta, ten aṅgulas and five jaus. //4.2759//

daṁ 1330 | ha 1 | aṁ 10 | ja 5 |

The diameter of this mountain is forty-five lac yojanas in the interior portion, and the circumference, in sequence of digits, (right to left), is the number of yojanas formed from nine, four, two, zero, three, two, four and one. //4.2760//

4500000 | 14230249 |

The square of the square of the diameter is multiplied by ten and the square root of the product taken out and divided by four. Whatever is the quotient, it gives the fine area of the equi-circular area. //4.2761//

The area of the human universe including the area of the Mānuṣottara mountain is as many yojanas as the number produced by placing the digits in sequence (right to left), zero, one, five, two, seven, two, seven, seven, five, three, two, zero, six and one. //4.2762//

16023577272510 |

On subtracting the width (vāsa) of both sides from twice the external diameter, the square of the remainder is multiplied by the square of the fourth part of the determinable term (śodhya rāśi) and again multiplied by ten. On finding out the square-root of the product, the area of the (ring-shaped) region is obtained. //4.2763//

The area of the Mānuṣottara mountain is the number of yojanas as is obtained by placing the digits in sequence (from right to left): seven, zero, nine,seven, one, six, six, four, five, four, and one. //4.2764//

14546617907 |

The width of the Himavān mountain is four thousand two hundred ten yojanas and ten parts out of nineteen parts of a yojana in excess. Beyond this, the width of mountains upto the Niṣadha mountain is successively four times. //4.2798//

$$4210\ \frac{10}{19} \mid 16842\ \frac{2}{19} \mid 67368\ \frac{8}{19} \mid$$

On summing up the widths of these three mountains and making the sum four times, (the result) gives the total width of all family mountains in yojanas. //4.2799//

The width of both the Iṣvākāra mountains is two thousand yojanas. On adding it to the earlier mentioned total width of the family mountains, the measure of the region occupied by the mountains in Puṣkarārdha island is obtained. //4.2800//

2000 |

The measure of the region occupied by the mountain is three lac fifty-five thousand six hundred eighty-four yojanas and four parts (out of nineteen parts) of a yojana. //4.2801//

$$355684 \mid \begin{matrix} 4 \\ 19 \end{matrix} \mid$$

The straight arrow, each of north and Devakuru, is fourteen lac eighty-six thousand nine hundred thirty-one yojanas. //4.2816//

1486931 |

The measure of chord of Kuru region is four lac thirty-six thousand nine hundred sixteen yojanas. //4.2817//

436916 |

On making the square of the arrow four times, add it to the square of the chord. The sum is divided again by four times the arrow. The quotient gives the widtl. of the circular region. //4.2818//

On multiplying each of its own width of the Mandara mountain etc. [without requisition] by each of its own number, (the result) gives the width of each region occupied, by itself. The sum of widths is subtracted from eight lac, the remainder is divided by its number. This gives own width of each. //4.2829-4.2830//

Whatever is obtained on adding width of the Mandara mountain in twice the width of the Bhadrasāla, it is added to the medium diameter, giving the measure of the diameter of Kacchā and Gandhamālinī. //4.2831//

That diameter, external to both Merus, upto the end of Bhadraśālas is forty-one lac forty thousand nine hundred sixteen yojanas. //4.2832//

4140916 |

The circumference of this diameter is one crore thirty lac ninety-four thousand seven hundred twenty-six yojanas. //4.2833//

13094726 |

The measure of the length of Videha is obtained by first subtracting the region occupied by mountain from the (above mentioned) circumference, the remainder is then multiplied by sixty-four and divided by twelve. //4.2834//

Then length of Videha near Kacchā and Gandhamālinī is the number of yojanas obtained by placing the digits in sequence (right to left), eight, four, seven, five, four, eight and three as well as one hundred twelve parts out of two hundred twelve parts of a yojana.

//4.2835//

$$3845748 \mid \begin{matrix} 112 \\ 212 \end{matrix} \mid$$

The square of the width of Vijaya, etc. is multiplied by ten and then square root of the product may be extracted. Afterwards, it is separately multiplied by thirty-two and the product divided by two hundred twelve. The quotient is added to the width of Kacchā country, giving the width of the half Videha at its own place. //4.2838-2839//

The increase of the Vijayas is nine thousand four hundred forty-eight yojanas and fifty-six parts in excess. //4.2840//

$$9448 \mid \begin{matrix} 56 \\ 212 \end{matrix} \mid$$

The increase of Vakṣāra mountains is nine hundred fifty-four yojanas and one hundred twenty parts out of two hundred twelve parts of a yojana. //4.2841//

$$954 \mid \begin{matrix} 120 \\ 212 \end{matrix} \mid$$

The increase for Vibhaṅga bifurcated rivers is two hundred thirty-eight yojanas and one hundred thirty-six parts (out of two hundred twelve parts of a yojana) in excess. //4.2842//

$$238 \mid \begin{matrix} 136 \\ 212 \end{matrix} \mid$$

The increase for Deva forests is five thousand seventy-eight yojanas and one hundred eighty-four parts in excess.// 4.2843 //

$$5578 \mid \begin{matrix} 184 \\ 212 \end{matrix} \mid$$

When that measure of increase is added to the initial length of Vijaya, etc., their medium length is obtained. When that measure of increase is also added to the medium length, the measure of its ultimate length is obtained. //4.2844//

The medium length of each of the Deva forest and Bhūta forest, is given by the number of yojanas produced by placing the digits three, nine, six, seven, eight, zero and two

in sequence (right to left), and one hundred fifty-six parts in excess. //4.2875//

$$2087693 \left| \begin{matrix} 156 \\ 212 \end{matrix} \right|$$

The length of the desired regions is obtained by subtracting the width of the Vijayārdha from the initial, middle, and last length of the Kacchā etc. regions, and dividing the quotients each by two. //4.2878//

$$2093272 \left| \begin{matrix} 128 \\ 212 \end{matrix} \right|$$

The area of the Himavān mountain is given by placing the digits two, five, zero, one, two, four, eight, six, three and three in sequence producing the number of yojanas, and twelve parts as divided by nineteen parts of a yojana. //4.2914//

$$3368421052 \left| \begin{matrix} 12 \\ 19 \end{matrix} \right|$$

The total area of twelve family mountains is obtained on multiplying the area of the Himavān mountain by eighty-four. When area of the mountains, Iṣvākāra, is also added to the former, the area of the occupied regions by fourteen mountains is obtained. //4.2915//

The area occupied by fourteen mountains is given in number of yojanas produced by placing digits one, two, four, eight, six, three, seven, four, five, four, eight, and two in sequence (right to left), and one part in excess. //4.2916//

$$284547368421 \left| \begin{matrix} 1 \\ 19 \end{matrix} \right|$$

The area of the Puṣkarārdha island is produced in number of yojanas on placing the digits eight, nine, zero, four, seven, eight, one, four, three, zero, six, three and nine in sequence (right to left). //4.2917//

$$9360341874098 |$$

The area of the Puṣkarārdha island without the area of the mountain is obtained in number of yojanas on placing the digits seven, seven, six, five, zero, five, four, nine, seven, five, seven, zero, nine. //4.2918//

$$9075794505677 |$$

When the above area is divided by two hundred. twelve, the area of Bharata kṣetra is obtained. //4.2919//

The area is given by number of yojanas obtained by placing the digits one, four, four, one, five, three, zero, one, eight, two and four in sequence (right to left) and one hundred eighty-five parts in excess. //4.2920//

$$42810351441 \left| \begin{matrix} 185 \\ 212 \end{matrix} \right|$$

Whatever is the area of Bharata region, the area of every region upto Videha is four times of it, successively. Again, ahead of this upto Airāvata region, there is decrease four times. //4.2921//

The area of Puṣkarārdha island is eleven hundred eighty-four parts relative to the measure of the area of the Jambū island. //4.2922//

$$1184 |$$

Whatever is obtained on dividing universe-line by the first and third root of the linear finger (set of points), on being reduced by unity, it gives the measure of the common human-set. //4.2926//

The digits in the following succession, four, eight, five, seven, eight, nine, five, eight, three, eight, nine, three, four, eight, zero, six, six, five, eight, two, six, zero, four, zero, seven, zero, eight, nine, one give the number of developed human set. The digits in the following succession, two, five, seven, two, six, nine, seven, five, one, five, nine, one, three, five, two, eight, nine, six, five, eight, eight, one, two, one, one, two, four, nine and five, give the measure of the female-set. //4.2927-4.2929//

$$1\,9\,8\,0\,7\,0\,4\,0\,6\,2\,8\,5\,6\,6\,0\,8\,4\,3\,9\,8\,3\,8\,5\,9\,8\,7\,5\,8\,4 \mid$$

and $$5\,9\,4\,2\,1\,1\,2\,1\,8\,8\,5\,6\,9\,8\,2\,5\,3\,1\,9\,5\,1\,5\,7\,9\,6\,2\,7\,5\,2 \mid$$

Whatever remains after subtracting the developed set and the common [general] human-set, it gives the measure of the non-developed set. //4.2930//

$$7 \left| \begin{matrix} 1 \\ 2 \end{matrix} \right|$$

The human beings born in inter-islands are a few. Finite times this amount are in ten Kuru regions and still finite times the preceding human-set resides in the Harivarṣa and

Ramyaka regions. //4.2931//

Finite times the preceding are in Hairaṅyavat and Haimavata regions. Finite times the preceding human beings are in Bharata and Airāvata regions and still finite times the preceding are in Videha region. //4.2932//

Innumerate times the preceding are attainment-non-developed human beings. They are spontaneously generated (sammūrchana). Specifically, in excess of the attainment-non-developed (labdhi-aparyāpta or sammūrchana) human beings, are the human beings of common human-set. //4.2933//

There are three types of human beings under the classification of the developed, the formation-non-developed, and the attainment-non-developed. //4.2934//

Thus ends the description of the comparability.

The minimal interval difference period of emancipation in human universe is one ultimate instant (samaya) and that of the maximal is upto six months beginning with two, three ultimate instants, and so on. After this, the bios get accomplishment in eight ultimate-instants positively. //4.2957//

Out of these ultimate-instants (samayas), there are accomplished, respectively, at the maximal thirty-two, forty-eight, sixty, seventy-two, eighty-four, ninety-six, and in the last two ultimate-instants one hundred eight and one hundred eight bios, as well as at the minimal only one by one souls reach accomplishment. According to average knowledge, in all the ultimate-instants, seventy-four, seventy-four bios get accomplished. //4.2958-4.2959//

The ultimate-istants number of the past-time is multiplied by five hundred ninety two and divided by six months and eight ultimate-instants. The quotient is the number of all liberated bios. //4.2960//

$$a\ 592\ |\ mā\ 6\ |$$

[Note: Here, a stands for atīta kāla (time ab aeterno).]

Thus ends the measure of the liberating bios.

V. A. T.

In whatever amount of space, there is movement and rest of bios and matter relative to the aether (dharma) and non-aether (adharma) fluents, that is sessile universe. //5.5//

The subhuman locomobile, two etc. sensed bios (tiryak trasa), universe is stationed in the region of one rāju length, one rāju breadth and with a height of one lac yojanas from the bottom of the Mandara mountain. //5.6//

$$= \left| \begin{matrix} \\ 49 \end{matrix} \right| \left| \begin{matrix} \\ 100000 \end{matrix} \right|$$

The measure of the fine hair of twenty-five crore squared uddhāra palyas is the number, both of islands and seas. Half of this are the islands and the rest half are the seas in number. //5.7//

All the islands and seas are innumerate and symmetric-circular. Out of these, the first is an island, the last is the sea and in the middle are the islands and seas. //5.8//

Above the Citrā earth, in the very central portion, within the region of one raju square, there are stationed islands and seas, one surrounding the other. //5.9//

All the seas, dividing the Citrā earth, are above the Vajrā earth, and all the islands are stationed above the Citrā earth. //5.10//

In the beginning of the islands there is the Jambū island and in the end there is the island called the noted Svayambhūramaṇa. //5.11//

Among all the seas begins the Lavaṇa sea, and in the end is the sea called the noted Svayambhūramaṇa. //5.12//

When (the above thirty-two islands and seas, from the beginning and end, counting) sixty-four is subtracted from the measure of set of two and a half uddhāra sāgara of fine hair, the remaining are the islands and seas out of which many have the similar names. //5.27//

The diameter of the Jambū island is one lac yojanas. Beyond this, from the Lavaṇa sea upto Svyambhūramaṇa sea, the widths of the island and sea (in shape of rings) are successively doubling. //5.32//

100000 | 200000 | 400000 | 800000 | 1600000 | 3200000 |

Thus are the widths upto the Svayambhūramaṇa sea. Beyond it is the width of the Yakṣavara island. //5.33//

$$\left| \begin{matrix} - \\ 3584 \end{matrix} \right. \text{ plus yojanas } \left. \begin{matrix} 9375 \\ 16 \end{matrix} \right| \quad \text{The width of Yakṣavara sea} \quad \left| \begin{matrix} - \\ 1792 \end{matrix} \right. \text{ plus } \left. \begin{matrix} 9375 \\ 8 \end{matrix} \right|$$

Devavara island – plus $\frac{9375}{896}$	Devavara sea – plus $\frac{9375}{448}$
Ahindravara island – plus $\frac{9375}{224}$	Ahindravara sea – plus $\frac{18750}{112}$
Svayambhūvara island – plus $\frac{37500}{56}$	Svayambhūvara sea – plus $\frac{75000}{28}$

When the width of the Lavaṇa sea etc. is multiplied in succession, respectively, by two, three and four, and the products are reduced each by three lac, then the measure of the initial, medial and external diameters are obtained. //5.34//

100000 | 300000 | 500000 | Dhāda 500000 | 900000 | 1300000 |

Kālo 1300000 | 2100000 | 2900000 |

In this way, the measure of the diameter be known upto the Devasamudra sea for each of its own. Beyond this,

of Ahīndravara island – minus $\frac{281250}{112}$	medium – minus $\frac{243750}{224/3}$
external – minus $\frac{2500}{56}$	Ahīndravara sea – minus $\frac{262500}{56}$
medium – minus $\frac{243750}{112/3}$	external – minus $\frac{225000}{28}$
Svayambhūramaṇa island – minus $\frac{225000}{28}$	medium – minus $\frac{187500}{56/3}$
external – minus $\frac{1500000}{14}$	Svayambhūramaṇa sea – minus $\frac{150000}{14}$
middle – minus $\frac{75000}{2/28}$	external – $\frac{}{7}$

The measure of the circumference of chosen island/ocean is obtained when the external pair of circumference (rough and fine) of the Jambū island is multiplied by the desired diamater of the island ocean and divided by the width of the Jambū island. //5.35//

The divisions of desired islands-seas are obtained by first subtracting the square of the internal diameter from the square of external diameter, and then, on dividing the remainder by square of one lac. //5.36//

24 | 144 | 672 |. This should be known upto the Svayambhūramaṇa.

The eighth island from the Jambū island is world famous, "Nandīśvara", surrounded by the "Nandīśvara" sea.//5.52//

The width of that ring-shaped island is one hundred sixty-three crore eighty-four lac yojanas. //5.53//

1638400000 |

The measure of the external diameter of this island is six hundred fifty-five crore thirty-three lac yojanas. //5.54//

6553300000 |

The internal circumference of Nandīśvara island in yojanas is the number obtained by placing the digits in sequence (from right to left), three, five, seven, two, zero, two, one, six, three, zero and one. //5.55//

10361202753 |

Its external circumference is two thousand seventy-two crore thirty-three lac fifty-four thousand one hundred and ninety yojanas. //5.56//

20723354190 |

In the very central portion of the Nandīśvara island, towards the east, there is the great, famous, clean mountain full of good saffire gems. //5.57//

This mountain is one thousand yojanas deep, eighty-four thousand yojanas high and every where symmetric circular, with a width every where of eighty-four thousand yojanas. //5.58//

1000 | 84000 | 84000 |

On all the four sides of this mountain in four directions, there are four rectangular lakes. Out of these, every one is rectangular with width of one lac yojanas //5.60//

100000 |

Beautiful due to bloomed lotus, blue water lilies, and flower forests' fragrance, these lakes are one thousand yojanas deep, pierced in stone and without water bios. //5.61//

1000 |

Those four Siddhakūṭas are like the Jina city as mentioned about those on Niṣadha mountain, with similar width and height etc., and appear graceful with such for Jina temples. //5.127//

This Kuṇḍala mountain is full of grace of gems, with the same width as that of the Mānuṣottara mountain, forty-two thousand yojanas high, and one thousand yojanas deep. //5.130//

The compiler of the Lokaviniścaya describe the Rucakavara mountain through another way which I show here. //5.167//

The (rough) circumference of a circular region is three times its diameter, and the rough area of the circular region is obtained by multiplying the circumference by one fourth of the diameter. //5.241//

The following aphorisms are meant for calculating the area of ring shaped islands and seas, beginning with the Lavaṇa sea:

One lac is subtracted from the width of the desired region, the remainder is multiplied by nine. This gives the length (āyāma) of the desired island or sea. Again, this length is multiplied by width, giving the area of the island-sea. //5.242//

Or

When the sum of initial, medium and external diameters is multiplied by width, the rough area of the desired ring shaped regions is obtained. //5.243//

Or

Thrice the middle diameter should be known to be the sum of the initial, middle and external diamerers of the desired ring shaped regions. When this sum is multiplied by the width, the product gives the rough area of those ring shaped regions. //5.244//

The rough area of the Jambū island is seven hundred fifty crore yojanas- 7500000000| The area of the Lavaṇa sea is eighteen thousand crore yojanas-180000000000 | The rough area of the Dhātakīkhaṇḍa island is one lac eight thousand crore yojanas- 1080000000000 |

The area of the Kāloda sea is five lac four thousand crore yojanas- 5040000000000 | The area of Puṣkara island is twenty-one lac sixty thousand crore yojanas- 21600000000000 | The area of Puṣkaravara sea is eighty-nine lac twenty-eight thousand crore yojanas- 89280000000000 |

In this way, beginning with the Jambū island, going upto the term-place, located by one plus minimal peripheral innumerate (jaghanya parīta asaṁkhyāta), in measure of logarithm to the base two, whatever island stands there, its area is obtained by multiplying minimal peripheral innumerate by minimal peripheral innumerate as reduced by unity and again by nine thousand crore yojanas also.

It is 16 | 15 | 90000000000 |

[Note: Here 16 is the symbol for minimal peripheral innumerate]

Afterwards, initiating with the Jambū island, again reaching the term-station after finding logarithm to base two of the palyopama and one more stations, whatever island is stationed there, its area is equal to the set obtained by multiplying the palyopama by the palyopama as reduced by unity and again on multiplying the product by nine thousand crore yojanas. That measure is this: [pa | pa - 1] 90000000000. Counting in this way, the area should be known upto the Svayambhūramaṇa sea. Out of these, the last abstraction is stated:

The square of the universe-line is muiltiplied by nine, as divided by seven hundred eighty-four. The quotient is added by a rāju as multiplied by one lac twelve thousand five hundred yojanas; again, on reducing the above mentioned both sets by one thousand six hundred eighty-seven crore fifty lac yojanas, the remainder becomes the area of the Svayaṁbhūramaṇa sea. Its presentation of proof

= 9	plus	rajju 1	112500	minus	16875000000	yojanas
784		7				

Now, from here the comparability (alpabahutva about the islands and seas is detailed through nineteen abstractions. It is as follows:

In the *first case*, the measure of the increase in width relative to one direction of the Lavaṇa sea with respect to the whole width of the Jambū island is searched. The measure of the increase in width of the Dhātakīkhaṇḍa relative to the mixed width of the Jambū island and the Lavaṇa sea is found out. In this way, the measure of increase in width with respect to a single direction of the island or sea, stationed in their successive external part relative to the one directional width of all internal islands-seas (correspondingly), is found out.

In the *second case,* search is made of the increase in single directional width of the Lavaṇa sea relative to half the width of the Jambū island. Afterwards, search is made of the increase in the width of the Dhātakīkhaṇḍa island relative to the sum of half width of Jambū island and width of the Lavaṇa sea. In this way, search is made in the increase of the single directional width of the island or sea, stationed in the external part successively relative to the single directional width of the total corresponding internal islands and seas.

In the *third case,* the increase in the one directional width, of successively stationed island or sea in the outer part relative to the single directional width of the corresponding internal desired sea , is found out.

In the *fourth case*, search is made in the increase in a width in single direction about the successive sea relative to single directional width of internal corresponding seas.

In the *fifth case,* search is made in the increase in a width in single direction about the successive upper island corresponding to single directional width of the desired island.

In the *sixth case,* search is made of the single dirctional width of the successive upper island relative to single directional increase of internal all corresponding islands.

In the *seventh case*, search is made of the single width directional increase of the successive upper island relative to both directional with of internal corresponding island.

In the *eighth case,* search is made of the single directional increase in the width of the successive sea relative to both directional width of the lower all seas.

In the *ninth case,* search is made about the increase of sectional-counting-rods (khaṇḍaśalākās) of the island relative to sea and that of the sea with respect to island, after having made sectional counting rods of area of the successive seas and islands through the measure of rough and fine area of the Jambū island.

In the *tenth case,* the measure of the increase of the sectional counting-rods of sea with respect to an island or that of an island with respect to a sea is found out similar to that of the Lavaṇa sea with respect to that of the Jambū island and that of tl.e Dhātakīkhaṇḍa island with respect to that of the Lavaṇa sea.

In the *eleventh case,* the increase in the sectional counting-rods of the sea or island situated in the outer part relative to the group of corresponding internal seas or islands for their sectional counting rods, is searched out.

In the *twelfth case,* the increase in the area of an island with respect to a desired sea, and that of a sea with respect to an island is searched out.

In the *thirteenth case,* the increase of area of the next island or next sea corresponding to the area of the corresponding internal islands-seas is found out.

In the *fourteenth case,* the increase of area of successively situated next sea with respect to the area of the desired sea, initiating with the Lavaṇa sea, is searched out.

In the *fifteenth case,* the increase of area of the successively next sea relative to the area of all the internal seas is searched out.

In the *sixteenth case,* the increase in the area of the successively next island relative to the area of the Dhātakīkhaṇḍa, etc., desired island is searched out.

In the *seventeenth case*, the increase in the area of successive externally situated island relative to the area of the Dhātakīkhaṇḍa, etc., internal islands is searched out.

In the *eighteenth case,* the increase in each of the initial middle or external diameters of successive, externally situated island or sea with respect to the measure of the initial, middle and external diameters of the desired island or sea, is found out.

In the *nineteenth case,* the increase in the width (āyāma) of successive, externally situated island or sea relative to the width of the desired islands seas is searched out.

Out of the above mentioned nineteen abstractions or choices (vikalpas) the comparability (alpabahutva) in the first case is described. It is as follows:

The width relative to single direction of Lavaṇa sea with respect to total width of the Jambū island is a lac yojana in excess. The one directional width of the Dhātakīkhaṇḍa relative to the singly directional combined width of the Jambū island and the Lavaṇa sea is one lac yojanas in excess. In this way, the width of successively situated island or sea relative to the single directional combined width of the internal islands seas upto the Svayambhūramaṇa sea is each in excess of one lac yojana.

For finding out this measure of increase, that is the following verse aphorism -

The initial diameter is added to the four times width of the desired islands-seas. The sum is divided by three and the quotient so obtained is subtracted from the twice width of the chosen island-sea. The remainder gives the measure of the increase.//5.245//

The following verse aphorisms are meant for finding out half the initial diameter combined with half lac yojanas of the chosen island or sea.

The widths of the desired islands-seas are reduced by two lac, the remainder is added to the external diameter and then divided by five. The quotient becomes the measure of the

half the initial diameter of the desired island or sea, when added by half lac. Similarly, the measure of the mentioned diameter from the Lavaṇa sea upto the last sea should be brought forth. //5-246-247//

Now the comparability in the *second case* is related- As compared with the half the width of the Jambū island, the width in a single direction of the Lavaṇa sea is one and a half yojanas in excess. As compared with the combined single directional width of half the width of Jambū island with that of the Lavaṇa sea, the singly directional width of the Dhātakīkhaṇḍa island is one and a half lac yojanas in excess. Similarly, upto the Svayaṁbhūramaṇa sea, there has been an increase of one and a half lac yojanas in the single directional width of the next island or sea as compared with its single directional width of the internal preceding all the islands and seas.

In order to calculate the corresponding increase measure, the following verse aphorisms are given.

Out of the half measure of external diameters of the desired islands-oceans, the initial diameter is subtracted. The remainder is the measure of the increase. //5.248//

From the Lavaṇa sea, upto the last sea, the combined width of the preceding island seas as compared with that of the desired island or sea is equal to half of the initial diameter of is own //5.249//

In the *third case* the comparability is related-

Relative to the single directional width of the Lavaṇa sea, the increase in single directional width of Kālodaka sea is in excess of six lac yojanas. Relative to the singly directional width of Kālodaka sea, the increase in the single directional width of the Puṣkaravara sea is in excess of twenty-four lac yojanas. Similarly, from the Kālodaka sea upto the Svayambhūramaṇa sea, there has been successively four times increase in the singly directional width of the next sea as compared with its preceding chosen sea's single directional width.

Its last abstraction is now related. There has been an increase of three universe-lines as divided by one hundred twelve and fifty six thousand two hundred and fifty yojanas in the single directional width of the Svayambhūramaṇa sea as compared with the single directional width of the Ahīndravara sea. Its representation is as follows:

$$-3 \left| \begin{matrix} \text{yojanas } 56250 \\ 112 \end{matrix} \right|$$

The following verse aphorism is meant for calculating those increase.

That measure of increase is derived by first making thrice the width of the desired sea half and reducing the result by three lac, and by subtracting the remainder from three times the width as reduced by three lac, and further by making the remainder half. // 5.250//

Comparability is related in the *fourth case*:

The single directional width of Kālodaka sea as compared with single directional width of Lavaṇa sea is six lac yojanas in excess. The single directional increase in width of the Puṣkaravara sea as compared with that of Lavaṇa sea as combined with Kālodaka sea is twenty-two lac yojanas in excess.

In this way, there has been an increase in the singly directional succeeding sea's width as compared with preceding group of sea's width in a single direction, by an amount of four times as reduced by two lac, upto the Svayambhūramaṇa sea.

Its last abstraction (vikalpa) is now related -

There is an increase of one sixth rāju and three lac fifty thousand yojanas in the singly directional width of Svayambhūramaṇa sea relative to that of the preceding all seas.

$$-\ \text{plus}\ \frac{350000\ \text{yojanas}}{42 \qquad\qquad 3}$$

The following verse aphorism is meant for finding out the increase-

Eight lac is subtracted from the width of desired sea, the remainder is divided by twelve, the quotient is then subtracted from three fourth part of the width. The remainder gives the increase in the width of arbitrarily chosen sea. // 5.251//

The following verse aphorism is meant for finding out the sum of the widths in a single direction for all the seas in relation to desired increase-

Two lac is reduced from every one of is increase, the remainder is halved, and this givs the width in relation to all the seas preceding to the sea with desired increase. // 5.252//

The comparability is related in the *fifth case*:

There has been an increase of three lac yojanas in the singly directional width of Dhātakīkhaṇḍa as compared with that of the Jambū island. There has been an increase of twelve lac yojanas in the singly directional width of the Puṣkaravara island as compared to that of the Dhātakīkhaṇḍa. In this way, there has been a three times increase in the width of

the successive next island as compared with that of its preceding island upto the Svayaṁbhūramaṇa island. Its last abstraction is stated-

The increase in the last Svayaṁbhūramaṇa's last island as compared with that of the last but one (dvicarama) Anīndravara island given by three by thirty-two rājus and twenty-eight thousand one hundred and twenty-five yojanas.

$$- \left| \begin{matrix} 3 \\ 7 \end{matrix} \right| \begin{matrix} \text{plus yojanas} \\ 32 \end{matrix} \left| \begin{matrix} 28125 \\ \end{matrix} \right|$$

For finding out the above increase, the verse aphorism is as follows-

The width of the desired island is multiplied by three and divided by two, and then reduced by three lac. The remainder is subtracted from three times the width as reduced by three lac, and the result when halved gives the measure of the increase.// 4.253//

Comparability is stated in the *sixth case*:

It is like this- Relative to the half of width of the Jambū island the singly directional width of the Dhātakīkhaṇḍa is in excess of three and a half lac: 350000/ Relative to the single directional combined width of the Jambū island as halved and that of the Dhātakīkhaṇḍa, the increase in the singly directional width of the Puṣkaravara island is eleven lac fifty thousand yojanas in excess. 1150000 | Thus, there has been an increase in the width of the succeeding island relative to singly directional width of Dhātakīkhaṇḍa etc. chosen island by four times as reduced by two and a half lac upto the Svayaṁbhūramaṇa island. Out of them, the last abstraction is stated - There has been an increase in the singly diectional width of Svayaṁbhūramaṇa sea relative to that of all the preceding islands from Svayaṁbhūramaṇa island by the universe-line as divided by eighty-four and added by three lac twenty-five thousand yojanas as divided by three. Its presentalion is

$$- \begin{matrix} \text{puls} \\ 84 \end{matrix} \begin{matrix} \text{Jo} \\ \end{matrix} \left| \begin{matrix} 325000 \\ 3 \end{matrix} \right|$$

The verse-aphorism for calculating those increase-

The last width as reduced by one lac is divided by three. The quotient is doubled and combined by three lac as divided by two. //5.254//

$$\left| \begin{matrix} (300000) \\ 2 \end{matrix} \right|$$

The (result) gives the measure of increase of islands.

The verse aphorism for finding out the width class of the preceding islands relative to the chosen island-

The width of the chosen island as divided by four is kept separate. The width of the island preceding the chosen island is reduced by one lac, the remainder is divided by three , this quotient is added to the above quantity (kept separate). This sum is reduced by half lac. The remainder gives the mixed width of those islands from the half Jambū island upto the chosen last but one (Ahīndravara) island // 5.255-256//

Comparability is related in the seventh case- There has been an increase of three lac yojanas in the singly directional width of Dhātakīkhaṇḍa from the total Jambū island. 300000 I There has been an increase of seven lac yojanas in the single directional width of Puṣkara island relative to both directional width of Dhātakīkhaṇḍa with Jambū island. 700000 I There has been an increase of four times as reduced by five lac in the singly directional width of the succeeding next island relative to both directional width of the Dhātakīkhaṇḍa etc. chosen islands in this way upto the Svayaṁbhūramaṇa island. The last abstraction is related out of them -

There has been an increase of a rāju as divided by twenty-four and five lac thirty-seven thousand five hundred as divided by three yojanas in the singly directional width of Svayaṁbhūramaṇa island as compared with both directional width of all the islands preceding to Svayaṁnbhūramaṇa island. Its representation is thus-

$$\frac{-}{7 \mid 24} \quad \text{plus yojanas } \frac{537500}{3}$$

Verse aphorism for finding out these increments. Every one of their widths is reduced by one lac and divided by three, and then added by two lac giving the measure of that increase. Or, the width is added by five lac, (then) divided by three. The quotient gives the measure of that increase. //5.257//

Again, initiating with one lac as the sum of the both directional width of all the preceding all islands from the chosen island, (that sum) goes as four times and five lac increase upto the Ahīndravara island.

The verse aphorism for calculating that increase is as follows-

Five lac is reduced from twice the width of each of its own, the remainder is divided by three, The quotient becomes the sum of both directional width of the preceding islands.

// 5.258//

Comparability is related in the ***eighth case*** :

There has been an increase of four lac in the singly directional width of Kālodaka sea relative to the both directional width of Lavaṇa sea. 400000 । There has been an increase of twelve lac, in the singly directional width of Puṣkara sea relative to combined both directional width of Lavaṇa and Kālodaka sea. 1200000 । In this way there has been four times as reduced by four lac increase in both directions of all the preceding seas relative to one-directional increase in the succeeding chosen seas from Kālodaka sea upto the Svayaṁbhūramaṇa sea. Out of them the last abstraction is related - There has been an increase of one twelfth of a rāju and four lac seventy-five yojanas as divided by three in the singly directional width of Svayaṁbhūramaṇa sea relative to both directional width of all preceding seas. Its representation is thus -

$$\begin{array}{|c|c|c|} - & & \text{plus yojanas } 475000 \\ 7 & 12 & 3 \end{array}$$

In order to calculate that increase, this is the verse aphoriom-

Four lac is added to the width of this sea, then divided by three. The quotient gives the singly directional increase in width of succeeding sea relative to both directional width of preceding seas. //5.259//

The sum of the preceding as well- From the desired Kāloda sea the width sum in relation to both directions of one Lavaṇa sea (in precedence, is four lac. 400000 । Preceding the Puṣkaravara sea, the width collection in relation to both directions of both seas is twenty lac yojanas. 2000000 । In this way, both directional width increase of succeeding sea is four times and four lac more relative to width collection of both directions of internal sea; and this has gone upto Ahīndravara sea. In order to calculate that increase, here is the verse aphorism-

Four lac is reduced from one's own twice the width, the remaining is divided by three. The quotient so obtained becomes the sum of both directional width of preceding seas. //5.260//

Comparability is related in the ***ninth case*** -

Relative to rough and fine areas of Jambū island, the area of Lavaṇa sea is twenty-four times. 24 । The area of Dhātakīkhaṇḍa relative to that of Jambū island is one hundred forty-four times. 144 । Known in this way, the description should be carried upto Svayaṁbhūramaṇa sea. The last abstraction out of them is stated- The square of the universe-

line is multiplied by three and is divided by one lac ninety-six crore. This is added by universe-line as divided by fourteen lac and is reduced by nine kosa. Its representation is as follows-

= 3	plus area	21	minus 9 kośas	|
1960000000000 |		1400000		

The following verse aphorism is for finding out that increase-

The width of chosen island or sea, as reduced by one lac, is multiplied by three, then it is multiplied by four times its width. The product, when divided by square of one lac, gives the number of equal parts of the Jambū island. //5.261//

Comparability is related in ***tenth case*** - It is as follows-

On dividing the area of Lavaṇa sea, equivalent to gross or fine area of Jambū island parts, it is twenty-four times that. 24 | The division-counting-rods of the Dhātakīkhaṇḍa are six times the number of division-counting-rods in relation to Lavaṇa sea. The division-counting-rods of the Kālodaka sea are ninety-six counts over four times those of the Dhātakīkhaṇḍa island. Again beyond this, the succeeding islands or seas have four times the division-counting-rods relative to those of the preceding island or sea, and their projected ninety-six has been doubled successively upto the Svàyaṁbhūramaṇa sea. Its last abstraction is related- The division-counting-rods of Svayaṁbhūramaṇa sea are three universe-line as divided by seven lac yojanas and increased by nine yojanas, relative to those of Svayaṁbhūramaṇa island.

Its representation is thus-

– 3	plus 9 yojanas	|
700000		

To find the measure in excess of the four times, the following verse aphorism is given-

Every one of own widths is divided by one lac, the quotient is reduced by unity, the remainder is divided by ones own division-counting-rods. This gives the measure of the number in excess. //5.262//

Comparability is stated in ***eleventh case*** : It is as follows - The measure of increase

of division-counting-rods of Dhātakīkhaṇḍa island relative to number of division-counting-rods in relation to Lavaṇa sea is one hundred and twenty. 120 | The division-counting-rods in the measure of increase of Kālodaka sea is five hundred four relative to the number of division-counting-rods of Dhātakīkhaṇḍa added with division-counting-rods of Lavaṇa sea. 504 | Thus, beginning with increase in counting rods of Dhātakīkhaṇḍa island upto the Svayaṁbhūramaṇa sea, the increase in the division-counting-rods of sea or island succeeding the preceding islands-seas counting-rods-set, is four-times in excess of twenty-four. Out of them, the last abstraction is stated-

What is the measure of increase when division-counting-rods of Svayaṁbhūramaṇa sea is reduced by division-counting-rods-set of all islands-seas preceding the Svayaṁbhūramaṇa sea ? Saying so, it is square of universe-line as divided by ninety-eight thousand yojanas, in addition to three universe-lines divided by seven lac yojanas, and as reduced by fourteen kośas. Its representation is as follows-

=	plus rajju	− 3	minus kośa 14 |
980000000000		700000	

In order to find out the measure of this increase, the verse-aphorism is as follows-

Whatever is the square of the last width as divided by one lac, one is subtracted from it, the remainder is multiplied by eight. This gives the measure of increase of division-counting-rods of successive island or sea relative to counting-rod-set of preceding islands-seas. //5.263//

Again, the mixed statement of division-counting-rods of islands-seas preceding to desired island or sea is made. The division-counting-rods of Dhātakīkhaṇḍa island added with those of Lavaṇa sea are seven times relative to those of Lavaṇa sea. The division counting-rods of preceding islands-seas along with those of Kālodaka sea are five times relative to those of Dhātakīkhaṇḍa island combined with division-counting-rods of Lavaṇa sea.

The division-counting-rods of preceding islands-oceans, along with those of Puṣkaravara island, are four times and in excess of three hundred sixty relative to those of preceding islands-seas combined with those of Kālodaka sea. The division-counting-rods of preceding islands-seas combined with those of Puṣkaravara sea are four times and in excess of seven hundred forty-four relative to those of preceding islands-seas along with those of Puṣkaravara island. Beyond this, upto the Svayaṁbhū sea, the division-counting-rods have become four times successively, and the additional seven hundred four times successively,

and the additional seven hundred forty-four have become twice successively, in excess of twenty-four.

For finding out the increase, the verse-aphorism is as follows- ''

One lac is reduced from half of the last width, the remainder is multiplied by width as reduced by one lac. The product is divided by cube of five and a crore. The quotient is mass-result of preceding islands-seas from the desired island or sea. //5.264//

For finding out the additional measure, the following is the verse aphorism-

Every one of the widths is divided by two lac. When every one of its own division-counting-rods is divided by the quotient, the measure of the excess is obtained. //5.265//

Comparability is related in the *twelfth case* - It is like this - Leaving the Jambū island, the width of the Lavaṇa sea is two lac and the length (needed for calculating its area) is nine lac yojanas. The width of Dhātakīkhaṇḍa is four lac and the length is twenty-seven lac yojanas. The width of Kālodaka sea is eight lac and the length is sixty-three lac yojanas. Thus, the width of the island is twice that of the sea, and the width of the sea is twice that of the island. The length is double the length in excess of nine lac, and this goes on upto the Svayaṁbhūramaṇa sea.

The area of the Dhātakīkhaṇḍa is six times that of the Lavaṇa sea, and the area of the Kālodaka sea is four times and in excess of twelve thousand crore yojanas relative to area of Dhātakīkhaṇḍa island. 720000000000 | In this way, the area of a successive island or a successive sea has been four times in excess of twelve thousand crore yojanas relative to the area of the preceding island or sea. This goes on upto the Svayaṁbhūramaṇa, doubling in each successive case. Out of these, the last abstraction is related- The width of the Svayaṁbhūramaṇa island is a universe-line as divided by fifty-six and in excess of thirty-seven thousand five hundred yojanas. Its representation is thus:

$$\begin{vmatrix} - \\ 56 \end{vmatrix} \text{ plus yojanas } 37500 \Big| \quad -$$

When this length is multiplied by width, the area of Svayaṁbhūramaṇa island is found to be square of rāju as multiplied by nine and divided by sixty-four, and as reduced by slightly less amount which is obtained by multiplying a rāju by twenty-eight thousand one hundred twenty-five yojanas as reduced by two thousand one hundred nine crore thirty-seven lac fifty thousand yojanas.

It is represented by

$$= \frac{9}{49} \left| \frac{64}{} \right| \text{ minus } - \frac{}{7} \left| \frac{28125}{} \right| \text{ minus yojanas } 21093750000$$

The width of Svayaṁbhūramaṇa sea is in excess of seventy-five thousand yojanas over universe-line as divided by twenty-eight. The length (āyāma) is nine universe-line divided by twenty-eight and reduced by two lac twenty-five thosand yojanas. Its representation is

$$- \frac{}{28} \left| \text{ plus } 75000 \right| \text{ length } - 9 \frac{}{28} \left| \text{ minus } 225000 \right|$$

The area of the Svayaṁbhūramaṇa sea is obtained by first multiplying the square of a rāju by nine, and dividing by sixteen, as combined with a rāju multiplied by one lac twelve thousand five hundred yojanas and as reduced by slightly greater than one thousand six hundred eighty-seven crore fifty lac yojanas. Its representation is thus

$$= \frac{9}{49} \left| \frac{9}{16} \right| \text{ plus } - \frac{}{7} \left| \frac{112500}{} \right| \text{ minus } 16875000000$$

Thus, for finding out the width, length and area, this verse aphorism is given-

The width is reduced by one lac and multiplied by nine . This gives the length of the desired island or sea. When this length is multiplied by width, it gives the area of the spherical regions.//5.266//

The following verse-aphorism is meant for showing the excess of area of the succeeding island or sea relative to preceding island or sea-

On multiplying every one of the widths of succeeding islands-seas relative to Kālodaka sea, the measure of increase in succession arrives. //5.267//

Comparability is related in the *thirteenth case* - The area of Lavaṇa sea is twenty-four times the area of the Jambū island. The area of Dhātakīkhaṇḍa island is five times in excess of fourteen thousand two hundred fifty crore yojanas relative to the combined area of Lavaṇa sea along with Jambū island. 142500000000 ।

The area of the Kālodaka sea is three times in excess of one lac twenty-three thousand seven hundred fifty crore yojanas relative to area of Dhātakīkhaṇḍa island along with those of the Lavaṇa sea and Jambū island. 1237500000000 । Thus, the area of the successive

island or sea relative to its combined areas of Kālodaka sea etc., preceding islands-seas, becomes three times, the projected one lac twenty-three thousand seven hundred fifty crore yojanas being respectively doubled alongwith excess of twenty thousand two hundred fifty crore yojanas upto the Svayaṁbhūramaṇa sea. 202500000000 | Out of them, the last abstraction is related- Leaving apart the Jambū island, whatever are the islands-oceans preceding Svayaṁbhūramaṇa sea, their combined area is three times the square of a rāju as divided by sixteen, and as added by nine hundred thirty-seven crore fifty lac yojanas and as reduced by a rāju multiplied by one lac twelve thousand five hundred. Its representation is thus-

$$= \left| \frac{3}{49} \right| \frac{3}{16} \Big| \text{ plus yojanas } 9375000000 \text{ minus rājus } 112500 \Big|$$

The following verse-aphorism is meant for finding out the combined result of preceding islands-seas relative to the chosen island or sea-

From the width and length of the chosen island or ocean, one lac and nine lac are reduced respectively. The remainder are mutually multiplied and the product on being divided by three, gives the combined result of the preceding islands-seas except the Jambū island, relative to chosen island or sea. //5.268//

Verse-aphorism for finding out the measure in excess- Among them, width, length and area is related for the last abstraction-

The width of Ahīndravara sea is sixteenth part of a rāju and in excess of eighteen thousand seven hundred and fifty yojanas. Its representation is thus-

$$- \left| \frac{1}{7} \right| \frac{1}{16} \Big| \text{ plus yojanas } 18750 \Big|$$

The length of this sea is obtained by dividing nine rājus by sixteen and on reducing the quotient by seven lac thirty-one thousand two hundred fifty yojanas. Its representation is-

$$- \left| \frac{9}{7} \right| \frac{9}{16} \Big| \text{ minus yojanas } 731250 \Big|$$

The width of Svayaṁbhūramaṇa sea is obtained by dividing a universe-line by twenty-eight and in excess of yojanas seventy-five thousand. Its representation is-

$$- \left| \frac{1}{28} \right| \text{ plus } 75000 \text{ yojanas} \Big|$$

Its length is obtained on dividing nine universe-line by twenty-eight and on reducing the quotient by two lac twenty-five thousand yojanas. Its representation is :-

$$\begin{array}{|c|l|}\hline -\ 9 & \text{minus yojanas } 225000 \\ 28 & \\ \hline \end{array}$$

The area of Ahīndravara sea is obtained (first) by making the square of rāju nine times and dividing by two hundred fifty-six. The quotient is reduced by one fourth of a rāju as multiplied by one lac forty thousand six hundred twenty-five yojanas, and also reduced by one thousand three hundred seventy-one crore nine lac thirty-seven thousand five hundred yojanas.

$$\begin{array}{|c|c|c|l|}\hline = & 9 & \text{minus rāju } 1 & 140625 \text{ minus } 13710937500 \text{ yojanas} \\ 49 & 256 & 4 & \\ \hline \end{array}$$

The area of the Svayaṁbhūramaṇa sea is obtained (first) by dividing nine times the square of rāju by sixteen and then adding to the quotient, the rāju as multiplied by one lac and then adding to the quotient, the rāju as multiplied by one lac twelve thousand five hundred yojanas, and reducing it by one thousand six hundred eighty-seven crore fifity lac yojanas. Its representation is thus-

$$\begin{array}{|c|c|c|l|}\hline = & 9 & \text{plus rāju } 1 & 112500 \text{ minus } 168750000000 \text{ yojanas.} \\ 49 & 16 & & \\ \hline \end{array}$$

The verse aphorism for calculating the excess measure. Taking the Vārunīvara sea as initial, the measure of excess is obtained by multiplying the succeeding desired sea width by twenty-seven lac. // 5.270//

Comparabitity is related in the *fifteenth case*: It is thus- The area of Kālodaka sea is twenty-eight times that of Lavaṇ sea. The area of Puṣkaravara sea is seventeen times as in excess of fifty-four thousand crore yojanas relative to area of Kālodaka sea along with that of Lavaṇa sea. Measure. 540000000000 | The area of Vāruṇīvara sea is fifteen times as in excess of forty-five lac fifty-four thousand crore yojanas relative to area of Puṣkaravara along with those of Lavaṇa and Kālodaka seas. 45540000000000 |

Thus the area of every sea, successive to area-collection of preceding seas from the Vārunīvara sea, each is fifteen times , as in excess of the projected four times of forty-five lac fifty-four thousand crore yojanas, as well as one lac sixty-two thousand crore yojanas. 1620000000000 | Thus this order should be known upto the Svayaṁbhūramaṇa sea.

Out of these, the last abstraction is related- Preceeding the Svayaṁbhūramaṇa sea, the measure of area of all the seas is obtained by multiplying the square of rāju by three and dividing it by eighty, and the result is added by one thousand six hundred eighty-seven crore fifty lac yojanas and is reduced by a rāju as multiplied by fifty-two thousand five hundred yojanas. Its representation is-

$$= \left| \frac{3}{49} \right| \frac{}{80} \text{ plus } 16875000000 \text{ yojanas minus rājus } - \frac{52500}{7} \Bigg|$$

The measure of area of the Svayaṁbhūrama ṇa sea is a rāju squared as multiplied by nine and divided by sixteen and in excess of one lac twelve thousand five hundred yojanas as mulitiplied by a rāju and as reduced by one thousand six hundred eighty-seven crore fifty lac yojanas. Its representation is-

$$= \left| \frac{9}{49} \right| \frac{}{16} \text{ plus } - \frac{112500}{7} \text{ minus } 16875000000 \Bigg|$$

The following verse aphorism is for calculating these increase- The preceding all the seas have the area obtained on mutually multiplying the ultimate width as reduced by three lac and the length as reduced by nine lac, and on dividing the product by fifteen. // 5.271//

The verse aphorism for calculating the excess measure- The measure of the excess is obtained on multiplying the sum of three types of diameters of successive Vāruṇīvara sea, etc. seas, by four lac, and on reducing the obtained product by eighteen thousand crore. // 5.272//

Comparablity is related in the *sixteenth case*: It is like this- The width of the Dhātakīkhaṇḍa island is four lac and the length is twenty-seven lac yojanas. The width of Puṣkaravara island is sixteen lac and length is one crore thirty-five lac yojanas. The width of Vāruṇīvara island is sixty-four lac and length is five crore sixty-eight lac yojanas. Thus the width of successive island relative to width of preceding island is four times. The length is four times and in excess of twenty-seven lac yojanas relative to length and this has been continued upto Śvayaṁbhūramaṇa island.

The area of Puṣkaravara island is twenty times the area of Dhātakīkhaṇḍa island. The area of Vāruṇīvara island is sixteen times and in excess of seventeen lac twenty-eight thousand crore yojanas relative to area of Puṣkaravara island.

$$17280000000000 \Bigg|$$

In this way, upto the Svayaṁbhūramaṇa island, the area of the successsive island

relative to the area of the preceding island is sixteen times in excess of projected seventeen lac twenty-eight thousand crore yojanas as multiplied by four. Here, the last abstraction of the width, length and area is related.

The width of the Ahīndravara island is one thirty two part and in excess of nine thousand three hundred seventy-five yojanas, and its length is obtained on dividing nine rājus by thirty-two, and on reducing the quotient by eight lac fifteen thousand six hundred twenty-five yojanas. Its representation is-

$$-\frac{1}{7}\frac{1}{32}\text{ plus yojanas }9375\text{ length }-\frac{9}{7}\frac{9}{32}\text{ minus }815625\text{ yojanas}$$

The area of the Ahīndravara island is obtained (first) by multipliying the square of rāju by nine and on dividing by one thousand twenty-four, and on reducing the result by the product of sixteenth part of a rāju by three lac sixty-five thousand six hundred twenty-five yojanas, and also on reducing the result by seven hundred sixty-four crore sixty-four lac eighty-four thousand three hundred seventy-five yojanas. Its representation is:-

$$=\frac{9}{49}\frac{9}{1024}\text{ minus rāju }-\frac{365625}{7}\frac{365625}{16}\text{ minus yojanas }7646484375$$

The width of the Svayaṁbhūramaṇa island is one eighth of a rāju and in excess of thirty-seven thousand five hundred yojanas. Its length is one eighth of a rāju as multiplied by nine, and as reduced by five lac sixty-two thousand five hundred yojanas, Its representation is-

$$-\frac{1}{7}\frac{1}{8}\text{ plus yojanas }37500\text{ length }-\frac{9}{7}\frac{9}{8}\text{ minus yojanas }562500$$

Again, the area of this island is obtained by multiplying square of rāju by nine and on dividing by sixty-four, and by reducing the result by the product of a rāju by twenty-eight thousand one hundred twenty-five yojanas, as also on reducing the result further by two thousand one hundred and nine crore thirty-seven lac fifty thousand yojanas. Its representation is as follows-

$$=\frac{9}{49}\frac{9}{64}\text{ minus rājus }-\frac{28}{7}\frac{28}{7}\text{ 25 minus yojanas }21093750000$$

The verse-aphorism for finding out the measure of excess-

The medium diameter of its own is multiplied by nine lac and as added by twenty-seven thousand crore gives the excess measure// 5.273//

Comparability is related in the *seventeenth case*: It is like this-

The area of Puṣkara island is twenty times the area of Dhātakīkhaṇḍa. The area of Vāruṇīvara island is sixteen times that of Puṣkaravara island along with that of Dhātakīkhaṇḍa.

The area of Kṣīravara island is fifteen times and in excess of ninety-one lac eight thousand crore yojanas relative to combined areas of the Dhātakīkhaṇḍa, Puṣkaravara island and Vāruṇīvara island. 91800000000000 | In this way, the area of the succeeding island external to the desired island, relative to area of all the preceding internal Kṣīravara etc. islands, is fifteen times and in excess of projected ninety-one lac eighty thousand crore as multiplied by four, and in excess of one lac eight thousand crore yojanas. 1080000000000 | This process should be known upto the Svayaṁbhūramaṇa island. Out of these, the last abstraction is related. The area of all the islands preceding Svayaṁbhūramaṇa island is obtained (first) on multiplying square of rāju by three and on dividing this by three hundred twenty, and on adding in the result one thousand three hundred fifty-nine crore thirty-seven lac fifty thousand yojanas, and on reducing the result further by the product of a rāju and thirty-one thousand eight hundred seventy-five yojanas.

Its representation is:-

$$= \left| \frac{3}{49} \right| \frac{320}{} \text{ plus yojanas } 13593750000 \text{ minus rāju } - \left| \frac{31875}{7} \right|$$

The area of the Svayaṁbhūramaṇa island is obtained on multiplying square of rāju by nine and on dividing it by sixty-four, and keeping it apart subtracting from it two sets, first being obtained on multiplying the rāju by twenty-eight thousand one hundred twenty-five, as well as the second being two thousand one hundred nine crore thirty-seven lac fifty thousand yojanas, Its representation is-

$$= \left| \frac{9}{49} \right| \frac{64}{} \text{ minus rāju } - \left| \frac{28125 \text{ minus yojanas } 21093750000}{7} \right|$$

In order to find out the area of all internal islands as combined, this is the verse aphorism-

From the width and length of the last island, one lac and twenty-seven lac are

subtracted respectively, and the remainders mutually multiplied. On dividing the product by fifteen, the quotient gives the total combined area, of the islands preceding the desired island. //5.274//

The following verse aphorism is meant for calculating the measure of excess-

The measure of lengths of the successive islands is taken with Kṣīravara ısland as the initial i.e., on multiplying the lengths by four lac, the measure of successive excess is obtained.// 5.275//

Comparability is related in the *eighteenth case-*

The Lavaṇa sea has initial diameter as one lac. The medium diameter as three lac and the external diameter as five lac yojanas. When in the middle of these three diameters, four lac, six lac and eight lac are added respectively, then the initial, medium and external , diameter of Dhātakīkhaṇḍa is obtained. Again, in the three diameters of Dhātakīkhaṇḍa the earlier projection is added after being doubled, respectively, resulting in the three diameters of the Kālodaka sea. In this way, on adding in the tri-station diameters of the preceding island or sea, the amounts of four, six and eight lac respectively, combining is effected by making them twice as much upto the Svayaṁbhūramaṇa sea. Out of these, the last abstraction is related- It is like this-

The intial diameter of the Svayaṁbhūramaṇa sea is obtained on adding one fourth part of a rāju and seventy-five yojanas in the initial diameter of the Svayaṁbhūramaṇa island.

Its representation is this-

$$-\frac{1}{28}\ \text{plus yojanas } 75000$$

Agaín, the medium diameter of the Svayaṁbhūramaṇa sea is obtained on adding three eight part of a rāju and one lac twelve thousand five hundred yojanas in the medium diameter of this island.

$$-\frac{3}{7}\ \text{plus yojanas } 112500$$

Again, on adding half a rāju and one and a half lac yojanas in the external diameter of the Svayaṁbhūramaṇa island, the last diameter of the successive sea, is obtained. Its representation is-

–		plus yojanas 150000
14		

For calculating the increase, the verse aphorism is as the following-

Half of the width of the desired islands-seas, as Dhātakīkhaṇḍa etc., is multiplied by two, three and four, respectively, giving the measures of the increase in three places, respectively. // 5.276//

Comparabitity is related in *nineteenth case*:

The length of Lavaṇa sea is nine lac. On adding eighteen lac in this, the length of Dhātakīkhaṇḍa is obtained. On adding the prjected eighteen lac as made twice in the length of the Dhātakīkhaṇḍa island, the length of Kālodaka sea is obtained. In this way, the projected eighteen lac has been doubling upto the Svayaṁbhūramaṇa sea. Here the last abstraction is related-

In the length of the Svayaṁbhūramaṇa sea, as compared with the length of Svayaṁbhūramaṇa island, there is increase given by nine by eighth part of a rāju and three lac thirty-seven thousand five hundred yojanas. Its representation-

–	9	plus yojanas 337500
7	8	

The verse aphorism for calculating measure of length increase of desired islands-seas , with Lavaṇa sea as the initial, is as follows.

The Dhātakīkhaṇḍa is taken as the initial, the width of desired islands-seas are halved and then multiplied by nine. The result gives the measure of increase in the length of successive island or sea as compared with preceding island or sea. //5.277/

In this way, the descriplion of various areas of islands-seas has come to an end.

From here ahead, the measure of thirty-four types of subhuman (tiryañca) beings is described-

At this time (instant) the generation law of the fire-bodied set is related according to the preaching received in the tradition of the non-contradictory aphorism of preceptors. It is as follows- A cubic universe (ghana loka) is established in form of counting rods and the other cubic universe is spread and to every one, the cubic universe set is given and mutually multiplied (squared over squared or vargita-saṁvargita), and (to denote the process

completed once) a figure one is reduced from the counting-rods set. Then, one mutual product counting rod is obtained. The logarithm of logarithm to the base two (vargaśalākās) of that set so produced is innumerate part of the palyopama (simile pit). The logarithm to the base two (ardhacceda śalākās) of this set is of innumerate universe measure and that set is also of innumerate universe measure. Again, after having spread this generated great set, this very great set is given to one-one figure and squared over squared (vargita saṁvargita) or mutually multiplied and another figure one is reduced from the counting-rod set. At this instant the mutual product counting-rods are two and the logarithm of logarithm to base two as well as logarithm to the base two are each innumerate universe measure sets. In this way, this process is continued till the universe measure counting-rod set is not exhausted. That instant, the measure of the mutual product counting-rods is a universe and the measure of the generated great set that instant, its logarithm of the logarithm to the base two as well as logarithm to the base two (of all these three sets), is innumerate universe. Again, this generated great set is spread and the same is established in the form of counting-rods, that generated great set is given to every figure of the spread set and then one figure is reduced from the counting-rod set, after squared over squared process. Then the mutual product counting-rods set, is a universe plus one, and the remaining three are innumerate universe in measure. Again, the generated set is spread and the generated set is given to one-one figure and squared over squared and then one figure is reduced again from the counting-rod set. Then the mutual product counting-rods are two in excess of universe measure and the remaining three sets, are still innumerate universe. In this way, through this process, at the entry of the mutual product counting-rods, measuring two less from maximal innumerate, into two more in universe of mutual product counting-rods, all the four sets become innumerate universe in measure. In this way, this process is continued till the established counting rods set is not exhausted second time. Still then, the four sets are of innumerate universe measure. Again, the generated great set is established in form of counting-rods set, and the very generated great set is spread and to its every one figure is given the very generated greatest, then squared over squared (mutually multiplied). The counting-rod set is reduced by unity. At this instant the four sets are of innumerate universe measure. In this way, at the exhaustion of the third time established counting-rod set, this process should be countined. Then, all the four sets are of innumerate universe in measure. Again, three countersets are taken for this generated great set. Out of them, one counterset is established in form of counting-rod set, and the other set is spread and to its every one is given the third counter set, then squared over squared, and from the counting-rod set is reduced by unity. Thus, the process is continued again and again till the fourth time established mutual-product counting-rod set as reduced by transgressed mutual-product counting-rods, is not exhausted.

Then the fire-bodied set is generated which is of innumerate cubic-universe measure. The symbol of cubic-universe is ≡ and the symbol of innumerate is a. (Thus the fire-body beings set is ≡ a

The mutual product counting-rods of the fire-body beings set is equal to the fourth time established counting-rod set. The symbol of the innumerate of this set is ।।९।।.

Again, on dividing the fire-bodied set by innumerate universe, whatever quotient is obtained, it is added to the same set, giving the earth-bodied set measure. ≡ a | 10 | / 9

This is divided by innumerate universe and the quotient is added to this set giving the measure of the set of water-bodied beings set.

$$\equiv a\,|\,10\,|\;\;10\,|\;.$$
$$\qquad\quad 9\;|\;\;9\;|$$

This is divided by innumerate universe and the quotient is added to this set giving the measure of the set of air-bodied beings set.

Again, these four general sets are each divided by its own proper innumerate universe and the measure of their own gross set in form of one part is produced, the remaining major part gives the measure of their own fine beings.

Again, when the world-square or universe-square (jagapratara) is multiplied by innumerate part of palyopama, and the product is divided by the product of finger-squared (pratarāṅgula) and innumerate part of a trail (āvalī), the quotient gives the gross earth-bodied developed beings set measure.

$$= \frac{|}{৪\ |\ ৯\ |\ pa}$$
$$\qquad a$$

When this is mutiplied by innumerate part of trail (āvalī), then the measure of gross water-bodied developed beings set is obtained. $= \frac{৪}{pa}$
$$\qquad\qquad\qquad

8 |
a |

Again, the measure of the gross air-bodied developed living-beings set is numerate part of the universe.

≡ | When one's own gross developed set is subtracted from one's own gross etc.,
९ | then the remainder gives its own gross undeveloped set.

earth ≡ a 10 minus = | ९ |
९ ९ ४ |
pa |
a |

Note: ९ is the numerical symbol which stands for innumerate of a special type. It is the number 9 which we shall write as ९ for the identity.

water ≡ a 10 10 minus = |
९ ९ ९ 4 |
pa |
a |

fire ≡ a minus 8 |
९ a |

air ≡ a 10 10 10 minus ≡ |
९ ९ ९ ९ ९ |

Again, on dividing every fine set of earth-bodied beings etc. by its own proper numerate figures, the measure of major part form (figure) of fine developed beings set is obtained:

earth ≡ a 10 8 4 |
९ ९ ९ 5 |

water ≡ a 10 10 8 4 |
ϙ ϙ ϙ 5 |

fire ≡ a 8 4 |
ϙ 5 |

air ≡ a 10 10 10 8 4 |
ϙ ϙ ϙ 9 5 |

And out of them, one part form is the measure of its own five undeveloped bios set:

earth ≡ a 10 8 |
ϙ ϙ 5 |

water ≡ a 10 10 8 |
ϙ ϙ ϙ 5 |

fire ≡ a 8 |
ϙ 5 |

air ≡ a 10 10 10 8 |
ϙ ϙ ϙ ϙ 5 |

Again, on subtracting the total mobile-bodied, earth-bodied, water-bodied, fire-bodied, and air-bodied beings set from the all-living-being-set, the measure of remaining general vegetable-bodied bios-set is obtained. Out of this, on subtracting

[all bios-set minus = minus ≡ a | $\overleftarrow{4}$]

4

2

a

Note: Here above 4 there is $\overleftarrow{\ }$ — meaning minusone. $\overleftarrow{0}$ —

innumerate universe measure, the measure of remaining common (sādhāraṇa) vegetable-bodied-bios is obtained. 13 ≡

On dividing the above by its own proper innumerate universe, one part is the measure of common gross bios-set: $13 \equiv \begin{vmatrix} \\ ९ \end{vmatrix}$

and the remaining major part is the measure of common fine bios-set: $13 \equiv 8 \begin{vmatrix} \\ ९ \end{vmatrix}$

Again on dividing common [bios] gross set by its own proper innumerate universe, one part out of it becomes the measure of common gross developed bios-set, and the remaining major part becomes the common gross undeveloped bios-set :

$13 \equiv 1 \begin{vmatrix} \\ ९ \; ७ \end{vmatrix}$ and $13 \equiv 6 \begin{vmatrix} \\ ९ \; ७ \end{vmatrix}$

Note- Here, the symbol ७ stands for a particular type of innumerate universe, denoted by number 7 as it seems from the symbolism. We shall use this symbol to keep its identity as ७ only.

Again, on dividing the common fine bios-set by its own proper numerate figure, the major part out of it becomes the measure of common fine developed bios-set, and the remaining one part becomes the common fine undeveloped bios-set :

$13 \equiv 8 \; 4 \begin{vmatrix} \\ ९ \quad 5 \end{vmatrix}$ and $13 \equiv 8 \begin{vmatrix} \\ ९ \quad 5 \end{vmatrix}$

Again, the earlier reduced innumerate universe measure set is the measure of everybody vegetable bios-set.

$\equiv a \equiv \overline{a}$

Owing to the gross vegetable-bodied (nigoda) being common-bodied (pratiṣṭhita) and single-bodied (apratiṣṭhita), those individual (pratyeka) bodied vegetable bios are of two types. Out of these the measure of single-bodied vegetable bios-set is innumerate-universe.

$\equiv a$ |

On multiplying this single-bodied vegatable bios set by innumerate-universes, the measure of gross-vegetable (bādara nigoda) common-bodied bios-set is obtained. $\equiv a \equiv a$ |

Both of these sets are of two types- developed and undeveloped. Again, on dividing the earlier mentioned gross earth bodied developed bios set by innumerate part of a trail

(āvalī), the measure of gross-vegetable common bodied developed bios-set is obtained.

= ४ ९९ pa a

[Here ४ denotes the symbol for trail, it is numerical and means 4, as a symbol, for pratarāvalī].

Whatever is obtained on dividing the above bios-set by innumerate part of the trail (āvalī), the quotient becomes the measure of gross-vegetable-single-bodied developed (bādara nigoda apratiṣṭhita paryāpta) bios-set.

= ४ ९ ९ ९ pa a

On subtracting its own developed set from its own common set, the remainder becomes the measure of the own undeveloped set.

gross-vegetable-common-bodied

≡ a ≡ a minus = ४ ९ ९ pa a

gross-vegetable-single-bodied

≡ a minus = ४ ९ ९ ९ pa a

Again, the universe-square (jagapratara) is divided by squared-finger (pratarāṅgula) as divided by innumerate part of the trail (āvalī). The quotient is divided by innumerate part of trail, one part is established at a place and remainder major part is established in identical four equal collections separately.

Again, innumerate part of the trail is spread, on dividing it into parts equal to one's own part, and on combining its major part into first collection, the measure of two-sensed bios-set is obtained. Again, on spreading innumerate part of trail, on dividing it in equal parts, each equal to remaining bios-set, and on combining the major part into the second collection, the measure of three-sensed bios-set is obtained. "The spread of this instant is similar or in excess, or less than the earlier spread." If this be the doubt, then the reply is that there is no lecture on it.

Again, the innumerate part of the applicable trail (āvalī) is spread, and on dividing it into parts each equal to the remainder, if the major part out of them is combined into the third collection, the measure of four-sensed bios-set is obtained. The remaining one part, if combined into fourth collection,the measure of five-sensed mythic (illusive)-visioned bios-set is obtained. Its ascertained quantities are as follows:-

Two sensed = 8424 ४ | ४ | 6561 | २ a	Three sensed = 6120 ४ | ४ | 6561 २ a
Four sensed = 5864 | ४ | ४ | 6561 | २ a	Five sensed = 5836 | ४ | ४ | 6561 | २ a

Here २ denotes āvalī, ४ denotes squared-finger (pratarāṅgula).

Again, universe-squared (jagapratara) is divided by numerate part of finger-squared (pratarāṅgula) the quotient is divided by innumerate part of trail (āvalī), one part is established separate, the remaining major part is established in four identical collections. Again, innumerate part of trail (āvalī) is spread, and on dividing it equal to its own established separate one part, the major part thereof when combined with first collection, gives the measure of three-sensed developed bios-set. Again, innumerate part of trail is spread, after the remaining one part set is divided into equal parts, each equal to the set, the major part thereof is two-sensed bios-set which is developed. Again, innumerate part of trail is spread, and dividing remaining part into equal parts, and the major-part there of is

combined with the third collection, giving the five-sensed developed bios-set. Again, when the remaining one part is combined in the remaining one part, the four-sensed developed bios-set is obtained. Their ascertained quantities are:

Three sensed = 8424 | ४ | ४ | 6561 | 5	Two sensed = 6120 | ४ | ४ | 6561 | 5
Five sensed = 5864 ४ | ४ | 6561 | 5	Four sensed = 5836 | ४ | ४ | 6561 |

Again, on subtracting its own developed set from the earlier mentioned two-sensed etc. common set, the remainder beccomes its own undevelped set. It is as follows:

Two sensed 5 | 6120 = | 8424 | a ४ | ४ | 6561 |	Three sensed 5 I 8424 I = 6120 I a I ४ | ४ | 6561
Four sensed 5 I 5836 = 5864 |a | 4 | 4 | 6561 |	Five sensed 5 I 5864 = 5836 | a| ' | 4 | 6561 |

Again, on subtracting the divine beings bios-set, the hellish beings bios-set, the human beings bios-set, and the subhuman beings rational bios-set which is numerate part of the divine beings bios-set, from five-sensed developed bios-set, the remainder gives the measure of subhuman irrational developed bios-set. Again, on dividing the earlier taken away subhuman, rational bios-set by its proper numerate figures, the major part thereof becomes the subhuman rational five-sensed developed bios-set, and the remaining one part becomes the rational five-sensed undeveloped bios-set. The above are given as follows:

developed = 5864 minus rā = | – २ mū | ⌐ ₀ ¬ = 1 | 3 mū | ४ 65536 | 5

४ | ४ | 6561 ४ | 65536

5

and = ४ =

४ 65536 | 5 | 5 | ४ 65536 | 5 | 5 |

Thus ends the description about numbers.

The maximal age of pure earth is twelve thousand years, that of the hard earth is twenty-two thousand years, that of water-(bodied) is seven thousand years, that of the fire-bodied is three days, that of air-bodied is three thousand years and that of vegetable-bodied is ten thousand years. //5.281//

12000 | 22000 | 7000 | di 3 | va 3000 | va 10000 |

[Here, abbreviated di is symbol for day, and va is for year]

Among the partial-sensed (vikalendriya), the maximal age of the two-sensed is twelve years, that of three-sensed is forty-nine days, and that of the four-sensed is six months. The maximum age of the original glider (sarisṛpa) is nine pūrvāṅga. //5.282//

va 12 | di 49 | mā 6 | pūrvāṅga 9 | Here, mā is the symbol for month.

The maximal age of the birds is seventy-two thousand years, and that of the snakes is forty-two thousand years. The maximal age of the remaining subhuman (tiryañca) is one pūrvakoṭi. //5.283//

year (varṣa) 72000 | 42000 | puvvakoḍi |

The minimal age of the one-sensed beings is eighteenth part of a respiration and that of the partial-sensed and the whole-sensed beings is, respectively, numerate times successively. //5.286//

Now from here ahead, comparability is related among thirty-four types of the subhuman beings. It is as follows:

The gross fire-bodied developed beings are the smallest in number. ८ | a |

The five-sensed subhuman rational beings set is innumerate times the preceding.

=

४ | 65536 | 5 | 5 |

The rational developed beings-set is numerate times the preceding.

= ४

४ | 65536 | 5 | 5 |

The four-sensed developed beings-set is numerate times the preceding.

= 5836

४ | ४ | 6561 |

5

The five-sensed subhuman irrational developed beings-set is specifically greater than the preceding.

= 5864 minus rā =

| ४ | ४ | 6561 | ४ | 65536 | | − 2 mū | | 1 | 3 mū | = | ४ | 65536 | 5 |

5

[Note: Here ४ stands for different symbolic representations which shall be given in the mathematical notes as pratarāṅgula, pratarāvalī and numerate.]

The two-sensed developed beings-set is specifically greater than the preceding.

= 6120 |

४ | ४ | 6561 |

5

The three-sensed developed beings-set is specifically greater than the preceding.

= 8424 |

४ | ४ | 6561 |

5

The irrational undeveloped beings-set is innumerate times the preceding.

5 | 5864 | minus =

= . 5836 | a | ४ | 65536 | 5 | 5 |

४ | ४ | 6561

The four-sensed undeveloped beings-set is specifically greater than the preceding.

5 | 5836 |

= 5864 | a

४ | ४ | 6561 |

The three-sensed undeveloped beings-set is specifically greater than the preceding.

5 | 8424

= 6120 | a

४ | ४ | 6561 |

The two-sensed undeveloped beings-set is specifically greater than the preceding.

5 | 6120 |

= 8424 | a |

४ | ४ | 6561 |

The single-bodied individual beings-set is innumerate times the preceding.

=

४ | ९ | ९ | ९ |

pa

a

The common bodied individual beings-set is innumerate times the preceding.

=

४ | ९ | ९ |

pa

a

The earth-bodied gross developed beings-set is innumerate times the preceding.

=

४ । ९ ।

pa

a

The gross water-bodied developed beings-set is innumerate times the preceding.

=

४

pa

a

The gross air-bodied developed beings-set is innumerate times the preceding. ≡ ९

The single-bodied undeveloped beings-set is innumerate times the preceding.

≡ a minus =

४ । ९ । ९ । ९ ।

pa

a

The common-bodied undeveloped beings-set is innumerate times the preceding.

≡ a ≡ a minus =

४ । ९ । ९ ।

pa

a

The fire-bodied gross undeveloped beings-set is innumerate times the preceding.

≡ a minus ८

९. a

The earth-bodied gross undeveloped is specifically greater than the preceding.

≡ a 10 minus =

९ ९ ४ । ९ ।

pa

a

The water-bodied gross undeveloped is specifically greater than the preceding.

≡ a 10 10 minus =

९ ९ ९ ४ । ९ ।

pa

a

The air-bodied gross undeveloped is specifically greater than the preceding.

≡ a 10 10 10 minus ≡ |

९ ९ ९ ९ ९ |

The fire-bodied fine undeveloped beings-set is innumerate times the preceding.

≡ a ८ |

९ ·5 |

The earth-bodied fine undeveloped is specifically greater than the preceding.

≡ a 10 ८ |

९ ९ 5 |

The water-bodied fine developed is specifically greater than the preceding.

≡ a 10 10 ८ |

९ ९ ९ 5 |

The air-bodied fine developed is specifically greater than the preceding.

≡ a 10 10 10 ८ |

९ ९ ९ ९ 5 |

The fire-bodied fine developed beings-set is numerate times the preceding.

$$\equiv \begin{array}{cc} a & \text{८} \\ ९ & 5 \end{array} \Big| \quad \Big|$$

The earth-bodied fine developed beings-set is specifically greater than the preceding.

$$\equiv \begin{array}{ccc} a & 10 & \text{८} \\ ९ & ९ & 5 \end{array} \Big| \quad \Big|$$

The water-bodied fine developed beings-set is specifically greater than the preceding.

$$\equiv \begin{array}{cccc} a & 10 & 10 & \text{८} \\ ९ & ९ & ९ & 5 \end{array} \Big| \quad \Big|$$

The air-bodied fine developed beings-set is specifically greater than the preceding.

$$\equiv \begin{array}{ccccc} a & 10 & 10 & 10 & \text{८} \\ & ९ & ९ & ९ & 5 \end{array} \Big| \quad \Big|$$

The common gross developed beings-set is innumerate times the preceding set.

$$१३ \equiv \begin{array}{c} 1 \\ ९ \quad ७ \end{array} \Big| \quad \Big|$$

[Here १३ denotes the set of all mundane bios, hence its symbol is written as it is here. Simlarly, ७ is a symbol in numerical notation. १३ is 13 and ७ is 7.]

$$१३ \equiv \begin{array}{c} 1 \\ ९ \quad ७ \end{array} \Big| \quad \Big|$$

The common gross undeveloped beings-set is innumerate times the preceding.

$$१३ \equiv \begin{array}{c} 6 \\ ९ \quad ७ \end{array} \Big| \quad \Big|$$

The common fine undeveloped beings-set is infinite times the preceding.

$$१३ \equiv \begin{array}{c} \text{८} \\ ९ \quad 5 \end{array} \Big| \quad \Big|$$

The common fine developed beings-set numerate times the preceding.

$$\frac{\text{१३} \equiv \quad \text{८} \quad \text{४}}{\text{९} \qquad 5}$$

Thus the comparability description ends.

At the third instant of the generation of the fine vegetable attainment-undeveloped being, the minimal immersion size is found to be innumerate part of finger (aṅgula). //5.315//

Afterwards, there is point-increase (pradeśa-vṛddhi) in the one thousand yojanas long, half of this broad, and half of this breadth thick body upto the maximal immersion. //5.316//

The measure of the immersion of the lotus, partial-sensed [two-sensed to four-sensed] bios and spontaneously generated great fish is, respectively, slightly greater than one thousand yojanas, twelve yojanas, a yojana as reduced by a kośa, one yojana and one thusand yojanas. //5.317//

$$1000 \mid 12 \mid \frac{3}{4} \mid 1 \mid 1000$$

Among the two-sensed, four-sensed and five-sensed developed bios, there is minimal immersion of the anuddharī, the kunthu, the kāna makṣikā, and the sikthaka fish. Out of these, the immersion of the anuddharī is numerate part of the cubic-finger (ghanāṅgula), those of the three is, successively, numerate times in order. //5.318//

Now here, the abstraction of immersion is related. That is as follows- At the third instant of being born, settled in that birth, the all minimal immersion of fine-vegetable-attainment-undeveloped bios is obtained on dividing one utsedha aṅgula by innumerate part of proper palyopama. Above this, on increase of one point, there is abstraction of intermediate immersion of the fine-vegetable-attainment-undeveloped. After this, in the sequence of two-point post, three-point post and four-point post, above all the minimal immersion of fine-vegetable-attainment-undeveloped, this minimal immersion increases by an amount obtained on multiplication by innumerate part of a trail (āvalī) as reduced by unity. At that instant there appears all minimal immersion of fine air-bodied attainment-undeveloped. This is also the abstraction of intermediate immersion of fine vegetable-attainment-undeveloped. Afterwards, above this immersion the increase should be effected in the sequence of point-post (pradeśottara).Thus, on such increase, that successive immersion gets on increasing as multiple of an innumerate part of a trail as reduced by unity. Then, all

the minimal immersion station of fine fire-bodied-attainment-undeveloped bios is reached. This also is the abstraction of intermediate immersion of earlier mentioned two bios. Again, above this, on increase in sequence of point-post, this immersion gets increase as multiple of an innumerate part of a trail (āvalī) less unity. Then, all the minimal immersion of the fine water-bodied-attainment-undeveloped is reached. This also is the abstraction of intermediate immersion of earlier mentioned three bios. Afterwards, the intermediate immersion of four bios in sequence of point-post continues, till this immersion gets increase as multiple of an innumerate part of a trail as reduced by unity. Then, there is obtained all minimal immersion of fine earth-bodied attainment-undeveloped bios. From this intermediate immersion of five bios in the sequence of point-post continues. This immersion gets increase as multiple of innumerate part of palyopama as reduced by unity. [Then there appears the all minimal immersion of gross air-bodied attainment undeveloped beings. Above this, in the sequence of point-post, the abstraction of intermediate immersion of six bios continues, till this immersion gets increase as multiple of innumerate part of palyopama as reduced by unity. Then, there appears all minimal immersion of gross fire-bodied undeveloped bios. Afterwards, in the post-point sequence, the abstraction of intermediate immersion of seven bios continues till the measure of that immersion increases by multiple of innumerate part of palyopama as reduced by unity, above this immersion. Then, the minimal immersion of gross water-bodied-attainment-undeveloped bios appears. Afterwards, the abstraction of intermediate immersion of eight bios in the sequence of post-point continues, till the next immersion may get increased by the multiple of innumerate part of palyopama as reduced by unity. Then the minimal immersion of gross earth-bodied-attainment-undeveloped being appears. Afterwards, intermediate immersion abstraction of above mentioned nine bios continues to increase in post-point sequence, till the next immersion increase above this is by multiple of innumerate part of palyopama as reduced by unity. Then, there happens all minimal immersion of gross-vegetable-attainment-undeveloped bios. Afterwards, the abstraction of intermediate immersion of the mentioned ten bios in post-point sequence continues to increase till above this immersion, the immersion increases as multiple of innumerate part of palyopama as reduced by unity. Then, there appears the minimal immersion of vegetable common-bodied attainment undeveloped bios. Afterwards, the abstraction of intermediate immersion of the mentioned eleven bios increases in post-point sequence till the next immersion is increased as multiple of innumerate part of palyopama as reduced by unity above this immersion. Then, there appears the minimal immersion of gross-vegetable-bodied-individual-body-attainment-undeveloped bios.

Afterwards, in the sequence of post-point, the abstraction of intermediate immersion

of the mentioned twelve bios goes on increasing till the increase above the multiple of innumerate part of a palyopama as reduced by unity for the next immersion is obtained. Then, there appears the all-minimal immersion of two-sensed attainment-undeveloped bios. Afterwards, ahead of this, the abstraction of intermediate immersion measure of the mentioned thirteen bios in the sequence of post-point (pradeśottara) goes on increasing till the increase above the multiple of innumerate part of a palyopama less unity is obtained. Then, there appears the all-minimal immersion of three sensed attainment-undeveloped bios. After this, the abstraction of intermediate immersion of the mentined fourteen bios goes on increasing in the sequence of post-point, till the increase above the multiple of innumerate part of a palyopama as reduced by unity for the next immersion is obtained. Then there appears the all minimal immersion measure of four-sensed attainment-undeveloped bios. After this, abstraction of intermediate immersion of the mentioned fifteen bios goes on increasing till the increase, in the sequence of post-point (pradeśottara), above the multiple of innumerate part of a palyopama as reduced by unity for the next immersion is obtained. Afterwards, in the sequence of post-point, the abstraction of intermediate immersion of the mentioned sixteen bios goes on increasing, till the increase of its proper innumerate points is obtained. Afterwards, there appears all-minimal immersion measure of fine vegetable undeveloped-finish. Afterwards, in the post-point sequence, the abstraction of intermediate immersion measure of the mentioned seventeen bios goes on increasing, till there is a proper increase of innumerate points. Then, there appears maximal immersion measure of the fine vegetable undeveloped-attainment bios. Above this, there is no abstraction of the fine-vegetable-undeveloped attainment for its immersion measure, because it has attained the maximal immersion measure----------.

Then, there appears the maximal immersion measure of the gross vegetable bodied individual body of undeveloped-finish bios. Afterwards, the abstraction of intermediate immersion of six bios in the post-point sequence continues till the next immersion measure becomes numerate times. Then, there appears the five-sensed bios with abstraction of maximal immersion measure when it has undeveloped-finish. Then, the abstraction of intermediate immersion measure of five-sensed bios in post-point sequcnce, continues to increase till the successive immersion measure becomes numerate times. [Then there appears the maximal immersion measure of the three-sensed with undeveloped finish.] It is questioned as to which bios does this immersion measure belong ? The explanation is that such a maximal inmersion belongs to certain centipede (gomhī) stationed at the external region of Svayaṁprabhācala and present in maximal inmersion measure. This is the reply. How much measure has it ? The answer is that its length is three parts out of four parts of a

utsedha yojana, its width is eighth part of this, and its depth is half of the width on mutual multiplication of these three, and conversion into pramāṇa ghanāṅgula, there are obtained one crore nineteen lac forty-three thousand nine hundred thirty-six multiple of ghanāṭgulas.

Then, in the sequence of post-point, the abstraction of intermediate inmersion of four bios continues till the successive inmersion measure becomes numerate times. Then, there appears maximal immersion of undeveloped-finish four-sensed-bios. To which bios does it belong ? The reply is that this maximal immersion measure appears in a certain humming bee (bhramara) born in the external region of Svayaṁprabhācala. What is its measure ? The reply is that its length is one utsedha yojana, half yojana in height, and after placing its breadth as half yojana of circumference, half breadth as multiplied by its height and then again multiplied by its length, resulting in three parts out of eight parts of an utsedha yojana. On conversion into pramāṇa ghanāṅgula, there are ghanāṅgulas as multiplied by the figures of one hundred thirty-five crore minety lac fifty-four thousand four hundred ninety-six.

Afterwards, in the sequence of post-point, the abstraction of intermediate immersion measure of the three bios continues till the successive immersion gets multiplied numerate times. Then there happens to be maximal immersion of two-sensed bios with undeveloped-finish. Where does this happen ? The answer is that there is born some two-sensed bios in the external region of Svayaṁprabhācala, which has maximal immersion measure. How much is it ? The answer is that the amount is the area of the conch with twelve yojanas of length and four yojanas of mouth.

The width is multiplied by width, then the product is reduced by half the mouth, and in the remainder is added the square of half of the mouth. The result is made twice as much and divided by four. The quotient gives the resultant conch area. //5.319//

On application of this formula, the area turns out to be seventy-three utsedha yojanas.

| 73 |

The mouth is subtracted from the length, length is then added to the remainder and then divided by the mouth. The quotient is the thickness of the conch shaped region. //5.320//

On application of this rule, the thickness is calculated to be five yojanas |5 | . The earlier result of the area of seventy-three yojanas is multiplied by the thickness (bāhalya) of the area, resulting in three hundred sixty-five cubic yojanas. | 365 | On converting this into cubic pramaṇāṅgulas, the volume is one lac thirty-two thousand two hundred seventy-one crore fifty-seven lac nine thousand four hundred forty as multiplied by ghanāṅgula alone. It is like this. | 6 | | 1322715709440 |

Afterwards, in the sequence of post-point, the abstraction of intermediate immersion measure of two bios continues till the successive immersion becomes numerate times. Then, there appears the maximal immersion mearsure of gross vegetable-bodied-every (individual)-body bios with undeveloped finish. What is that bios, in what region and with what immersion has present maximal immersion ? The answer is that the maximal immersion appears in an evolved lotus (padma) in the external region of Svayaṁprabhācala. How much is it ? The answer is that its height is in utsedha yojana in exess of a kośa and a thousand yojanas and it is a yojana thick circular lotus. Its immersion volume in yojanas is seven hundred fifty yojanas and a kośa. On converting this in pramāṇa cubic- finger, it is two lac seventy-one thousand eight hundred fifty-eight crore eighty-four lac sixty-nine thousand two hundred forty-eight as multiplied by pramāṇāṅgulas. It is like this:

| 1 | 6 | 27 | 85 8 8 4 6 9 2 4 8 |

Afterwards, in the sequence of post-point, the abstraction of intermediate immersion of five-sensed bios with undeveloped finish, continues till the successive immersion becomes numerate times. [Then there appears the maximal immersion mearsure of the five-sensed bios with undeveloped-finish.] This immersion is in what region and in what bios ? The answer is that the maximal-most immersion appears in the spontaneously generated (sammūrcchana) great fish (mahāmatsya) in the external region of Svayaṁprabhācala. How much is it ? The answer is that in utsedha yojana, it is one thousand yojanas in length, five hundred yojanas in width, and half of this is the height. This is the mentioned immersion. On converting this in pramāṇāṅgula, it is four thousand five hundred twenty-nine crore eighty-four lac eighty-three thousand two hundred crore as multiplied by pramāṇāṅgulas.

Thus ends the description of types of immersion measure.

VI. A. T.

There are three types of cities of Vyantara deities in the middle of the product of the square of a rāju and one lac ninety-nine thousand. //6.5//

$$= \left| \frac{199000}{49} \right.$$

The maximal age of Vyantara deities is one palya, medium age is immumerate years, that of chief courtezans is half palya, and that of remaining deities is in proper accord. //6.84//

The age of low-born deities is ten thousand years. Ahead of this, the age of divine-

dwellers etc., as remaining deities, is upto eighty thousand years, with increase of ten thousand years respectively. Afterwards, it is eighty-four thousand years, eighth part of a palya, fourth part of a palya and half of a palya. //6.85-86//

$$10000 \mid 20000 \mid 30000 \mid 40000 \mid 50000 \mid 60000 \mid 70000 \mid 80000 \mid 84000 \left| \frac{1}{8} \right| \frac{1}{4} \left| \frac{1}{2} \right|$$

Note: In place of 1, there is pa in TPT (V), 6.236.

The measure of the Vyantara deities is obtained on dividing square of universe-line (jagaśrenī) by the square of twenty-three crore four lac linear-fingers (sūcyaṅgulas). //6.99//

$$= \left| \frac{53084160000000000}{\text{अ}} \right|$$

[Note: Here, = stands for square of a universe-line and अ denotes the square of a linear finger २.]

The measure of the Jina cities in the Vyantara universe is obtained on dividing the numerate part of universe-square (jagapratara) by the square of three hundred yojanas. //6.102//

$$= \left| \frac{53084160000000000}{\text{अ}} \right|$$

[Note: Mark that the expressions in 6.102 should have been different.]

Whatever is obtained on multiplying the square of a rāju by one hundred and ten yojanas, leaving apart the inaccessible region out of it, the astral (deities) reside in the remainder region. //7.5//

$$= \frac{110}{49} \left|\right.$$

That very inaccessible region is situated in the very certral region of the circular Jambū island. Its measure is given in yojanas by the number formed (right to left) from five, one, zero, five, two, nine,two,three,zero, three and one numerals. //7.6//

13032925015 |

The collections of the astral (deities) are of five kinds: the moon, the sun, the planets, the constellations and miscellaneous stars. The astral (deities) touch the air-envelops of the dense-water at the end of the universe. //7.7//

In particular, there is difference in the east, west, south and north. Hence those astral deities do not touch that dense-water air-envelop. (?) //7.8//

In every direction, the east-west interval is one thousand seventy-two yojanas as reduced by one divided by innumerate. //7.9//

1072 | minus 1 |
a |

That interval in every one of the south-north regions is three rājus as reduced by twelve and one by innumerate yojanas. //7.10//

– 3 minus jo 12 | 1 |
7 | a |

The total set of astral deities is obtained on dividing square of universe-line-square by the square of two hundred fifty-six fingers (aṅgulas). //7.11//

= | 65536 |
४ |

Note-Here, ४ represents square of linear finger point-set. It is a numerical symbol, made from 4.

The number is formed, respectively (right to left), from eight, four, two, three, three, seven, seven, nine places with cyphers, thirty-six, seven, two, nine, eight, three and four. This is the multiple of numerate finger-square point-set (pratarāṅgula). The square of universe-line is divided by the above product, getting the measure of the moon's astral (bodies). //7.13//

=
४ | ३ | 43838927360000000007733248 |

The suns are also as many. They are the pratīndra of the moons. Every moon has eighty-eight planets. //7.14//

=
४ | ३ | 43838927360000000007733248 |

[Note: The names of eighty-eight planets are given in vv. 7.15-22]

The number is formed from (right to left) six, five, six, six, six, nine, ten places with cyphers, two, nine, five, six, eight, four and five. This is multiplied with numerate finger-squared (pratarāṅgulas). Then the square of the universe-line is divided by the above product, and the quotient so obtained is multiplied by eleven, resulting in the total number of planets. //7.23-24//

= | 11 |

४ | २ | 54865920000000000966656 |

Every moon has twenty-eight constellations (nakṣatras). Here, their names are related in order-plan. //7.25//

The total number of constellations is obtained by first writing the number with two, one, three, three, three, nine, one, zero in nine places, four, eight, one, three, seven, nine, zero and one (right to left), and multiplying it by numerate fingres-squared (pratarāṅgulas). Then, the square of the universe-line (jagaśreṇī) is divided by the above product. The quotient is multiplied by seven, resulting in the total number of constellations. //7.29-30//

= 7 |

४ | २ | 109731840000000001933312 |

Every one of the moons has sixty-six thousand nine hundred seventy-five crore stars. //7.31//

Number of star collections 66975000000000000 |

When the number produced by writing (right to left) the numerals two, seven, four, eleven zeros in place value, nine, seven, six and two, is multiplied by numerate finger-squared (pratarāṅgulas), and then the square of the universe-line (jagapratara) is divided by the above product, a quotient is obtained. This is multiplied by the number written as five, seven, three, four, eight, nine, eight, five, nine, two, eight, seven, eight, nine and four (right to left). The product gives the total number of all the stars. //7.33-35//

= 498782958984375

४ | २ | 2679 000 000 000 00 472 |

The orbits of the moons are eight hundred eighty yojanas above the Citrā earth in the sky. //7.38//

The diameter of the upper surface of those moon-celestial planes is fifty-six parts out

of sixty-one parts of a yojana, and half of this is its thickness. //7.39//

$$56\frac{28}{61}$$

Their circumferences are separately slightly greater than two yojanas. Those images are natural and aeternal, (anādinidhana). //7.40//

The city-surface of the perpetual suns are eight hundred yojanas above the upper surface of the Citrā earth. //7.65//

| 800 |

The images of the suns are full of gems, like the half sphere, kept vertical, they have separately twelve thousand warmer rays. //7.66//

| 12000 |

The diameter of the upper surfaces of every one of the sun's images is forty-eight parts out of sixty-one parts of a yojana and their thickness is half of this. //7.68//

$$48\frac{24}{61}$$

Their circumferences are separately slightly greater than two yojanas. Those sun's images are natural and aeternal. //7.69//

The cities of the planetary system is eight hundred eighty-eight yojanas above the upper surface of the Citrā earth, in the thickness range of twice of six yojanas (twelve yojanas). //7.82//

888| 12 |

The cities of the Mercury planet are eight hundred eighty-eight yojanas, as mentioned earlier, above the Citrā earth's upper surface, out of them, in the sky.

Out of them, the diameter of the upper surface (as half vertical sphere) is half kośa, thickness is half of this, and the circumference is more than one and a half kośa. //7.85//

The cities of the Venus planets are nine hundred as reduced by nine (eight hundred ninety-one) yojanas, above the upper surface of the Citrā earth, in the sky. //7.89//

891 |

There are two thousand five hundred rays of those city surfaces which are like the half sphere standing vertical and made of noble silver. //7.90//

2500 |

The diameter of the upper surface of those natural cities inlaid with various types of gems is one kośa and their thickness is half of this. //7.91//

ko 1 | ko 1 |
2 |

Their circumferences are separately greater than three kośa alone. The remaining description of these cities is like that of the cities of Mercury. //7.92//

The cities of Jupiter are nine hundred as reduced by six (eight hundred ninety- four) yojanas above the upper surface of the Citrā earth in the sky. //7.93//

894 |

The diameter of their upper surface is major part of a kośa. Their remaining description is like that of the cities of Venus. //7.95//

The cities of Mars are nine hundred as reduced by three (eight hundred ninety- seven) yojanas above the upper surface of the Citrā earth in the sky. //7.96//

897 |

All these cities are built up with rubies having blood-red colour, like half sphere with standing vertical-mouth (top), and have dim rays. //7.97//

The diameter of their upper surface is half kośa and the thickness is half of this. Their remaining description is like that of the earlier mentioned cities. //7.98//

The golden cities of the Saturn planets are nine hundred yojanas above the surface of the Citrā earth in the sky. //7.99//

900 |

Every one of their diameters of the upper surface is half a kośa alone. Their remaining description is like that of the earlier cities. //7.100//

The eternal cities of the remaining planets are in the interval between the Mercury and the Saturn planets, above the Citrā earth. //7.101//

The diameter of these cities are as properly related, with thickness, the cities being

like vertical-top semisphere and inlaid with many types of gems. //7.102//

Their remaining description is similar to the earlier mentioned cities. Can I reach the extremity while describing specifically through a tongue alone ? //7.103//

The cities of constellation are eight hundred eighty-four yojanas above the Citrā earth in the sky path. //7.104//

884 |

The width of their upper surface is one kośa and thickness is nalf of this. Their remaining description is like that of the cities of the sun. //5.106//

The cities of stars are seven hundred ninety yojanas above the Citrā earth in the sky (celestial) plane, and in the depth range of one hundred ten yojanas. //7.108//

The cities of those stars are inlaid with several types of noble gems, along with dim rays, are like vertically set semisphere with aeternal (perpetual) nature. //7.109//

(cf.TPT(V), p.226, vol.3)

These are of three types:- the maximal, the minimum, and the intermediate. Out of them, the diameter of the upper surface of the maximal cities is two thousand dhanuṣas alone. //7.110//

2000 |

That diameter of the minimal range cities is five hundred dhanuṣas. On multiplying this minmal range measure by three and two respectively, the diameters of the intermediate cities in two places are obtained. //7.111//

500 | 1000 | 1500 |

The oblique interval of the minimal type of stars is one seventh part of a kośa, that of the intermediate type of stars is fifty yojanas, and that of the maximal type of stars is one thousand yojanas. //7.112//

ko 1/7 jo 50 | 1000 |

The moving celestial bodies (bimba) are in the human-region alone. Inside the human-region in the Jambū island, there are two moons also of which the orbital-field is the same. // 7. 116//

The diameter of the orbital field of the moon is five hundred ten yojanas as in excess of (forty-eight parts out of sixty-one parts of a yojana) the sun's-image. //7.117//

$$510\ \frac{48}{61}$$

The moons move for two hundred yojanas as reduced by twenty, in the Jambū island, and move for three hundred thirty yojanas as in excess of the sun's circle, in the Lavaṇa sea. //7.118//

Whatever are the fifteen orbits of orbital-field of the moon, every one of them has the diameter of the moon's circle, which is fifty-six parts out of sixty-one parts of a yojana, where as the width is half of this. //7.119//

$$\frac{56}{61}\ \frac{28}{61}$$

From the first orbit of the moon, the interval upto the Mandara mountain is obtained on subtracting three hundred sixty yojanas (orbital-field of both sides) and the diameter (vistāra) of the Mandara mountain, and then halving the remainder. //7.120//

The measure of the innermost orbit of the moons is fourty-four thousand eight hundred and twenty yojanas distant from the Mandara mountain. // 7.121 //

$$44820$$

The width of the orbital-field, known as the constant-set (dhruva rāśi) is obtained first by multiplying five hundred ten yojanas by sixty-one, and then on adding forty-eight parts in the product. //7.122//

Whatever is the quotient obtained on dividing thirty-one thousand one hundred fifty-eight by sixty-one, is said to be the measure of the constant-set. //7.123//

$$\frac{31158}{61}$$

The remaining orbital interval measure is obtained on multiplying the diameter of the moons by fifteen and on subtracting the product from the constant set. //7.124//

$$\frac{30318}{61}$$

On dividing the above measure by fourteen, the interval measure of every one of the orbital interval, is obtained. This measure is greater than thirty-five yojanas. The measure of that excess is two hundred fourteen parts out of four hundred twenty-seven parts (of a yojana). //7.125-126//

$$35 \left| \begin{matrix} 214 \\ 427 \end{matrix} \right|$$

The interval associated with every image should be added to every orbit, while the moons moving from the first orbit to the second, etc., external orbits. //7.127//

$$36 \left| \begin{matrix} 179 \\ 427 \end{matrix} \right|$$

On reaching the second orbit, the moon's distance from the Meru mountain is forty-four thousand eight hundred fifty-six yojanas and one hundred seventy-nine parts out of four hundred twenty-seven parts of a yojana. //7.128//

$$44856 \left| \begin{matrix} 179 \\ 427 \end{matrix} \right|$$

On reaching the third orbit, the distance between the moon and the Meru mountain is forty-four thousand eight hundred ninety-two yojanas and three hundred fifty-eight parts out of four hundred twenty-seven parts of a yojana. //7.129//

$$44892 \left| \begin{matrix} 358 \\ 427 \end{matrix} \right|$$

On reaching the fourth orbit, the distance between the moon and the Meru is forty-four thousand nine hundred twenty-nine and one hundred ten parts out of four hundred twenty-seven parts of a yojana in excess. //7.130//

$$44929 \left| \begin{matrix} 110 \\ 427 \end{matrix} \right|$$

On reaching the fifth orbit, the distance between the moon and the Meru mountain becomes forty-four thousand nine hundred sixty-five and two hundred eighty-nine parts out of four hundred twenty seven parts of a yojana (in excess). //7.131//

$$44965 \left| \begin{matrix} 289 \\ 427 \end{matrix} \right.$$

On reaching the sixth orbit, the distance between the moon and the golden mountain (Meru) is forty-five thousand two and forty-one parts out of four hundred twenty- seven parts of a yojana. //7.132//

$$45002 \left| \begin{matrix} 41 \\ 427 \end{matrix} \right.$$

On reaching the seventh orbit, the distance between the moon and the Meru is forty-five thousand thirty-eight and two hundred twenty parts out of four hundred twenty-seven parts of a yojana. //7.133//

$$45038 \left| \begin{matrix} 220 \\ 247 \end{matrix} \right.$$

On reaching the eighth orbit, the distance between the moon and the Meru is forty-five thousand seventy-four yojanas and three hundred ninety-nine parts in excess. //7.234//

$$45074 \left| \begin{matrix} 399 \\ 427 \end{matrix} \right.$$

On reaching the ninth orbit, the distance between the moon and the Meru is forty-five thousand one hundred eleven and one hundred fifty-one parts (out of four hundred twenty-seven) in excess. //7.135//

$$45111 \left| \begin{matrix} 151 \\ 427 \end{matrix} \right.$$

On the tenth orbit, the interval between the moon and the Meru is forty-five thousand one hundred forty-seven yojanas and three hundred thirty parts. //7.136//

$$45147 \left| \begin{matrix} 330 \\ 427 \end{matrix} \right.$$

In the eleventh orbit, the distance between both is forty-five thousand one hundred eighty-four yojanas and eighty-two parts alone. //7.137//

45184 | 82 |
| 427 |

On the twelfth orbit, their interval is forty-five thousand two hundred twenty yojanas and two hundred sixty-one parts alone. //7.138//

45220 | 261 |
| 427 |

On the thirteenth orbit, their interval is forty-five thousand two hundred fifty-seven and thirteen parts alone. //7.139//

45257 | 13 |
| 427 |

On the fourteenth orbit, that interval is forty-five thousand two hundred ninety-three yojanas and eight less than two hundred parts of a yojana is excess. //7.140//

45293 | 192 |
| 427 |

On the fifteenth path, that intervel is forty-five thousand three hundred twenty-nine yojanas and three hundred seventy-one parts in excess. //7.141//

45329 | 371 |
| 427 |

From the fifteenth orbit, while on the return journey towards the first orbit, the intervals between them, initiating with the fourteenth orbit is obtained on reducing the total sum gradually by the range (of $36\frac{179}{427}$ yojanas) which was added earlier. //7.142//

The interval between both the moons situated on the interior orbit is obtained on subtracting (the orbital-field of both sides by) three hundred sixty yojanas out of the diameter of the Jambū island. //7.143//

The interval between the moons situated on the inner orbit is ninety-nine thousand six hundred forty yojanas //7.144//

99640 |

Whatever is the measure of interval-increase between the Sumeru and the moon's orbits, when it is multiplied by two, the mutual interval excess between both the moons in every orbit is obtained as interval increase. //7.145//

$$72 \;\Big|\; \begin{matrix} 358 \\ 427 \end{matrix} \Big|$$

In the second orbit, the interval between one moon from the other is ninety-nine thousand seven hundred twelve yojanas and three hundred fifty-eight parts in excess. //7.146//

$$99712 \;\Big|\; \begin{matrix} 358 \\ 427 \end{matrix} \Big|$$

On the third orbit, the interval between the moons is ninety thousand seven hundred eighty-five yojanas and two hundred eighty-nine parts of a yojan in excess. //7.147//

$$99785 \;\Big|\; \begin{matrix} 289 \\ 427 \end{matrix} \Big|$$

On the fourth orbit, the interval between the two moons is ninety-nine thousand eight hundred fifty-eight yojanas and two hundred twenty parts (of a yojana) in exess. // 7.148 //

$$99858 \;\Big|\; \begin{matrix} 220 \\ 427 \end{matrix} \Big|$$

On the fifth orbit, the interval between the two moons is ninety-nine thousand nine hundred thirty-one yojanas and one hundred fifty-one parts in excess. //7.149//

$$99931 \;\Big|\; \begin{matrix} 151 \\ 427 \end{matrix} \Big|$$

On the sixth path the interval between the moons is one lac four vojanas and eighty-two parts (of a yojana) in excess. //7.150//

$$100004 \;\Big|\; \begin{matrix} 82 \\ 427 \end{matrix} \Big|$$

On the seventh orbit, the interval between the moons is one lac seventy-seven yojanas

and thirteen parts in excess. //7.151//

$$100077 \left| \begin{matrix} 13 \\ 42 / \end{matrix} \right|$$

On the eighth orbit, the interval between the moons is one lac one hundred forty-nine yojanas and three hundred seventy-one parts in excess. //7.152//

$$100149 \left| \begin{matrix} 371 \\ 427 \end{matrix} \right|$$

On the ninth orbit, the interval between those two moons is one lac two hundred twenty-two yojanas and three hundred two parts in excess. //7.153//

$$100222 \left| \begin{matrix} 302 \\ 427 \end{matrix} \right|$$

On the tenth orbit, the interval between those two moons is one lac two hundred ninety-five yojanas and two hundred thirty-three parts in measure. //7.154//

$$100295 \left| \begin{matrix} 233 \\ 427 \end{matrix} \right|$$

On the eleventh orbit, this interval is one lac three hundred sixty-eight parts and one hundred sixty-four parts more. //7.155//

$$100368 \left| \begin{matrix} 164 \\ 427 \end{matrix} \right|$$

On the twelfth orbit, the interval between those moons is one lac four hundred forty-one yojanas and ninety-five parts in excess. //7.156//

$$100441 \left| \begin{matrix} 95 \\ 427 \end{matrix} \right|$$

On the thirteenth orbit, the interval between both the moons is one lac five hundred fourteen yojanas and twenty-six parts in excess. //7.157//

$$100514 \left| \begin{matrix} 26 \\ 427 \end{matrix} \right|$$

On the fourteenth orbit, the interval between the moons is one lac five hundred eighty-six yojanas and three hundred eighty-four parts in excess. //7.158//

$$100586 \left| \begin{matrix} 384 \\ 427 \end{matrix} \right|$$

On the fifteenth orbit, their interval is one lac six hundred fifty-nine yojanas and three hundred fifteen parts in excess. //7.159//

$$100659 \left| \begin{matrix} 315 \\ 427 \end{matrix} \right|$$

On the return journey of the moon from its outermost orbit towards the first orbit, reduction of the earlier successive increase added before, the interval measure between the moons is obtained from the fourteenth orbit to the first orbit, respectively. //7.160//

The circumference-set measure of the inner orbit is three lac fifteen thousand eighty-nine yojanas in number (parisaṁkhā). //7.161//

$$315089 |$$

For finding out the measure of circumference of the remaining orbits, the common difference addition (prakṣepa) is related according to instruction of the spiritual guide (guru). //7.162//

The linear increase of the moon's orbits is doubled and then squared. Whatever is obtained is multiplied by ten and square root of its product so obtained is found out. This gives the common-difference addition in case of the circumference. //7.163//

$$72 \left| \begin{matrix} 358 \\ 427 \end{matrix} \right|$$

The measure of the earlier mentioned common difference addition (prakṣepaka) is two hundred thirty yojanas and one hundred forty-three parts out of four hundred twenty-seven parts of a yojana in excess. //7.164//

$$230 \left| \begin{matrix} 143 \\ 427 \end{matrix} \right|$$

On the second orbit, the measure of the circumference is three lac fifteen thousand three hundred nineteen yojanas and one hundred forty-three parts alone. //7.165//

$$315319 \left| \begin{matrix} 143 \\ 427 \end{matrix} \right.$$

On the third orbit, that circumference is three lac fifteen thousand five hundred forty-nine and two hundred eighty-six parts alone. //7.166//

$$315549 \left| \begin{matrix} 286 \\ 427 \end{matrix} \right.$$

The circumference of the fourth orbit of the moon is three lac fifteen thousand seven hundred eighty yojanas and two parts in excess. //7.167//

$$315780 \left| \begin{matrix} 2 \\ 427 \end{matrix} \right.$$

On the fifth orbit, that circumference is three lac sixteen thousand ten yojanas and one hundred forty-five parts in excess. //7.168//

$$316010 \left| \begin{matrix} 145 \\ 427 \end{matrix} \right.$$

On the sixth orbit, that circumference is three lac sixteen thousand two hundred and forty yojanas and two hundred eighty-eight parts. //7.169//

$$316240 \left| \begin{matrix} 288 \\ 427 \end{matrix} \right.$$

On the seventh orbit of the moon, that circumference is three lac sixteen thousand four hundred seventy-one yojanas and four parts. //7.170//

$$316471 \left| \begin{matrix} 4 \\ 427 \end{matrix} \right.$$

On the eighth orbit, the measure of that circumference is three lac sixteen thousand seven hundred one yojanas and one hundred forty-seven parts in excess. //7.171//

$$316701 \left| \begin{matrix} 147 \\ 427 \end{matrix} \right.$$

On the ninth orbit of the moon, that circumference is three lac sixteen thousand nine hundred thirty-one yojanas and two hundred ninety parts. //7.172//

316931	290	
	427	

The circumference of the tenth orbit of the moon is three lac seventeen thousand one hundred sixty-two yojanas and six parts. //7.173//

317162	6	
	427	

On the eleventh orbit, this circumference is three lac seventeen thousand three hundred ninety-two yojanas and one hundred forty-nine parts. //7.174//

317392	149	
	427	

On the twelfth orbit, this circumference is three lac seventeen thousand six hundred twenty-two yojanas and eight less than three hundred or two hundred ninety-two parts. //7.175//

317622	292	
	427	

On the thirteenth orbit of the moon, that circumference is three lac seventeen thousand eight hundred fifty-three yojanas and eight parts more. //7.176//

317853	8	
	427	

On the fourteenth orbit of the moon, this circumference is three lac eighteen thousand eighty-three yojanas and one hundred fifty-one parts more. //7.177//

317853	151	
	427	

On the outer path, this circumference is three lac eighteen thousand three hundred and thirteen yojanas and two hundred ninety-four parts in excess. //7.178//

318313	294	
	247	

The moon and the sun, while moving out (in outer orbits), become faster in velocity

and while moving towards inner orbits become slower in velocity, hence they cover unequal circumferences in equal periods. //7.179//

Every one of those circumferences be divided into a measure of one lac nine thousand eight hundred yojanas of celestial parts (gagana khaṇḍas). //7.180//

109800 |

The moon transgresses seventeen hundred sixty-eight celestial parts (gagana-khaṇḍas). Hence on dividing the total number of the celestial parts by this set, there is obtained sixty-two and twenty-three over two hundred twenty-one muhūrtas. //7.181-182//

62 | 23 |
221 |

Both the moon's images move from the inner orbit to the outer orbit in a period of more than sixty-two muhūrtas. //7.183//

The measure of this excess is twenty-three parts out of two hundred twenty-one parts of a yojana. //7.184//

23 |
221 |

Sixty-two is added through common denominator form, and on dividing the chosen circumference by it, the measure of celestial parts of motion of the moon in a muhūrta is obtained in the desired orbit. //7.185//

13725 | 315089 | 1 |
221 | | |

On the first orbit, the moon travels five thousand seventy-three yojanas and three kośas in a muhūrta. //7.186//

5073 | ko 3 |

On the second orbit, the moon travels five thousand seventy-seven yojanas and one kośa of the celestial region in one muhūrta limit. //7.187//

5077 | ko 1 |

On the third orbit, the moon travels fivethousand eighty yojanas and three kosas of the celestial region in one muhūrta limit. //7.188//

5080 | ko 3 |

On the fourth orbit, the moon travels five-thousand eighty-four yojanas and two kośas in one muhūrta limit. //7.189//

5084 | ko 2 |

On the fifth orbit, the movement of the moon in a muhūrta is five thousand eighty-eight yojanas and one kośa. //7.190//

5088 | ko 1 |

On the sixth orbit, the motion of the moon in a muhūrta is obtained as five thousand ninety-two yojanas. //7.191//

5092 |

On the seventh orbit the muhūrta motion of the moon is obtained as five thousand ninety-five yojanas and three kośas. //7.192//

5095 | ko 3 |

On the eighth orbit, the muhūrta motion of the moon is found to be five thousand ninety-nine yojanas and two kośas. //7.193//

5099 | ko 2 |

On the ninth orbit, the muhūrta motion of the moon is found to be five thousand one hundred three yojanas measure. //7.194//

5103 |

On the tenth orbit, the muhūrta motion of the moons is found to be five thousand one hundred six yojanas and three kośas. //7.195//

5106 | ko 3 |

On the eleventh orbit, the muhūrta motion of the moon is found to be a measure of five thousand one hundred ten yojanas and two kośas. //7.196//

5110 | ko 2 |

On the twelfth orbit, the muhūrta motion of the moon is found to be five thousand one hundred and fourteen yojanas and one kośa. //7.197//

5114 | ko 4 |

On the thirteenth orbit, the muhūrta motion of the moon is five thousand one hundred and eighteen yojanas. //7.198//

5118 |

On the fourteenth orbit, the muhūrta motion of the moon is five thousand one hundred twenty-one yojanas and three kośas. //7.199//

5121 | ko 3 |

On the outer orbit the muhūrta motion of the moon is five thousand one hundred twety-five yojanas and two kośas. //7.200//

5125 | ko 2 |

Four pramāṇa aṅgulas below the city surface of the moon, are the flag-staff of the Rāhu celestial plane (vimāna). //7.201//

Those celestial planes of Rāhu are black coloured, built up of ominous gems, with width of slightly less than a yojana, and with a depth thickness of half the width. //7.202//

The thickness (bāhalya) of the Rāhu city is two hundred fifty dhanuṣas, such is the presentation of the preceptor author of the Loya vinicchaya [Lokaviniścaya]. //7.203//

According to the distinction of the day and the ritual, the motion of the Rāhu city surface is of two types. Out of these, the motion of Rāhu is similar to that of the moon. //7.205//

Here in the human universe, in whatsoever orbit out of them, the moons image appears to be full, that is called the full moon's (purṇimā) day. //7.206//

Having crossed that orbit, the day Rāhu and the moon's image move towards the next orbit from the south east and the north west directions. //7.207//

On reaching the second orbit, owing to special motion of Rāhu, one part out of sixteen parts of the moon's circle appears obscured. //7.208//

Afterwards, the moon's image moves across the south-east direction and reaches the middle point of the orbit, and does not move in the remaining half part owing to the motion of the second moon. //7.209//

Similarly, in the remaining orbits also, Rāhu and the moon's images cross the successive paths always from the north-west and south-east directions. //7. 210//

Rāhu covers the moon's image, one part each, (successively), in every (successive) path, upto fifteen phases. //7.211//

In this way, on the coverage of the phases one by one, of the moon, by the Rāhu's image, the path on which there appears only phase of the moon, that is called the new moon (amāvasyā) day. // 7. 212 //

The measure of the moon's day is thirty-one muhūrtas and twenty-three parts out of four hundred forty-two parts of a muhūrta in excess. //7.213//

$$31 \left| \begin{array}{c} 23 \\ \hline 442 \end{array} \right.$$

That Rāhu leaves (uncovers) each one of the phases of the moon, since the first day (of the fortnight), through its specific motion in every-one of the orbits (successively), upto the full moon day (pūrṇimā). //7.214//

Or, the moon's image, of its own natural accord, transforms for a fortnight as radiant with black radiance, and the same period as radiant with white radiance. //7.215//

The ritual Rāhu (parva Rāhu) covers the moon's images, owing to their specific motion, separately, in every six months at the end of the full moon, regularly. //7.216//

There are two suns in the Jambū island. Their orbital paths are the same. The width of this orbital plane is five hundred ten yojanas as in excess of the sun's image. //7.217//

$$510 \left| \begin{array}{c} 48 \\ \hline 61 \end{array} \right.$$

The sun moves in the Jambū island for one hundred eighty yojanas, and moves in the Lavaṇa sea for the sun's image in excess of three hundred thirty yojanas. //7.218//

$$180 \left| \begin{array}{c} 330 \end{array} \right| \left| \begin{array}{c} 48 \\ \hline 61 \end{array} \right.$$

There are one hundred eighty-four orbits of the sun. Out of these, the width of every orbit is equal to the (sun's) image and the thickness is half of this. //7.219//

$$184 \left| \begin{array}{c} 48 \\ \hline 61 \end{array} \right| \left| \begin{array}{c} 24 \\ \hline 61 \end{array} \right.$$

There is interval space in the one hundred eighty-three orbits. Both the sun's images

move in the same path. //7.220//

Three hundred sixty yojanas and the diameter of Meru are subtracted from the diameter of the Jambū island, and the remainder is halved. This gives the interval measure between the first path of sun and middle point of Meru. //7.221//

360 | 44820 |

On dividing thirty-one thousand one hundred fifty-eight by sixty-one, the quotient gives the constant-set (dhruva rāśi) corresponding to the suns. //7.222//

31158 |
61 |

The width of the sun's image is multiplied with one hundred eighty-four and the product is subtracted from the constant-set. The remainder is divided by one hundred eighty-three, the quotient gives the interval between every two orbits (cross-transgression between every orbit). //7.223-224//

The measure of the interval between the orbits, is two yojanas. On adding the width of the sun's image in it, the measure of the linear common difference between the sun's paths (is obtained). //7.225//

170 |
61 |

This interval (lies) between the Mandara mountain and the sun's image, in every path, while the sun moves towards out wards path from its first path. //7.226//

Or

The desired path as reduced by unity is multiplied by the path linear common difference. The product is added to the interval between the initial orbit of the sun and the Meru. The sum gives the desired interval. //7.227//

The interval between the sun on its first orbit and the Meru is forty-four thousand eight hundred twenty yojanas. //7.228//

44820 |

The interval between the sun on its second orbit and the Meru is forty-four thousand eight hundred twenty-two yojanas as increased by the width of the sun's image. //7.229//

$$44822\ \frac{48}{61}$$

The interval between the sun on its third orbit and the Meru is forty-four thousand eight hundred twenty-five yojanas and thirty-five parts (out of sixty-one parts of a yojana). //7.230//

$$44825\ \frac{35}{61}$$

In this way, this should be known from the initial orbit to the middle orbit.

The interval between the sun on its middle orbit and the ~~Meru mountain~~ is forty-five thousand seventy- five yojanas and slightly more. //7.231//

45075 |

In this way, this should be carried on upto the penultimate path.

The interval between the sun on its outermost path and the Meru mountain is forty-five thousand three hundred thirty yojanas. //7.232//

45330 |

The interval from the penultimate path upto the initial path is known by subtracting the earlier increase, for the sun while moving from the outermost orbit towards its initial path. //7.233//

On subtracting three hundred sixty yojanas from the diameter of the Jambū island, the remainder gives the interval between both the suns on its first path. //7.234//

The interval between the both suns while in the innermost orbit is ninety-nine thousand six hundred forty yojanas. //7.235//

99640 |

The interval increase of the suns is obtained on multiplying the sun's path-linear increase by two. //7.236//

$$5\ \frac{35}{61}$$

The desired interval between the suns is obtained by first multiplying the chosen path

as reduced by unity by twice the path's linear increase, and on adding this product to the first interval. //7.237//

The interval between both the suns on the second orbit is ninety-nine thousand six hundred forty-five yojanas and thirty-five parts. //7.238//

99645	35	
	61	

This is to be carried on till the middle path.

On the middle orbit, the interval between the two suns is one lac one hundred fifty yojanas. //7.239//

100150 |

In this way, this should be carried on upto the penultimate path.

In the outermost orbit, the interval between both the suns is one lac six hundred sixty yojanas. //7.240//

100660 |

If it is desired to know the diameter of the sun's image, the total path-interval be subtracted from the constant-set, and the remainder be divided by one hundred eighty-four. The quotient gives the diameter of the sun's image. //7.241//

48	31158	22316
61	61	61

Or

The path-intervals of the sun are subtracted from the constant-set, the remainder is divided by the (diameter) of the sun's image. This gives the number of the orbits of the sun which is one hundred eighty-four. //7.242//

48	8832	184
61	61	

The path's linear-increase of the sun is multiplied by one hundred eighty-three, the product gives the orbital-area without the sun's image. When the width of the sun's image is added to this, the total orbital plane area is obtained. //7.243//

1	170 / 61	183	laddha	510

For the knowledge of day and night, the measure of the periods of light and darkness, and the Meru circumference as well as the one hundred ninety-four circumferences are related. //7.244//

194 |

The circumference of the Mandara mountain is thirty-one thousand six hundred twenty-two yojanas alone. //7.245//

31622 |

At the joints of the Kṣema and Avadhyā cities, the measure of circumference is zero, six, seven, seven, seven and one as numerals in decimal notation (written right to left), [forming the one lac seventy-seven thousand seven hundred sixty] of yojanas as well as in excess of five parts out of eight parts of a yojana. //7.246//

177760 | 5/8 |

At the united part of the Kṣemapurī and Ayodhyā cities, the measure of the circumference is the number formed by writing (right to left) the numerals eight, one, nine, four, nine and one in yojanas as in excess of three parts. //7.247//

194918 | 3/8 |

In the united part of the Khaḍgapurī and the Ariṣṭā cities, the measure of the circumference is the number formed in (decimal notation) order of numerals four, zero, seven, nine, zero and two in yojanas as in excess of three parts. //7.248//

209704 | 3/8 |

In the united part of Cakrapurī and Ariṣṭāpurī, the circumference is the number in decimal order of numerals two, six, eight, six, two and two in yojanas as in excess of one part. //7.249//

226862 | 1 |
8 |

In the middle of the cities of Khaḍgā and Aparājitā, the circumference is the number in decimal order of numerals eight, four, six, one, four and two in yojanas as in excess of one part. //7.250//

241648 | 1 |
8 |

In the middle of the cities of Manjūṣa and Jayanta, the circumference is the number in decimal order of numerals five, zero, eight, eight, five and two, in yojanas as in excess of seven parts. //7.251//

258805 | 7 |
8 |

The circumference of Oṣadhīpura and Vaiyantī cities is the number in decimal order of numerals one, nine, five, three, seven and two as in excess of seven parts in yojanas. //7.252//

273591 | 7 |
8 |

The circumference of the Vijayapurī and Puṇḍrīkiṇī cities is the number of yojanas in decimal order of the numerals nine, four, seven, zero, nine and two, and in excess of five parts. //7.253//

290749 | 5 |
8 |

In the innermost path out of all the orbits of the sun, the circumference is three lac fifteen thousand eighty-nine yojanas. //7.254//

315089 |

In order to know the measure of the circumferences of the remaining paths, the circumference-increase (paridhi kṣepa) is related in accordance with the preceptor's instructions. The increase in circumference (paridhi kṣepa) is obtained by making the linear-increase of sun's orbits twice, squaring it and multiplying it by ten and then finding out the

squareroot of the product. //7.255//

The measure of that circumference increase is seventeen yojanas and thirty-eight parts out of sixty-one parts of a yojana in excess. //7.256//

$$17 \left| \begin{matrix} 38 \\ 61 \end{matrix} \right.$$

On the second orbit, that circumference is three lac fifteen thousand one hundred six yojanas and thirty-eight parts in excess. //7.257//

$$315106 \left| \begin{matrix} 38 \\ 61 \end{matrix} \right.$$

On the third orbit, the circumference is three lac fifteen thousand one hundred twenty-four yojanas and fifteen parts in excess. //7.259//

$$315124 \left| \begin{matrix} 15 \\ 61 \end{matrix} \right.$$

On the fourth orbit, the circumference is three lac fifteen thousand one hundred forty-one yojanas and fifty-three parts in excess. //7.260//

$$315141 \left| \begin{matrix} 53 \\ 61 \end{matrix} \right.$$

On the fifth orbit that circumference is three lac fifteen thousand one hundred sixty-nine yojanas and thirty parts in excess. //7.261//

$$315159 \left| \begin{matrix} 30 \\ 61 \end{matrix} \right.$$

In this way, the circumference-increase is added to preceding result of circumference, upto the penultimate circumference, the measure of the successive circumference. //7.262//

In the outer path of the sun, the circumference measures three lac eighteen thousand three hundred fourteen yojanas. //7.263//

318314 |

In the sixth part of diameter of Lavaṇa ocean, the circumference is five lac twenty-seven thousand forty-six yojanas. //7.264//

527046 |

The sun's images, while travelling out, move with great velocity and while entering in, moves with slow velocity, hence they sweep out unequal circumsference (arcs) in equal time. //7.265//

Out of these circumferences, every one should be divided into one lac nine thousand eight hundred yojanas form of celestial parts (gayaṇa khaṇḍa). //7.266//

109800 |

The sun transgresses eighteen hundred thirty celestial parts. Hence the total celestial parts are divided by this amount. The quotient is the period of transgression of all celestial parts in muhūrtas. //7.267//

1830 |

From the innermost orbit, in all the orbits- second, third, fourth, etc. the two suns travel in sixty muhūrtas respectively.// 7.268//

On dividing the chosen circumference by sixty muhūrtas, the quotient should be known to be the traversed path in a muhūrta for the suns. //7.269//

On the first orbit, the velocity of the sun per muhūrta is five thousand two hundred fifty-one yojanas and twenty-nine parts out of sixty parts of a yojana in excess. //7.270//

$$5251 \left| \frac{29}{60} \right|$$

In this way, the process be continued till the one hundred eighty-three orbits are over.

In the outer most orbit (one hundred eighty-fourth path) the velocity of the sun is five thousand three hundred five yojanas and fourteen parts in excess. //7.271//

$$5305 \left| \frac{14}{60} \right|$$

The flag-staff of the inauspicious (ariṣṭa) planes are four pramāṇa fingers (aṅgulas) below the city surface of the sun. //7.272//

4 |

The city surfaces of Ketu are built up of inauspicious gems and are black coloured.

Every one of these has a diameter slightly less than a yojana. //7.273//

Out of those beautiful cities, the thickness of each is two hundred fifty dhanuṣas. //7.274//

250 |

Alongwith four gopuras, beautified with Jina buildings, and enjoyable, those city-planes are the residence of deity Ketu and their several families. //7.275//

Owing to the specific motion of the sun's images in human universe, there has been division of day and night, described as follows. //7.276//

When the sun is on the first orbit, the day is of eighteen muhūrtas and the night is of twelve muhūrtas in all the orbits. //7.277//

18 | 12 |

When the sun is on the outer most orbit, the night is of eighteen muhūrtas and the day is of twelve muhūrtas in all the orbits //7.278//

18 | 12 |

The mouth (mukha) is subtracted from the base (bhūmi), and this remainder is divided by number of orbits as reduced by unity. The quotient gives the increase in the (duration of) day over night and the night over day. //7.279//

The measure of the above mentioned increase is two muhūrtas as divided by sixty-one. This much is the decrease-increase everyday in both days and nights. //7.280//

$$\frac{2}{61}$$

The sun being on the second path, the duration of the day is seventeen muhūrtas and fifty-nine parts in excess in all the one hundred ninety-four orbits. //7.281//

$$17 \left| \frac{59}{61} \right|$$

When the sun is on the second orbit, the length of the night is twelve muhūrtas and two parts, in excess, in all the same orbits. // 7.282 //

$$12 \left| \frac{2}{61} \right|$$

When the sun is on the third path, the length of the day is twelve muhūrtas and fifty-seven parts in excess in all the same orbits. //7.283//

17 | 57 |
61 |

On the third orbital path of the sun, the length of night is twelve muhūrtas and four parts in excess in all those orbits. //7.284//

12 | 4 |
61 |

When the sun is on the fourth orbit, the length of day is seventeen muhūrtas and fifty-five parts in excess. //7.285//

17 | 55 |
61 |

When the sun's image is on the fourth path, the length of night is twelve muhūrtas and six parts in all the orbits. //7.286//

12 | 6 |
61 |

The process should be continued similarly, till the middle path. When the sun is on the middle path, days and nights, each in the earlier mentioned orbits, are each of fifteen muhūrtas. //7.287//

15 |

The process should be continued upto the penultimate orbit. When the sun reaches the outer orbit, in all the above mentioned orbits, the night is of eighteen muhūrtas and the day is of twelve muhūrtas. //7.288//

18 | 12 |

When the sun reaches the inner orbits on its return journey from the outermost orbit, the length of day is to be added by the earlier described order, successively, with this increase. //7.289//

2 |
61 |

Thus the above mentioned lengths of the days and nights happen to be due to specific motions of the single sun in this way. When these mTRANSLATION OF THE MATHEMATICAL VERSES OF THE TILOYPANNATTIasures are multiplied by two, the measures of the lengths of days and nights are obtained due to specific motions of the two suns. //7.290//

Thus ends the description of the secret of days and nights.

Now from here ahead, the regions of sun-shine (ātapa) and darkness, happening in the human-universe due to specific orbital motion of the sun, are described. //7.291//

The sun-shine and darkness regions are like the spokes (uddhi) of a cart, with regular lengths, from the middle [central] part of the Mandara mountain upto the sixth part of the Lavaṇa sea. //7.292//

The length of every sun-shine and darkness regions is eighty-three thousand three hundred thirty-three yojanas and third part of a yojana. //7.293//

$$83333\ \frac{1}{3}$$

The desired orbital circumference is multiplied by three and divided by ten. The quotient gives the circumference of that sunshine region when the sun is in the first orbit. //7.294//

$$\frac{3}{10}$$

When the sun is on the first orbit, the sunshine region over the Meru mountain is nine thousand four hundred eighty-six yojanas and three parts out of five parts of a yojana. //7.295//

$$9486\ \frac{3}{5}$$

When the sun is on the first orbit, in the applied portion of the Kṣema city, the sunshine region is fifty-three thousand three hundred twenty-eight yojanas and three parts out of sixteen parts of a yojana in excess. //7.296//

$$53328\ \frac{3}{16}$$

That sunshine region, in the applied portion of Kṣemapurī, remains fifty-eight thousand four hundred seventy-five yojanas and forty-one parts divided by eighty parts of a yojana. //7.297//

$$58475 \left| \begin{matrix} 41 \\ 80 \end{matrix} \right|$$

The sunshine region, in the applied portion of Ariṣtā citi, remains sixty-two thousand nine hundred eleven yojanas and five parts out of sixteen parts of a yojana. //7.298//

$$62911 \left| \begin{matrix} 5 \\ 16 \end{matrix} \right|$$

The sunshine region, in the applied portion of Ariṣtāpuri remains sixty-eight thousand fifty-eight yojanas and fifty-one parts out of eighty parts of a yojana in excess. //7.299//

$$68058 \left| \begin{matrix} 51 \\ 80 \end{matrix} \right|$$

In the applied portion of Khaḍgapurī, the sunshine region is seventy-two thousand four hundred ninety-four yojanas and seven divided by sixteen parts of a yojana in excess. //7.300//

$$72494 \left| \begin{matrix} 7 \\ 16 \end{matrix} \right|$$

In Manjuṣāpura, the sunshine region is seventy seven thousand six hundred forty-one yojanas and sixty-one divided by eighty parts of a yojana in excess. //7.301//

$$77641 \left| \begin{matrix} 61 \\ 80 \end{matrix} \right|$$

In the Auṣadhi city, at the applied portion, the sunshine region is eighty-two thousand seventy-seven yojanas and nine parts divided by sixteen parts of a yojana in excess. //7.302//

$$82077 \left| \begin{matrix} 9 \\ 16 \end{matrix} \right|$$

In the Puṇḍarīkinī city, the sunshine region is eighty-seven thousand two hundred twenty-four yojanas and seventy-one parts divided by eighty parts of a yojana in excess. //7.303//

87224 | 71 |
| 80 |

The circumference of the sunshine region on the first orbit is ninety-four thousand five hundred twenty-six yojanas and seven divided by ten parts (of a yojana) in excess. //7.304//

94526 | 7 |
| 10 |

The circumference of the sunshine in the second path is ninety-four thousand five hundred thirty-one yojanas and four divided by five parts of a yojana in excess. //7.305//

94531 | 4 |
| 5 |

In this way, the process is continued upto the middle path.

When the sun remains in the first path, in the outer path (orbit), the sunshine region is ninety-five thousand four hundred ninety-four yojanas and one out of five parts of a yojana in excess. //7.307//

95494 | 1 |
| 5 |

When the sun is on the first orbit, in the sixth part of circumference of the diameter of Lavaṇa sea, this sunshine region is one lac fifty-eight thousand one hundred thirteen yojanas and four divided by five parts of a yojana in excess. //7.308-309//

158113 | 4 |
| 5 |

The chosen circumference is multiplied by two hundred seventy-four and divided by nine hundred fifteen. The result gives the sun-shine region of the sun on its second orbit. //7.310//

274 |
915 |

When the sun is on the second orbit, the sun-shine region over the Meru mountain is

nine thousand four hundred sixty-nine yojanas and two hundred ninety-three parts in excess. //7.311//

9469	293	
	915	

In the corresponding portion of Kṣemā city, the sun-shine region is given by (decimal notation, right to left as) one, three, two, three and five in succession, alongwith thirty-seven parts (divided by seven hundred thirty-two parts of a yojana,) in excess. //7.312//

53231	37	
	732	

In the corresponding portion of Kṣemapurī, the sun-shine region is given by eight, six, three, eight and five numerals in succession, and three thousand six hundred fifty-nine parts out of three thousand six hundred sixty parts in excess. // 7.313//

58368	3659	
	3660	

In the corresponding portion of Ariṣṭa city, the sun-shine region is given by six, nine, seven, two and six numerals in succession, and two thousand six hundred thirty-five parts out of three thousand six hundred sixty parts in excess.//7.314//

62796	2635	
	3660	

In the corresponding portion of the Ariṣṭapurī, the sunshine region is given by four three, nine, seven and six numerals in succession, and two thousand four hundred forty-nine parts in excess.//7.315//

67934	2449	
	3660	

In the corresponding portion of Khaḍgapurī, the sun-shine region is given by two, six, three, two and seven numerals in succession, and one thousand four hundred twenty-five parts in excess.// 7.316//

72362	1425	
	6160	

In the corresponding portion of Mañjuṣāpura the sun-shine region is given by zero, zero, five, seven and seven numerals in succession, and one thousand two hundred thirty-nine parts. // 7.317//

$$77500 \left| \begin{matrix} 1239 \\ 3660 \end{matrix} \right|$$

In the corresponding portion of Auṣadhipura, the sun-shine region is given by eight, two, nine, one, eight yojanas in decimal order as in excess of two hundred fifteen parts. // 7.318//

$$81928 \left| \begin{matrix} 215 \\ 3660 \end{matrix} \right|$$

In the city of Puṇḍarīkiṇī, the sunshine region is given by six, six, zero, seven, eight yojanas in decimal order as in excess of twenty-nine parts. //7.319//

$$87066 \left| \begin{matrix} 29 \\ 3660 \end{matrix} \right|$$

In the second path, the sun-shine region of the sun has a sun-shine region in its first orbit given by four, five, three, four, nine, numerals in decimal order of yojanas as in excess of four hundred seventy-six parts. // 7.320//

$$94354 \left| \begin{matrix} 476 \\ 915 \end{matrix} \right|$$

When the sun is in the second orbit, the sun-shine region in the second orbit is given by ninety-four thousand three hundred fifty-nine yojanas as in excess of five hundred fifty-nine parts. // 7.321//

$$94359 \left| \begin{matrix} 559 \\ 915 \end{matrix} \right|$$

When the sun is on the second path, the sunshine region in the third orbit is ninety-four thousand three hundred sixty-five yojanas in excess of one part. //7.322//

$$94365 \left| \begin{matrix} 1 \\ 915 \end{matrix} \right|$$

In this way, the process should be carried over to the initial path of the middle orbit.

When the sun is situated on the second orbit, the sun-shine region in the middle orbit is given by numerals seven, three, eight, four, nine yojanas in decimal order, as in excess of four hundred ninety-three parts. //7.323//

94837	493	
	915	

Thus the process be continued upto the penultimalte (preceding) path of the external path.

When the sun is on its second orbit, the sun-shine region in the ultimate orbit is ninety-five thousand three hundred twenty yojanas as in excess of two hundred thirty-six parts.// 7.324//

95320	236	
	915	

When the sun is on the second orbit, the sun-shine region in the sixth path of the Lavaṇa sea is given by five, two, eight, seven, five and one numerals in decimal order, as in excess of seven hundred twenty-nine parts. // 7.325//

157825	729	
	915	

The chosen circumference is multiplied by five hundred forty-seven and divided by one thousand eight hundred thirty. The quotient gives the sunshine region in the chosen orbit when the sun is situated on the third path. //7.326//

547	
1830	

When the sun is on the third orbit, the sun-shine region over the Mandara mountain is nine thousand four hundred fifty-two yojanas and seventy-four parts in excess. //7.327//

9452	74	
	1830	

When the sun is on the third orbit, the sun-shine region in the Kṣemā city is given by three, three, one, three, five, in decimal numerals of yojanas as in excess of two thousand six

hundred seventy-five parts of a yojana. // 7.328//

53133 | 2675 / 2928 |

When the sun is on the third orbit, the sun-shine region in Kṣemapurī is given by two, six, two, eight, five numerals in decimal order, as in excess of seven thousand one hundred twenty-nine parts divided by fourteen thousand six hundred forty parts. // 7.329//

58262 | 7129 / 14640 |

When the sun is on the third orbit the sun-shine region in Ariṣṭā city is given by numerals two, eight, six, two and six in decimal order of yojanas, as in excess of one thousand eight hundred sixty-five parts. // 7.330//

62682 | 1865 / 14640 |

When the sun is on the third orbit, the sun-shine.in Ariṣṭāpura is given by numerals zero, one, eight, seven, six yojanas in decimal order as in excess of ten thousand two hundred fifty-nine parts. // 7.331//

67810 | 10259 / 14640 |

When the sun is on the third path, the sun-shine region in Khaṇgapurī is given by zero, three, two, two, seven numerals in decimal order of yojanas as in excess of four thousand nine hundred ninety-five yojanas. //7.332//

72230 | 4995 / 14640 |

When the sun is on the third path, the sun-shine region in Mañjūṣāpurī is given by eight, five, three, seven and seven yojanas in decimal order, and thirteen thousand three hundred eighty-nine parts in excess. //7.333//

77358 | 13389 / 14640 |

The sun being on the third path, the sun-shine region in Auṣadhīpurī is given by eigth, seven, seven, one and eight numerals in decimal order of yojanas as in excess of eight thousand one hundred and twenty-five parts. // 7.334//

$$81778 \left| \begin{matrix} 8125 \\ 14640 \end{matrix} \right.$$

The sun being on the third path, the sun-shine region in Puṇḍarīkiṇī city is given by seven, zero, nine, six, eight in decimal order of yojanas as in excess of one thousand eight hundred seventy-nine parts. // 7.335//

$$86907 \left| \begin{matrix} 1879 \\ 14640 \end{matrix} \right.$$

When the sun is on the third orbit, the sun-shine region in the first path is given in yojanas by the numerals two, eight, one, four, nine in decimal order and six hundred twenty-three parts in excess.// 7.336//

$$94182 \left| \begin{matrix} 623 \\ 1830 \end{matrix} \right.$$

When the sun is on the third orbit the sun-shine region in the second path is given by ninety-four thousand one hundred eighty-seven yojanas and seven hundred seventy-two parts. // 7.337//

$$94187 \left| \begin{matrix} 772 \\ 1830 \end{matrix} \right.$$

When the sun is on the third orbit the sun-shine region in the third path is ninety-four thousand one hundred ninety-two yojanas and sixteen hundred three parts in excess.//7.338//

$$94192 \left| \begin{matrix} 1603 \\ 1830 \end{matrix} \right.$$

When the sun is on the third orbit, the sun-shine region in the fourth path is ninety-four thousand one hundred ninety-eight yojanas, and two hundred sixty-three parts. // 7.339//

$$94198 \left| \begin{matrix} 263 \\ 1830 \end{matrix} \right.$$

In this way, the process should be continued upto the initial circumference.

When the sun is on the third orbit, the sun-shine region in the middle path is ninety-four thousand six hundred sixty-four yojanas and eight hundred seventy-four parts. //7.340//

94664	874	
	1830	

In this way, the process should be continued utpo the penultimate path.

When the sun is situated in the third orbit, the sun-shine region in the external path is ninety-five thousand one hundred forty-six yojanas and five hundred seventy-eight parts. // 7.341//

95146	578	
	1830	

When the sun is on the third orbit, the sun-shine region in the sixth part of the Lavaṇa sea is given by the numerals seven , three, five, seven, five, one in decimal order and one thousand four hundred fifty-two parts.// 7.342//

157537	1452	
	1830	

Similarly, in every orbit, having taken support of the muhūrtas of day, the sun-shine region in all the orbits be taken out upto the penultimate orbit in the remaining orbits. // 7.343//

The desired orbit is divided by five. The quotient is the circumference of the sun-shine region while the sun is on the outer orbit. //7.344//

When the sun is on the outer path, the sun-shine region over the Meru mountain is six thousand three hundred twenty-four yojanas and two over five parts of a yojana in excess. // 7.345//

6324	2	
	5	

When the sun is on the outer path, the sun-shine region over Kṣemā city is thirty-five thousand five hundred fifty-two yojanas and one eighth part of a yojana.// 7.346//

$$35552\ \frac{7}{8}$$

When the sun is on the outer path, the sun-shine region in Kṣemapura is given by numerals three, eight, nine, eight, three, in decimal order and twenty-seven parts, out of forty.// 7.347//

$$38983\ \frac{27}{40}$$

When the sun is situated on the outward orbit, the sun-shine region in Ariṣṭā city is forty-one thousand nine hundred forty yojanas and thirty-five parts. // 7.348//

$$41940\ \frac{35}{40}$$

When the sun is on the outward orbit, the sun-shine region in Ariṣṭapura is forty-five thousand three hundred seventy-two yojanas and seventeen (over forty) parts, // 7.349//

$$45372\ \frac{17}{40}$$

When the sun is on the outer orbit, the sun-shine region over Khaḍgā city is forty-eight thousand three hundred twenty-nine yojanas and twenty-five parts. // 7.350//

$$48329\ \frac{25}{40}$$

When the sun is on the outer orbit, the sun-shine in Mañjūṣā city is fifty-one thousand seven hundred sixty-one yojanas and seven parts. //7.351//

$$51761\ \frac{7}{40}$$

When the sun is on the outer orbit, the sun-shine region in Auṣadhipura is fifty-four thousand seven hundred eighteen yojanas and fifteen parts. // 7.352//

$$54718\ \frac{15}{40}$$

When the sun is on the outer orbit, the sunshine region in Antimapura (Puṇḍarīkiṇī)

city, is fifty-eight thousand one hundred forty-nine yojanas and thirty-seven parts, (out of forty one parts of a yojana). //7.353//

$$58149 \left| \begin{matrix} 37 \\ 41 \end{matrix} \right.$$

When the sun is on the outer orbit, the sun-shine region in the first orbit is sixty-three thousand seventeen vojanas and four (out of five) parts. // 7.354//

$$63017 \left| \begin{matrix} 4 \\ 5 \end{matrix} \right.$$

When the sun is on the outer orbit the sun-shine region of the second orbit is sixty-three thousand twenty-one yojanas and one part. // 7.355/

$$63021 \left| \begin{matrix} 1 \\ 5 \end{matrix} \right.$$

In this way, the process should be continued upto the middle path.

When the sun is on the outer orbit, the sun-shine region in the middle path is sixty-three thousand three hundred forty yojanas and two parts in excess. // 7.356//

$$63340 \left| \begin{matrix} 2 \\ 5 \end{matrix} \right.$$

In this way, this process be continued upto the penultimate path.

When the sun is on the outer path, the sun-shine region in the outer orbit is sixty-three thousand six hundred sixty-two yojanas and four parts. // 7.357//

$$63662 \left| \begin{matrix} 4 \\ 5 \end{matrix} \right.$$

When the sun is on the external orbit the sun-shine region in the sixth part of the Lavaṇa sea is one lac fifty-four hundred nine yojanas and one part. //7.358//

$$105409 \left| \begin{matrix} 1 \\ 5 \end{matrix} \right.$$

When the sun is from the initial path towards the outer path, the power of the rays of the sun is lesser and while on its return journey towards initial path from the outer path, that

power of the rays is greater (on the increase). //7.359//

Whatever amount of the sun-shine remains in the sun-shine region orbit, while there is one sun, the amount becomes twice, while there are two suns. //7.360//

Thus, the description of the sunshine region orbit ends.

When the sun is on first orbit there is night of twelve muhūrtas in all the orbits, separately. //7.361//

Whatever is obtained on dividing the desired orbit by five, that becomes the measure of the dark region orbital, while the sun is on the first path. //7.362//

When the sun is on the initial path, the dark region over the Meru mountain remains six thousand three hundred twenty-four yojanas and two parts in excess. //7.363//

$$6324 \left| \begin{matrix} 2 \\ 5 \end{matrix} \right.$$

When the sun is on its first path, the dark region in Kṣemā city is thirty-five thousand five hundred fifty-two yojanas and one out of eight parts of a yojana (in excess). //7.364//

$$35552 \left| \begin{matrix} 1 \\ 8 \end{matrix} \right.$$

When the sun is on its first orbit, the dark region in Kṣemapurī is given by numerals in decimal order as three, eight, nine, eight and three, as also twenty-seven parts. //7.365//

$$38983 \left| \begin{matrix} 27 \\ 40 \end{matrix} \right.$$

When the sun is on its first orbit, the dark region in Ariṣṭā city is forty-one thousand nine hundred forty yojanas and thirty-five parts. //7.366//

$$41940 \left| \begin{matrix} 35 \\ 40 \end{matrix} \right.$$

When the sun is on it first orbit, the dark region in Ariṣṭapura is forty-five thousand three hundred seventy-two yojanas and seventeen parts (in excess). //7.367//

$$45372 \left| \begin{matrix} 17 \\ 40 \end{matrix} \right.$$

In the corresponding very central portion of the Khaḍgā city, the dark region is forty-eight thousand three hundred twenty-nine yojanas and twenty-five parts. //7.368//

$$48329\ \frac{25}{40}$$

In the central portion of Mañjūṣāpura, the dark region is fifty-one thousand seven hundred sixty-one yojanas and seven parts. //7.369//

$$51761\ \frac{7}{40}$$

In the very corresponding central portion of Auṣadhīpura, the dark region is fifty-four thousand seven hundred eighteen yojanas and fifteen parts. //7.370//

$$54718\ \frac{15}{40}$$

In the corresponding very central portion of Puṇḍarīkiṇīpurī, the dark region is fifty-eight thousand one hundred forty-nine yojanas and thirty-seven parts in excess. //7.371//

$$58149\ \frac{37}{40}$$

When the sun is on the first orbit, the dark region's circumference (arc) is sixty-three thousand seventeen and four parts. //7.372//

$$63017\ \frac{4}{40}$$

When the sun is on the first orbit, the dark region in the second orbit is sixty-three thousand twenty-one yojanas and one part in excess. //7.373//

$$63021\ \frac{1}{5}$$

When the sun is on the first orbit, the dark region in the third path is sixty-three thousand twenty-four yojanas and four parts in excess. //7.374//

$$63024\ \frac{4}{5}$$

In this way, the process be continued upto the middle path.

When the sun is on the first orbit, the dark region on the middle path is sixty-three thousand three hundred forty yojanas and two parts in excess. //7.375//

63340	2	
	5	

In this way, the process be continued upto the penultimate path.

When the sun is on the first path, the dark region on the outermost orbit is sixty-three thousand six hundred sixty-two and four parts in excess. //7.376//

63662	4	
	5	

When the sun is on the first orbit, the dark region in the sixth part of water related with Lavaṇa ocean is one lac fifty-four hundred nine yojanas and one part in excess. //7.377//

105409	1	
	5	

The chosen circumference set is multiplied by three hundred sixty-seven, and the product is divided by eighteen hundred thirty. The quotient gives the dark region measure when the sun is on the second path. //7.378//

367	
1830	

When the sun is on the second orbit, the dark region on the Meru mountain is given by numerals one, four, three, six, in decimal order, and six hundred twenty-two parts divided by nine hundred fifteen parts in excess. //7.379//

6341	622	
	915	

In the corresponding central portion of Kṣema city, the dark region is given by numerals nine, four, six, five, three yojanas in decimal order, and seven hundred sixty-seven parts as divided by two thousand nine hundred twenty-eight parts. //7.380//

35649	767
	2928

In the corresponding portion of Kṣemapurī, the dark region is given by decimal numerals zero, nine, zero, nine, three yojanas and two thousand seven hundred forty-nine parts divided by fourteen thousand six hundred forty parts. //7.381//

39090	2749
	14640

In the middle corresponding portion of Riṣṭā city, the dark region in decimal numerals is five, five, zero, two, four, and six thousand eight hundred forty-five parts in excess. //7.382//

42055	6845
	14640

In the middle corresponding portion of Ariṣṭā city, the dark region is given by six, nine, four, five, four yojanas in decimal order and five thousand seven hundred fifty-nine parts in excess. //7.383//

45496	5759
	14640

In the middle corresponding portion of Khaḍgāpurī, the dark region is given in decimal order by numerals one, six, four, eight and four of yojanas, and nine thousand eight hundred fifty-five parts in excess. //7.384//

48461	9855
	14640

In the middle corresponding portion of Mañjūṣā city, the dark region is given in decimal numerals two, zero, nine, one, five yojanas, and eight thousand seven hundred sixty-nine parts. //7.385//

51902	8769
	14640

In the corresponding portion of Auṣadhipura, the dark region is given in decimal numerals seven, six, eight, four, five yojanas and twelve thousand eight hundred sixty-five

parts. //7.386//

54867	12865	
	14640	

In the Puṇḍarīkiṇī city, the dark region is given by numerals eight, zero, three, eight, five and eleven thousand seven hundred seventy-nine parts. //7.387//

58308	11779	
	14640	

When the sun is on the second orbit, the dark region on the first path is given by numerals is decimal order nine, eight, one, three, six of yojanas and seventeen hundred ninety-three parts as divided by eighteen hundred thirty parts in excess. //7.388//

63189	1793	
	1830	

When the sun is on the second orbit, the dark region in the second path is given by decimal numerals three, nine, one, three, six of yojanas and seven hundred twelve parts as divided by nine hundred fifteen parts. //7.389//

63193	712	
	915	

When the sun is on the second path, the dark region in the third path is given by decimal numerals, six, nine, one, three, six of yojanas and eighteen hundred twenty-eight parts as divided by eighteen thirty. //7.390//

63196	1828	
	1830	

In this way, the process be continued upto the middle path.

When the sun is on the second orbit, the dark region in the middle path is sixty-three thousand five hundred thirteen yojanas and eight hundred forty-four parts in excess. //7.391//

63513	844	
	1830	

When the sun is on the second path, the dark region in the outermost path is given in

decimal numerals six, three, eight, three, six of yojanas and six hundred seventy-nine as divided by nine hundred fifteen parts in excess. //7.392//

$$63836 \left| \begin{matrix} 679 \\ 915 \end{matrix} \right.$$

In this way, the process be continued upto the penultimate path.

When the sun is on the second path, the dark region in the sixth part of Lavaṇa sea in decimal numerals is seven, nine, six, five, zero, one of yojanas, and three hundred seventy-two parts as divided by eighteen hundred thirty parts in excess. //7.393//

$$105679 \left| \begin{matrix} 372 \\ 1830 \end{matrix} \right.$$

In this way, the night muhūrtas are established in every one of the remaining paths, and the dark region is calculated for two hundred orbits as reduced by six. //7.394//

When the sun is on the outermost path, there is a night of eighteen muhūrtas in all the orbits. On this basis, I relate the dark region. //7.395//

The chosen orbital set is multiplied by three and divided by ten. The quotient becomes the dark region in the chosen orbit when the sun is on the outermost orbit. //7.396//

When the sun is situated on the outermost orbit, the dark region over the Meru is nine thousand four hundred eighty-six yojanas and three parts divided by five. //7.397//

$$9486 \left| \begin{matrix} 3 \\ 5 \end{matrix} \right.$$

In the middle corresponding part of Kṣemā city, the dark region is fifty-three thousand three hundred twenty-eight yojanas and three parts as divided by sixteen. //7.398//

$$53328 \left| \begin{matrix} 3 \\ 16 \end{matrix} \right.$$

The dark region in Kṣemapurī is fifty-eight thousand four hundred seventy-five yojanas and forty-one parts. //7.399//

$$58475 \left| \begin{matrix} 41 \\ 80 \end{matrix} \right.$$

In the corresponding central portion of the Riṣṭā city, the dark region is sixty-two thousand nine hundred eleven yojanas and twenty-five parts divided by eighty parts in excess. //7.400//

$$62911\ \frac{25}{80}$$

In the corresponding central portion of the Ariṣṭāpurī, the dark region is sixty-eight thousand fifty-eight yojanas and fifty-one parts in excess. //7.401//

$$68058\ \frac{51}{80}$$

In the corresponding central portion of the Khaḍgā city, the dark region is seventy-two thousand four hundred ninety-four yojanas and thirty-five parts in excess. //7.402//

$$72494\ \frac{35}{80}$$

In the corresponding portion of Mañjūṣa city, the dark region is seventy-seven thousand six hundred forty-one yojanas and sixty one parts in excess. //7.403//

$$77641\ \frac{61}{80}$$

When the sun is on the outermost path, the dark region in Auṣadhīpurī is eighty-two thousand seventy-seven yojanas and forty-five parts. //7.404//

$$82077\ \frac{45}{80}$$

In the corresponding portion of Puṇḍarīkiṇī city, the dark region is eighty-seven thousand two hundred twenty-four yojanas and seventy one parts in excess. //7.405//

$$87224\ \frac{71}{80}$$

When the sun is situated on the outermost path, the dark region in the first path is ninety-four thousand five hundred twenty-six yojanas and seven parts out of ten parts in excess. //7.406//

$$94526 \left| \begin{matrix} 7 \\ 10 \end{matrix} \right|$$

When the sun is on its outermost orbit, the dark region on the second path is ninety-four thousand five hundred thirty-one yojanas and four parts as divided by five. //7.407//

$$94531 \left| \begin{matrix} 4 \\ 5 \end{matrix} \right|$$

When the sun is on its outermost orbit, the dark region on the third path is ninety-four thousand five hundred thirty-seven yojanas and one part in excess. //7.408//

$$94537 \left| \begin{matrix} 1 \\ 5 \end{matrix} \right|$$

When the sun is on its outermost orbit, the dark region on the fourth path is ninety-four thousand five hundred forty-two yojanas and three parts out of ten parts in excess. //7.409//

$$94542 \left| \begin{matrix} 3 \\ 10 \end{matrix} \right|$$

In this way, the process is continued upto the first orbit of the middle path.

When the sun is situated on its outermost path, the dark region in the middle path is ninety-five thousand ten yojanas and four parts out of five in excess. //7.410//

$$95010 \left| \begin{matrix} 4 \\ 5 \end{matrix} \right|$$

When the sun is situated on the outermost path, the dark region in the outer path is ninety-five thousand four hundred ninety-four yojanas and one (out of five parts) in length. //7.411//

$$95494 \left| \begin{matrix} 1 \\ 5 \end{matrix} \right|$$

When the sun is on the outermost path, the dark region in the sixth part of the Lavaṇa sea is given by decimal numerals three, one, one, eight, five, one yojanas and four parts in excess. //7.412//

158113 | 4 |
| 5 |

The above classes of dark regions are due to one sun. When there are two suns, the measure should be known to be doubled. //7.413//

When the sun moves from its initial path towards outer orbit, the dark region increases and during its return period, it decreases. //7.414//

In this way, the dark regions in all the paths have been related. Now ahead of this, the sun-shine and dark regions are described for their areas. //7.415//

Whatever is the circumference of the width of the Lavaṇa sea, in its sixth part, when its twelfth part is multiplied by five lac, the areas of the dark and sun-shine region are obtained. //7.416//

Zero in four places, five, two, zero, six, nine, one, two are written in decimal order of numerals, giving the area as twenty-one hundred ninety-six crore two lac fifty thousand yojanas. //7.417//

21960250000 |

This is multiplied by three and divided by ten giving the area of a sun-shine region, and two parts out of three parts of the quotient is the area of the dark region. //7.418//

6588075000 | ti 4392050000 |

This is due to one sun for the areas of sun-shine and dark regions. For two suns this is doubled. //7.419//

Below all the suns for eighteen hundred yojanas, and for one hundred yojanas above them, warms the sun-shine region. //7.420//

1800 | 100 |

Ahead of this, whatever happens in the rise and setting of the suns, that is related according to instructions from the supreme teachers. //7.421//

The square of the chord is obtained on multiplying the arrow less width by four times the arrow (segment's height). When the square of the arrow is multiplied by six and added to the square of the above chord, the square of the bow (dhanuṣa) is obtained. //7.422//

The arrow (height of segment) of Harivarṣa region is three lac ten thousand yojanas as divided by nineteen. //7.423//

310000 |
19 |

When out of the above, one hundred eighty yojanas are reduced, the remaining becomes the arrow of the Harivarṣa region from the first path. //7.424//

180 |

The arrow of the Harivarṣa region from the initial path is three lac six thousand five hundred eighty yojanas as divided by nineteen. //7.425//

306580 |
19 |

The measure of the diameter of the first orbit is ninety-nine thousand six hundred forty yojanas. //7.426//

99640 |

Zero in three places, four, six, five, two, zero, six, nine, zero, five, two numerals in decimal order give the number which when divided by three hundred sixty-one results in a quotient giving the square of the bow of the Harivarṣa region. //7.427//

2509602564000 |
361 |

The arc of the bow of the Harivarṣa region from the initial path is eighty-three thousand three hundred seventy-seven yojanas and nine parts. //7.428//

83377 | 9 |
19 |

When the half of bow-arc is subtracted from the eye-touch-region (cakṣu sparśa adhvāna) the remaining is the upper earth of the Niṣadha mountain [where the rising sun at Ayodhyāpurī is seen by Bharata emperor etc.] //7.429//

41688 | 14 |
19 |

The initial circumference is multiplied by three and divided by twenty. The quotient is forty-seven thousand two hundred sixty-three yojanas and seven parts out of twenty parts of

a yojana. This is the maximal eye-touch-region. Half of the bow-arc measure of Harivarṣa region is subtracted from the above. //7.430-431//

$$47263 \left| \begin{matrix} 7 \\ 20 \end{matrix} \right.$$

On subtracting the half bow-arc of Harivarṣa from the maximal range region of eye, the upper earth of Niṣadha mountain is obtained as five thousand five hundred seventy-four yojanas and two hundred thirty-three parts out of three hundred eighty parts of a yojana in excess. The emperor of Bharata region sees the sun's image situated in first orbit over the Niṣadha mountain. //7.432-433//

$$5574 \left| \begin{matrix} 233 \\ 380 \end{matrix} \right.$$

The emperor of Airāvata region sees the second sun's image situated on the first orbit above the Nīla mountain upto the same measure of yojanas as above. //7.434//

When the sun rises in Bharata region, there is night in Kṣemā etc., three cities in excess by slightly greater than a muhūrta, and in Ariṣta city in excess by slightly smaller than a nālī. //7.435//

ṇālī 1 |

At that time there is sunset in Khaḍgapurī, afternoon in excess of a nālī in Mañjūṣāpura, and afternoon in excess of a muhūrta in Auṣadhīnagara. //7.436//

At that time that afternoon is in excess of a muhūrta in Puṇḍarīkiṇī city, and at nearby Devāraṇya, it is in excess of two muhūrtas. //7.437//

At this instant, on the first path, near Susīmā city, in Devāranya, there is afternoon in excess of three muhūrtas. //7.438//

At this time, the afternoon at Susīmā and Kuṇḍalapura, is in excess by three muhūrtas each; at Aparājita and Prabhaṅkarapura, it is in excess by two muhūrtas each; at Aṅkapura and Padmapura, it is in excess by one muhūrta each; and at Śubhanagara, it is in excess by a nālī. Besides this, in Ratnasaṁcayapura at that time, there is night for slightly less than the third part of a nālī. //7.439-7.440//

When there is rise of the sun in Airāvata region, I relate the day-night classification for Apara Videhas. //7.441//

Whatever measures for the previous night and the afternoon periods happen to be from Kṣemā city upto Devāraṅya, those very measures should be known, respectively, for Aśvapurī, etc., the nine stations. //7.442//

There happen to be previous-night, and afternoon periods in nine stations, Avadhyā etc., as mentioned earlier similar to those at the cities of Ratnasaṁcayapura etc. //7.443//

When there is noon in Bharata and Airāvata regions, just as there is night for slightly less than six muhūrtas in Puṇḍarīkiṇī city. Similarly, there is night for slightly less than six muhūrtas in Vītaśokā city. //7.444//

At that time, just as there is rise and setting of the sun on the Niṣadha mountain, similarly, simultaneously there is rise and setting of the sun in both sides above the Nīla mountain. //7.445//

In Bharata region, the emperor can not see the sun's image in the first path above Niṣadha mountain beyond five thousand five hundred seventy-four yojanas and two hundred thirty-three parts out of three hundred eighty parts of a yojana in excess. //7.446-447//

$$5574 \left| \begin{matrix} 233 \\ 380 \end{matrix} \right|$$

In Airāvata region, the emperor can not see the next sum in the first path, beyond the above measure above the Nīla mountain. //7.448//

Both the sun's images of Jambū island enter into the second path from the first orbit, transgressing two yojanas each, separately from south-east and north-west directions. //7.449//

When both the suns, entering into the first orbit, enter into Bharata and Airāvata regions respectively, simultaneously the earlier mentioned days and nights occur.//7.450//

In this way in all the paths, having known those rise and setting details, the measures of day and night in every orbit be calculated for the sun situated in the external path. //7.451//

When the sun is situated on the external (outward) path, the day happens to be of twelve muhūrtas and the night happens to be of eighteen muhūrtas in all the orbits. //7.452//

When the sun is coming from the outermost path towards the initial path, the earlier mentioned day and night go on becoming greater and lesser, successively. //7.453//

In the diurnal motion of the sun, there is obtained only one rise-station. Similarly, the

measures of rise stations be calculated in the island, altar and the Lavaṇa sea. //7.454//

In the Jambū island, those rise stations are sixty-three and twenty-six parts over one hundred seventy, and on the altar over the island, the number is one and seventy-four over one hundred seventy. //7.455//

63	26	1	74
	170		170

There are one hundred eighteen and one hundred eighteen parts over one hundred seventy stations of rising of sun in the Lavaṇa sea. When all these are combined, the total number of rise-stations is one hundred eighty-three and forty-eight over one hundred seventy. //7.456//

118	118	183	48
	170		170

Here, there is only one orbital plane of the eighty-eight planets, where in every orbit there are orbits and circumferences (epicycles ?)

Those planets move in these epicycles ? Their interval span from the Meru mountain and that whatever has been mentioned earlier, the lessons have been lost in course of time (kālavaśa). //7.458//

The presentation of planets comes to an end.

In the middle of the fifteen paths of the moon, there happen to be only eight orbits of the twenty-eight constellations (nakṣatra). //7.459//

Nine, Abhijit, etc.; Svāti, Pūrvāphālgunī and Uttarāphālgunī, these twelve constellations move in the first orbit of the moon. //7.460//

In the third path of the moon, Punarvasu and Maghā, in the seventh path Rohiṇī and Citrā; in the sixth path Kṛttikā; and in the eighth Viśākhā constellation move along. //7.461//

Anurādhā in the tenth; Jyeṣṭhā in the eleventh, Hasta, Mūla etc. (Mūla, Pūrvāṣaḍhā, Uttarāṣāḍhā) three, Mṛgaśīrṣā, Ārdrā, Puṣya, and Āśleṣā, these eight constellations move along. //7.462//

The numbers of stars corresponding to the constellations Kṛttikā, etc., respectively, are denoted as six, five, three, one, six, three, six, four, two, two, five, one, one, four, six, three, nine, four, four, three, three, five, one hundred eleven, two , two, thirty-two, five and

three. //7.463-464//

6 | 5 | 3 | 1 | 6 | 3 | 6 | 4 | 2 | 2 | 5 | 1 | 1 | 4 | 6 | 3 | 9 |
4 | 4 | 3 | 3 | 5 | 111 | 2 | 2 | 32 | 5 | 3 .

The geometrical shapes of the stars of those constellations, Kṛttikā etc., are like those of the fan, spoke of cart-wheel, head of a deer, lamp, arched gateway, umbrella, an ant hill, cow-uric, bow and arrow, hand, blue lotus, lamp, blacksmith's instrument, garland, lute, horn, scorpion, complex rectangular well, head of a lion, head of an elephant, drum, winged bird, army, front portion of an elephant, back portion of an elephant, boat, head of a horse, an oven. //7.465-467//

The numbers corresponding to own all stars, are placed and multiplied by eleven hundred eleven, resulting in the measure of the family-stars of every constellation. When the measure of original stars is added to this, the measure of all stars is known. The constellations are of three types, intermediate, maximal and minimum. //7.468-469//

Multiplier, Family stars:-

1111

6666	5555	3333	1111	6666	3333	6666	4444
2222	2222	5555	1111	1111	4444	6666	3333
9999	4444	4444	3333	3333	5555	123321	2222
2222	35552	5555	3333				

[Total stars]-

6672	5560	3336	1112	6672	3336	6672	4448
2224	2224	5560	1112	1112	4448	6672	3336
10008	4448	4448	3336	3336	5560	123432	2224
2224	35584	5560	3336				

The six constellations, Jyeṣṭhā, Ārdrā, Śatbhiṣak, Bharaṇī, Svāti, and Āśleṣā are the smaller. The Punarvasu, three uttarās (Uttarāphālgunī, Uttarāṣāḍhā, Uttarābhādrapadā), Rohiṇī and Viśākhā are the greater, and the remaining constellations are medium. Out of these, the smaller constellations have one thousand five, medium have twice as these, and the greater constellations have thrice as many celestial parts (nabha khaṇḍa). //7.470-471//

1005 | 2010 | 3015 |

But, the Abhijit constellation has only six hundred thirty celestial parts. In this way,

the boundary of each of these constellations be known for their divisions. //7.472//

630 |

Every one of all constellations, transgresses eighteen hundred thirty-five celestial parts in a muhūrta. //7.473//

1835 |

I relate the measure of celestial parts of the constellations relative to two moons. These celestial parts are in the shape of a special musical instrument, Kāhalā. Their total measure is one lac nine thousand eight hundred. //7.474//

109800 |

The velocity of the constellations per muhūrta, [1835], is the measure (pramāṇa) set (rāśi). One muhūrta is the fruit set (phala rāśi), and all total sùm of celestial parts is the requisition set (icchā rāśi). Whatever is obtained on application of the rule of three sets (trairāśika), those amounts be known to be the period of motion in individual orbits. That measure is found to be slightly greater than fifty-nine muhūrtas. //7.475-476//

1835 | 109800 | 59 |

The measure of this excess is three hundred seven as divided by three hundred sixty-seven parts of a muhūrta. //7.477//

307 |

367 |

Śravaṇa etc. eight, Abhijit, Svāti, Uttarā, Pūrvā, constellations move fifty-two hundred sixty-five and a bit in excess in a muhūrta. Here, the measure of excess is eighteen thousand two hundred sixty-three parts as divided by twenty-one thousand nine hundred sixty parts of a yojana. //7.478-479//

5265	18263
	21960

Punarvasu and Maghā move in yojana given in decimal order by numerals three, seven, two, five, and eleven thousand four hundred three parts of a yojana in excess in a muhūrta. //7.480//

5273	11403
	21960

The Kṛttikā constellation moves fifty-two hundred eighty-five yojanas and thirty-seven parts divided by five hundred ninety-four parts in excess. //7.481//

$$5285\ \frac{37}{594}$$

Every one of Citrā and Rohiṇī move slightly greater than five thousand two hundred eighty-eight yojanas. The measure of excess is given by numerals in decimal order, zero, six, nine, one, two, parts as divisor of twenty thousand three hundred seventy-seven parts of a yojana. //7.482-483//

$$5288\ \frac{20377}{21960}$$

Viśākhā constellation moves fifty-two hundred ninety-two yojanas and sixteen thousand nine hundred forty-seven parts in excess in a muhūrta. //7.484//

$$5292\ \frac{16947}{21960}$$

Anurādhā constellation moves fifty-three hundred yojanas and ten thousand four hundred fifty-four parts in excess in a muhūrta. //7.485//

$$5300\ \frac{10454}{21960}$$

Jyeṣṭhā conatellation moves fifty-three hundred four yojanas and seven thousand twenty-four parts in excess in a muhūrta. //7.486//

$$5304\ \frac{7024}{21960}$$

Each of the eight constellations, Puṣya, Āśleṣā, Pūrvāṣāḍhā, Uttarāṣāḍhā, Hasta, Mṛgaśīrṣā, Mūla and Ārdrā move fifty-three hundred nineteen yojanas and fifteen thousand nine hundred ninety-eight parts in excess in a muhūrta. //7.487-488//

$$5319\ \frac{15998}{21960}$$

The orbital region of the smaller constellations is thirty yojanas and twice as well as

thrice of this is the measure of that of the medium and greater constellations, respectively. //7.489//

30	60	
	90	

The orbital region of the Abhijit constellation is eighteen yojanas, and the orbital region of their own stars is the self-stationed space alone. //7.490//

The five constellations, Svāti, Bharaṇī, Mūla, Abhijit and Kṛttikā move vertically up, vertically down, in the south, north and middle, respectively. //7.491//

These constellations move perpetually in their own earlier mentioned paths, circumscribing the Mandara mountain. //7.492//

At the setting period of Kṛttikā constellation, Maghā is at the meridian (noon) and Anurādhā gets risen. Similarly, the rise etc. of remaining constellations should be known. //7.493//

Thus ends the description of constellations.

The scattered stars are of two types: moving and stable. Their maximal number is one lac thirty-three thousand nine hundred fifty crore squared. //7.494//

133950000000000000000 |

Out of these, thirty-six stable stars are situated in four directional parts of the Jambu island. These family-stars belong to the two moons. Half of these are the family-stars of one moon. //7.495//

36 | 66975000000000000000 |

The motion of the stars in all be known to be greater than the velocity of the constellations. The discourse about their names has become extinct in course of time. //7.496//

The sun moves faster than the moon, the planets move faster than the sun, the consellations move faster than the planets, and the stars move (still) faster. //7.497//

Thus ends the description of the stars.

The sun, the moon and all those planets moving in their own regions have solstices (ayana). For the group of constellations and the stars, there is no such rule of solstices. //7.498//

In every solstice of the sun there are one hundred eighty-three day-nights, and in the solstice of the moon there are thirteen and forty-four parts out of sixty-seven parts of days. //7.499//

183	13	44
		67

The south solstice of the suns is in the beginning and the north solstice happens to be in the end. The order of the moon's solstices is reverse of the above. //7.500//

The extension of the Abhijit constellation among constellations, (or its measure in celestial parts) has been seen to be six hundred thirty through infinite knowledge by the omnivisionaries. //7.501//

630 |

The boundary-extension of the constellions Śatbhiṣak, Bharaṇī, Ārdrā, Svāti, Āśleṣā and Jyeṣṭhā is one thousand five celestial parts. //7.502//

The celestial parts of Punarvasu, Rohiṇī, Viśākhā, and the three uttarās are each three times of the above, and those of the remaining constellations are twice as above (1005). //7.503//

The total celestial parts of all constellations are fifty-four thousand nine hundred. Twice as these are to be understood as the celestial parts of the two moons. //7.504//

54900 |

In this way, this orbital division full of one lac ninety-eight hundred celestial parts is in the extension form of the boundaries of the constellation groups. //7.505//

109800 |

The sun transgresses eighteen hundred thirty celestial parts in a muhūrta. The division of boundary of the constellations ------- is to be known. //7.506//

1830 |

The moon transgresses seventeen hundred sixty-eight celestial parts in a muhūrta. Relative to this, the sun moves sixty-two celestial parts more, and the constellation group moves sixty-seven celestial parts more. //7.507//

1768 | 1830 | 1835 |

The difference between the celestial parts of the moon and the sun is sixty-two. When the sun moves sixty-two celestial parts more than those relative to the moon, how many will it move in thirty muhūrtas ? In this type of the rule of three sets (trairāśika), the measure set is one muhūrta, the fruit-set is sixty-two, and the requisition set is thirty muhūrtas. //7.508//

1 | 62 | 30 |

When there is transgression of celestial parts given by one, eight, three, zero in decimal order, in a muhūrta, what (time in muhūrta) will be taken in transgression of eighteen hundred sixty celestial parts ? //7.509//

1830 | 1860 | 1 |

The sun moves relative to the moon one muhūrta in a day or thirty muhūrtas and one out of sixty-one parts of a muhūrta in excess. //7.510//

$$1 \quad \Big| \quad \begin{matrix} 1 \\ 61 \end{matrix} \quad \Big|$$

Whatever be the difference between the celestial parts of the sun and the constellations, taking it here the measure set is one muhūrta, the fruit set is five and the requision set is thirty muhūrtas. //7.511//

1 | 5 | 30 |

When the sun transgresses eighteen hundred thirty celestial parts in a muhūrta period, in how much time will it be able to transgress one hundred and fifty celestial parts ? //7.512//

1830 | 1 | 150 |

The constellations, relative to the sun, move in excess of five out of sixty-one parts of a muhūrta out of the day-muhūrtas. //7.513//

$$5 \quad \Big| \quad \begin{matrix} \\ 60 \end{matrix}$$

Whatever is the amount of celestial parts for which the sun and the moon remain behind relative to the constellations, on dividing the celestial parts of the constellations by it, the quotient gives the period for which the sun or the moon remain, in conjunction with the constellations. //7.514//

If the sun moves half of three hundred celestial parts behind, how much time will be taken by it to traverse different constellations in their own celestial parts ? //7.515//

150 | 1 | 630 |

The Abhijit constellation moves with the sun for four day-nights (ahorātras) and six muhūrtas. I relate the description of the remaining constellations. //7.516//

a. rā. 4, mu. 6 |

The Śatabhiṣak, Bharaṇī, Ārdra, Svāti, Āsleṣā, Jyeṣṭhā [small or minimal] constellations move with the sun for six day-nights and twenty one muhurtas. //7.517//

a. rā. 6, mu. 21 |

The three Uttarās, Punarvasu, Rohiṇī and Viśākhā, these six great [maximal] constellations move with the sun for twenty day-nights and three muhūrtas period. //7.518//

a. rā. 20, mu. 3 |

The remaining medium constellations move with the sun for thirteen day-nights and twelve muhūrtas period. //7.519//

a. 13 mu 12 |

When the moon remains sixty-seven celestial parts behind the constellations in a muhūrta, then how much time will it take to move with the celestial parts (of the constellations) ? //7.520//

67 | 1 | 630 |

On dividing the celestial parts of the Abhijit constellation by sixty-seven, the quotient obtained is nine muhūrtas and twenty-seven parts out of sixty-seven parts of a muhūrta. This is the time-period for which the moon moves with the Abhijit constellation. //7.521//

$$9 \left| \begin{matrix} 27 \\ 67 \end{matrix} \right|$$

The six constellations, Śatabhiṣak, Bharaṇī, Ārdrā, Svāti, Āśleṣā, Jyeṣṭhā, remain with the moon for fifteen muhūrtas. //7.522//

15 |

The remaining fifteen constellations move with the moon for thirty muhūrtas. This has been called the yoga (conjunction) of those constellations. //7.523//

30 |

The three Uttaras, Punarvasu, Rohiṇī, Viśākhā, these six constellations remain in conjunction with the moon for forty-five muhūrtas. //7.524//

45 ।

There are one hundred eighty-three days in one solstice of the sun. Out of these solstices, the southern solstice happens to be in the beginning and the northern solstice happens to be in the end. //7.525//

183 ।

In the southern solstice of the sun, there are frequencies (āvṛttis) beginning with one, and then two more in succession, as one, three, five, seven and nine. In this frequency, the number of terms (gaccha) is five (pañca pāda). Similarly, initiating with two, there are frequencies with more with two, as two, four, six, eight and ten. In this way, the frequencies happen to be in the northern solstice also. In this northern frequency, the number of terms (pada) shall remain five. //7.526//

There are two solstices in a year. After lapse of three months of every solstice, there is an equinox (viṣupa). In this way, there are ten equinoxes in a semideca period (yuga) of five years. On dividing these by two, there are five equinoxes, each corresponding to different solstice in every semi-deca period (yuga). Here now, is the method of finding out the constellation corresponding to the day relative to the frequency and equinox. //7.527//

The term of the frequency as reduced by unity is multiplied by six. When one is added to the product the date (tithi) of the frequency is obtained. And in that very product when three is added, the date (tithi) of the equinox is obtained. If the date number is odd, it is the dark fortnight, and if it is even, it is the white fortnight. When the date-number is doubled, the measure of festival (parva) is obtained. //7.528//

The chosen frequency as reduced by unity is multiplied by seven and divided by ten. The remainder is multiplied by number [184] of solstice-days and divided by sixty-seven. Whatever is the quotient, its counting initiating with the Abhijit constellation gives the lapsed constellation, and hence the next constellation is the frequency-constellation. //7.529//

On the full moon day of the Āsāḍha month, the semi-deca period (yuga) (of five years) completes, and on the Śravaṇa dark first day, the moon conjuncts with the Abhijit constellation, which is the beginning of the semi-deca period (yuga). //7.530//

On the thirteenth dark of Śravaṇa, at the conjunction of the Mṛgśīrṣā constellation, in this month and the second, the third frequency occurs on the tenth white. //7.531//

[The fourth and fifth frequency has been related as follows in TPT (V). v.535]

On the Śrāvaṇa dark seventh, at the conjunction with the Revatī constellation there is the fourth frequency, and on Śrāvaṇa white fourth, at the conjunction of Pūrvāphālgunī constalletion, there happens to be the fifth frequency. //7.535// [TPT (V)]

When the sun reaches the northern direction, within five years, in the month of Śrāvaṇa, these five frequencies occur as per rule. //7.532//

When the sun is situated on the Hasta constellation, in the dark fortnight of Maghā month, on the seventh day, at the Rudra muhūrta, it turns from the south towards the north. //7.533//

In this very month, at the constellation of Śatbhiṣak, on the fourth of the white fortnight, on the second and the first of the dark fortnight, when there is the Puṣya constellation, there is the third frequency (āvṛtti). //7.534//

On the thirteenth of the dark fortnight, at the Mūla constellation, fourth, and on the white fortnight at tenth date (tithi), when there is the Kṛttikā constellation, there is the fifth frequency. //7.535//

Within the five years, in the month of Māgha, at the south solstice, there happen to be these five frequencies of the sun, as per rule. //7.536//

Out of the equinoxes which are in form of equal day and equal night, the first equinox happens to be on the third date (tithi) of dark fortnight in Kārtika month, at the lapse of six festivals (parvas), full moon and the last day of the dark fortnight (amāvasyā), when there is the Rohiṇī constellation. //7.537//

The second equinox happens to be on the ninth of dark fortnight in the month of Vaiśākha, at the Dhaniṣṭhā constellation at the lapse of eighteen parvas (the last days of the white and dark fortnights) from the beginning. //7.538//

The third equinox happens to be on the full moon day of the Kārtika month at the Svāti nakṣatra, after the lapse of twenty-one parvas (the last days of the white and dark halves). //7.539//

The fourth equinox happens to be on the sixth of the white half of Vaiśākha month, at the Punarvasu constellation after the lapse of forty-three parvas. //7.540//

The fifth equinox happens to be on the twelfth of the white fortnight in Kārtika month, after the lapse of fifty-five parvas [at the Uttarābhādrapada constellation], as per rule.

//7.541//

The sixth equinox happens to be on the third of the dark fortnight of Vaiśākha mouth, [at the Anurādhā constellation after the lapse of sixty-eight parvas] as per rule. //7.542//

The seventh equinox happens to be in the Kārtika month on the ninth of its dark half, at the Maghā constellation, after the lapse of eighty parvas. //7.543//

The eighth equinox happens to be on the full moon day of the Vaiśākha month, at Aśvinī constellation, after the lapse of ninety-three parvas from the beginning of the yuga. //7.544//

The ninth equnox happens to be on the sixth of the white fortnight in Kārtika month, at the Uttarābhādrapada constellation, after the lapse of one hundred five parvas. //7.545//

The tenth equinox happens to be on the twelfth of the white half of the Vaiśākha month, at the Uttaraphālgunī constellation (having Uttarā term in its precedence), after the lapse of one hundred seventeen parvas (the last days of the white and dark fortnights). //7.546//

In this way, from the first instant of the hyperserpentine (utsarpiṇī) period, upto the last instant, in the yuga bound by five years each, the southern and northern solstices and the equinoxes be calculated. //7.547//

The measure of the southern solstices is innumerate part of the palya and as much is also the measure of northern solstices. The measure of the equinoxes is twice this. //7.548//

dakki	pa	utta	pa	usu	pa	2
	a		a		a	

Similarly, in the hyposerpentine (avasarpiṇī) period, like the water-wheel clock, the southern solstices and the northern solstices as well as the equinoxes, be related. The casts of the sun, as earlier, are infinite-infinite. //7.549//

There are four moons in the Lavaṇa sea, twelve in the Dhātakīkhaṇḍa, forty-two in the Kāloda sea, and seventy-two moons in the Puṣkarārdha island. //7.550//

4 | 12 | 42 | 72 |

Half of the moons of the islands and seas for each, move in one portion and the remaining half in the other portion in a linear order. //7.551//

The orbilal region of the two moons has a width of five hundred ten yojanas as in

excess of the image of the sun $\frac{48}{61}$ of a yojana. //7.552//

Whatever are the orbits of the moons as fifteen, in the separate orbital region, their width is fifty-six parts out of sixty-one parts of a yojana. //7.553//

$$15 \left| \begin{matrix} 56 \\ 61 \end{matrix} \right|$$

The number of moons (belonging to an island or sea) is divided by sixty-one units and multiplied by twenty-eight. The product is subtracted from the width of the corresponding island or sea, and then divided by the number of moons. The quotient is the interval between the initial path of the moons situated in the innermost orbit and the boundary of the island or sea. //7.554-555//

In the Lavaṇa sea the interval between the inner orbit and the boundary is forty-nine thousand nine hundred ninety-nine and thirty-three parts out of sixty-one parts of a yojana. //7.556//

$$49999 \left| \begin{matrix} 33 \\ 61 \end{matrix} \right|$$

In the Dhātakīkhaṇḍa, this interval is given by the number in decimal order as two, three, three, three, three, yojanas and one hundred sixty parts out of one hundred eighty-three parts of a yojana. //7.557//

$$33332 \left| \begin{matrix} 160 \\ 183 \end{matrix} \right|$$

The interval betveen the boundary of the Kālodaka sea and inner orbit is given by the number of yojanas in decimal order as seven, four, zero, nine, one, and two hundred five parts out of twelve hundred eighty-one parts of a yojana. //7.558//

$$19047 \left| \begin{matrix} 205 \\ 1281 \end{matrix} \right|$$

In the Puṣkarārdha island, this interval measure is given by the number of yojanas in decimal order as zero, one in four places, and three hundred fifty-eight parts out of five hundred forty-nine parts of a yojana. //7.559//

$$11110 \left| \begin{matrix} 358 \\ 549 \end{matrix} \right.$$

The above mentioned intervals of the moons situated on the first path, are greater than the second etc. paths inside, and are without them outside. //7.560//

From the width of the Lavaṇa sea etc., half the measure of width of the four moons is subtracted. The remainder is divided by half the number of moons. This quotient gives the interval between two moons of the Lavaṇa sea. //7.561-562//

In the Lavaṇa sea, the interval between two moons is ninety-nine thousand nine hundred ninety-nine yojanas and five parts of a yojana. //7.563//

$$99999 \left| \begin{matrix} 5 \\ 61 \end{matrix} \right.$$

In the Dhātakīkhaṇḍa island, the interval between the moons is given by the number of yojanas in decimal order as five, six in four places and one hundred thirty-seven parts divided by one hundred eighty-three parts of a yojana. //7.564//

$$66665 \left| \begin{matrix} 137 \\ 183 \end{matrix} \right.$$

In the Kāloda sea, the interval between the moons is given by the number of yojanas in decimal order as four, nine, zero, eight, three and four hundred ten parts out of [or divided by] twelve hundred eighty-one parts of a yojana. //7.565//

$$38094 \left| \begin{matrix} 410 \\ 1281 \end{matrix} \right.$$

In the Puṣkarārdha island, the interval between the moons is given by the number in decimal order as one and two in four places, and one hundred sixty-seven parts as divided by five hundred forty-nine parts of a yojana. //7.566//

$$22221 \left| \begin{matrix} 167 \\ 549 \end{matrix} \right.$$

There are own velocities of the own rays of each of the moons equal to the difference [interval] between the first path and the boundaries. //7.567//

In the Lavaṇa sea etc., there are respectively, thirty, ninety, three hundred fifteen and

five hundred forty orbits of the moons. //7.568//

30 | 90 | 315 | 540 |

The circumferences of own paths are saparately multiplied by two hundred twenty-one and divided by thirteen thousand seven hundred twenty-five. This gives the velocity per muhūrta period. //7.569//

$$\frac{221}{13725}$$

The remaining description of the moons situated in the Lavaṇa sea, Dhātakīkhaṇḍa, Kāloda sea, and Puṣkarārdha island should be known as that of the moons of the Jambū island. //7.570//

Thus ends the description of the moons.

There are four suns in the Lavaṇa sea, twelve in the Dhātakīkhaṇḍa, forty-two in the Kāloda sea, and seventy-two suns in the Puṣkarārdha island. //7.571//

4 | 12 | 42 | 72 |

Out of the numbers of the suns belonging to islands and seas, half of them move in the one portion and the [remaining] half move in the second portion in a linear order. //7.572//

There are orbital regions each of the two suns. The diameter of this orbital region is five hundred ten yojanas in excess of the sun's image. //7.573//

$$1 \,\Big|\, 2 \,\Big|\, \frac{510}{61} \,\Big|\, 48$$

There are one hundred eighty-four orbits in every one of the orbital regions. Their width is forty-eight as divided by sixty-one parts of a yojana. //7.574//

$$184 \,\Big|\, \frac{48}{61} \,\Big|$$

From the width of the orbital motions in Lavaṇa etc., half the width of sun's image is subtracted, the remainder is divided by half the number of suns. The quotient is the interval between the two suns, and the interval between the boundary and first path is given by half the quotient. //7.575 576//

The interval between each of the suns in Lavaṇa sea is ninety-nine thousand nine hundred ninety-nine yojanas and thirteen divided by sixty-one parts. Half of this is the interval between the boundary and own first path. //7.577-578//

$$99999\ \frac{13}{61}$$

In the Dhātakīkhaṇḍa, the interval between the each of the suns is sixty-six thousand six hundred sixty-five yojanas and one hundred sixty-one parts out of one hundred eighty-three parts of a yojana. Half of this is the velocity of the rays and equivalent to this is the interval (ābāhā) of the sea. //7.579-580//

$$66665\ \frac{161}{183}$$

The interval of each of suns in Kāloda sea is thirty-eight thousand ninety-four yojanas and five hundred seventy-eight parts as divided by twelve hundred eighty-one parts of a yojana. Half of this is the velocity of the rays and equivalent to it is the interval (ābāhā) of the sea. //7.581-582//

$$38094\ \frac{578}{1281}$$

In the Puṣkarārdha island, the interval between each one of the suns is twenty-two thousand two hund[illegible]d twenty-one yojanas and two hundred thirty-nine parts as divided by five hundred forty-nine parts of a yojana. Half of this, the velocity of the rays and equivalent to it is the difference (antara) of the sea. //7.583-584//

$$22221\ \frac{239}{549}$$

The interval of the suns situated in two sides, in the interior, is in excess of the orbital region, and in the exterior, is without the orbital region. //7.585//

In the Jambū island the rays of the moons and the suns move for the number of yojanas given by decimal order as zero, three, three, zero, five, from the last orbit to the interior. //7.586//

$$50330$$

In the Lavaṇa sea the rays move for the number of yojanas given by decimal order as

two, two zeros, three and three, and one hundred parts out of one hundred eighty-three parts of a yojana, from the last path to the exterior. //7.587//

$$33002\ \frac{100}{183}$$

In the first path [the motion of the rays of the suns and moons], is given by the number of yojanas given in decimal order as zero, two, eight, nine, four. This has been related by the Lord Jina. //7.588//cf. //7.592-593TPT(V)//

49820 |

In the exterior part, the rays of the sum propagate for the number of yojanas given in decimal order as three, one, five, three, three, and one out of three parts of a yojana. In the remaining paths, there is decrease and increase of the rays. //7.588// cf. 7.593 TPT (V)//

$$33513\ \frac{1}{3}$$

The rays of the suns and moons in the orbital region of the Lavaṇa sea propagate only upto their own region and never to other regions. //7.589//

There are three hundred sixty-eight solar orbits in the Lavaṇa sea and eleven hundred four alone in the Dhātakīkhaṇḍa island. //7.590//

368 | 1104 |

There are three thousand eight hundred sixty four orbits in the Kāloda sea and six thousand six hundred twenty-four orbits in the Puṣkarārdha island. //7.591//

3864 | 6624 |

On dividing the own circumferences by sixty muhūrtas, the quotient becomes the measure of the motion of the suns in a muhūrta. //7.592//

Whatever description is of the suns situated in the Jambū island, that very should be understood for the Lavaṇa sea, Dhātakīkhaṇḍa, Kāloda and Puṣkarārdha as well. //7.593//

Thus ends the presentation of the sun's description.

There are three hundred fifty-two planets in the Lavaṇa sea and one thousand fifty-six in the Dhātakīkhaṇḍa island. //7.594//

352| 1056 |

There are three thousand six hundred ninety-six planets in the Kāloda sea and sixty-three hundred twenty-six in the Puṣkarārdha island. //7.595//

3696 | 6326 |

There are one hundred twelve constellations in Lavaṇa sea and three hundred thirty-six in Dhātakīkhaṇḍa. //7.596//

112| 336 |

There are eleven hundred seventy-six constellations in the Kāloda sea and two thousand sixteen in the Puṣkarārdha island. //7.597//

1176 | 2016 |

The remaining description, as described in the Jambū island, is to be similarly, known for the Lavaṇa sea, Dhātakīkhaṇḍa island, Kāloda sea and Puṣkarārdha island. //7.598//

Thus ends the presentation on constellations.

There are two lac sixty-seven thousand nine hundred crore squared stars in the Lavaṇa sea. //7.599//

267900000000000000000 |

There are eight lac three thousand seven hundred crore squared stars in the Dhātakiīkhaṇḍa. //7.600//

803700000000000000000 |

There are twenty-eight lac twelve thousand nine hundred fifty crore squared stars in the Kāloda sea. //7. 601//

2812950000000000000000 |

In the Puṣkarārdha island there are forty-eight lac twenty-two thousand two hundred crore squared stars. //7.602//

48222000000000000000000 |

Their remaining description is like that of the Jambū island. The only speciality is this that the number of constant stars [immovable stars] is different. //7.603//

These immovable stars are one hundred thirty-nine in Lavaṇa sea and one thousand ten in Dhātakī island. //7.604//

139| 1010 |

There are forty-one thousand one hundred twenty constant stars in the Kāloda sea, fifty-three thousand two hundred thirty constant stars in the Puṣkarārdha island. //7.605//

41120 | 53230 |

In one side portion, in the interior of the human universe, there are sixty-six, one in both the side portions there are just the double moons, and the same number is that of the suns. //7.606//

66 | 132 |

There are eleven thousand six hundred sixteen planets in the human universe and three thousand six hundred ninety-six constellations [there] //7.607//

11616 | 3696 |

In the human region, there are eighty-eight lac forty thousand seven hundred crore squared stars. //7.608//

8840700000000000000 |

In the human region, ninety-five thousand five hundred thirty-five stars are fixed (motionless). //7.609//

95535 |

The moon, the sun, the constellation, the planet, and the star, all these move in the celestial parts in line through the circumferences of each of its own path. //7.610//

In the Jambū island, all the groups of astral deities move round the Meru. In the Dhātakīkhaṇḍa and the semi-Puṣkara island, half of the astral deities move round the Meru. //7.611//

Thus ends the description of the movements of the moving planets.

Ahead of the Mānuṣottara mountain, upto the Svayaṁbhūramaṇa, there are stationed immoveable form of groups of astral deities in the islands and seas. //7.612//

Ahead of this, from the Mānuṣottara mountain upto the Svayaṁbhūramaṇa sea, the method of arrangement of the stationed moons and suns, is related. It is like this- There is first ring, fifty thousand yojanas ahead of Mānuṣottara sea. Ahead of this, upto Svayaṁbhūramaṇa sea, there are second etc. rings, each one lac yojanas ahead (of the preceding). The speciality is this that just fifty fhousand yojanas this foreside of the altar of

sea of the Svayaṁbhūramaṇa sea, there is the last ring in the region.

In this way, reply of the question as to how many are the rings, (the answer is) that when the universe-line is divided by fourteen lac yojanas, the quotient on being reduced by twenty-three gives the total number of rings. Its representation is

$$\begin{array}{|l} - \quad ri \quad 23 \\ 140000 \end{array}$$

The measure of the moons and the suns situated in these rings is related- In the first ring of Puṣkarārdha island are situated one hundred forty-four of each of the moon or sun. |144 | 144 |. In the first ring of Puṣkaravara sea, there are two hundred eighty-eight of each of the moon or the sun. In this way, the number of the moons and the suns situated each in the first ring of the subsequent island or sea have been becoming double of those situated each in the first ring of the preceding island or sea. Out of them, the last abstraction (vikalpa) is related- The moons and the suns situated in the first ring of the Svayaṁbhūramaṇa sea, nine universe-line as divided by twenty-eight lac and in excess of twenty-seven as divided by four. It is as follows-

$$\begin{array}{|l} - \quad 9 \quad | \quad 27 \\ 2800000 \quad | \quad 4 \end{array}$$

The following verse- formula for finding out the number of the moons-suns situated in the first ring of the each of the island or sea from the Puṣkarārdha island upto the Svayaṁbhūramaṇa sea-

The number of the moons-suns situated in the first ring of each of the islands-seas is obtained on dividing the width of its successive Puṣkaravara sea etc. islands-seas by one lac and multiplying the quotient by nine. //7.613//

Here the common difference, in every place of every ring, has been four in successive order, upto the Svayaṁbhūramaṇa sea. Omitting the first ring station of the penultimate island or ocean, the increase should be related in the successive order of four everywhere. (?) |

Going fifty thousand yojanas ahead of the Mānuṣottara mountain, the interval between the moons-suns, situated on the first ring is forty-seven thousand nine hundred fourteen yojanas and one hundred seventy-six parts of a yojana out of one hundred eighty-three parts of a yojana. It is this-

47914	176	
	183	

In the second ring, the interval between the moons-suns is forty-eight thousand six hundred forty-six yojanas and in excess of two thousand one hundred thirty parts out of two thousand two hundred fifty-seven parts of a yojana. That is as:

48646	2130	
	2257	

and it should be carried over upto the Svayaṁbhūramaṇa sea in this way.

The last abstraction out of them is related- In the first ring of the Svayaṁbhūramaṇa sea the interval between every one of the moons-suns is thirty-three thousand three hundred thirty-one yojanas and one hundred fifteen parts out of one hundred eighty-three parts of a yojana as also in excess of one out of innumerate part of a yojana. It is as

33331	115	
	183	

In this way, the interval has gone on increasing in special excess from the second path of the Svayaṁbhūramaṇa sea upto its penultimate path. In this way, the interval between the moons-suns in the last ring of the Svayaṁbhūramaṇa sea is related to be forty-six thousand one hundred fifty-two yojanas and one hundred twelve parts out of seven hundred ninety-three parts of a yojana. It is as:

46152	112	
	793	

Thus the description of the immoveable astral collections comes to an end.

Further, the method for finding out the total number of moons and with their families is described. It is like this - Leaving the Jambū island etc. five island-seas, initiating from the third sea, the operational method for calculating these upto the Svayaṁbhūramaṇa sea is given:

In the third sea, the number of terms is thirty-two, that for the fourth island is sixty-four and that for the next sea is one hundred twenty-eight, and in this way the number of terms (gaccha) goes on doubling upto the Svayaṁbhūramaṇa sea. Now, separate multiplicand quantities (rāśis) corresponding to these number of terms are described. Out of these, for the

third sea, it is two hundred eighty-eight, and that for the next island, the multiplicand set is twice as much. In this way, the multiplicand quantities go on successively doubling upto the Svayaṁbhūramaṇa sea. Now, having divided the multiplicand sets by two-hundred eighty-eight, the quotients are multiplied by their corresponding number of terms (gacchas), two hundred eighty-eight alone is to be the multiplicand set for all the number of terms. On having done thus, all the number of terms are arranged mutually in the order of four-folds. At this instant, four is the initial, while summing up the previous, in the successive order of four, the corresponding number of terms is less by one than that of the earlier mentioned (number of terms), because there is absence of increase of four digits in the place of doubling.

The multiplicand middle-sum (madhyama dhana) sixty-four corresponding to these number of terms is made the initial term, which goes on successively doubling upto the Svayaṁbhūramaṇa sea. Again, for the equation of the number of terms, one digit is to be cast into all the number of terms, separately. After having done this, on dividing the middle sums by sixty-four, the quotients are to be multiplied by their corresponding number of terms, and sixty-four digits are to be placed as multiplicand-set of all the number of terms.

After having done this, the amount of the negative quantity is related- One is made the initial term, the negative quantity extends in the two-fold order, corresponding to number of terms upto the Svayaṁbhūramaṇa sea. Now, the summations of such arrangements in sequential form is related- If the number of terms is taken to be the logarithm of the Rāju to base two (as reduced by logarithm of the Jambū iland to the base two) as increased by six digits, for the summation, then it does not produce the astral bioset, because the divisor does not form to be the square of two hundred fifty-six fingers (aṅgulas), for the universe-line-square (jagapratara). Hence the number of terms be established on having a reduction of other finite digits fit, from the logarithm of the Rāju to the base two. On doing so, the third sea is not the initial, such a doubt be not entertained, because that very third sea is the initial. The reason for this is to reduce the logarithm of Rāju to the base two in the exterior part (para-bhāga) of the Svayaṁbhūramaṇa sea.

The question is, from where it is known that there are logarithm of Rāju to the base two, in the exterior part of the Svayaṁbhūramaṇa sea? The answer is, "from the demonstrative formula of the divisor amounting to square of two hundred fifty-six angulas". "Whatever is the number of islands-seas and the logarithm of Jambū island to the base two, that is also the number of logarithm of Rāju to the base two as in excess of six digits". "Will this lecture not stand in contradiction to the Parikarma" ? The answer to this question is given, that this lecture may contradict the Parikarma, but will not contradict the formula

(sūtra). Hence this lecture may be accepted, and not the Parikarma formula, because it is against the formula, and the lecture, if against the formula, is not to be accepted due to its extreme-context (ati-prasaṅga). Through what authority it is known that there are no astral bodies there? From this very formula (sūtra).

This examination process of the measure of the logarithm of Rāju to the base two as equal to the number of islands-seas alongwith the logarithm of Jambū island to the base two as increased by very-applicable innumerate digits, does not follow the tradition of the instruction (upadeśa) of other preceptors. This follows only the formula of the Triloka prajñapti alone. This description has been described for proving the number of terms in the context through the force of plan which takes support of the formula which produces the corresponding divisor for the astral deities. Hence, here, "This is only such", is the monoended (ekānta) statement which should not be accepted for wrong assertion, because the instruction received from the tradition of the supreme teachers (gurus), can not be analysed through such an import of plan (yukti). Besides this, there is no rule for not opposing the abstractions made by the less learned about the symbolic-norms (padārthas) which are beyond senses. Hence, without omitting the lecture of the earlier preceptors, this direction is fit for demonstration for proper reception by proficient disciples following motivism (hetuvāda) and for making the non-proficient as proficient. Hence the opposition of the school should also not be doubted here.

According to this earlier mentioned ruling, the earlier mentioned number of terms are spread out, and to every single digit, four digits are given and all mutually mutuplied. When asked as to how many, it becomes the measure of the quotient when the universe-line-square is divided by the products of the square of one lac yojanas by finite digits, again multiplied by seven hundred digits (?), and again multiplied by square of sixty-four digits. This quantity is placed at two stations, and one set is multiplied by two hundred eighty-eight, yielding total initial sum. The other set is multiplied by sixty-four digits, yielding the total sum of the common-differences. Both these sets are summed up, reduced by the negative set, cancelling the multipliers and divisors, and on dividing the universe-line-square by the appropriate finite digits, multiplying the square of one lac yojanas converted into square-fingers (pratarāṅgulas), or by the sixty-five thousand five hundred thirty-six digits as multiplied by finite number of digits, the measure of all the astral bodies is obtained. That is this:

4 | 655361655361 |

Again, in a body, there are present very applicable finite bios, hence on multiplying that number by finite number of digits, the measure of the total astral bioset is obtained. That

is as:

1655361 |

The moon's maximal age is one lac years in excess of one palya, that of Venus is one hundred years in excess of one palya, that of Jupiter is one complete palya. The maximal age of the remaining planets should be known to be half a palya. The minimal age of the stars is one-eighth part of a palya and the maximal age is one-fourth part of a palya. //7.614-615//

pa 1 va 100000 | pa 1 va 1000 | pa 1 va 100 | pa 1 | pa 1 pa 1 pa 1
2 | 8 | 4 |

Thus ends the description of age.

✪✪✪

The heavenly planes are situated over and above the heights given by seven rājus as reduced respectively be a hair (bāla) of human beings of Uttarakuru, four hundred twenty-five bow (dhanuṣa), and one lac sixty-one yojanas. //8.6-7//

– 7 riṇa 100061 riṇa daṇḍa 425 ri vā 1
7 |

The first central (indraka) is situated one hair (bāla) of uttarakurū region human over the Kanakādri (peak of the Meru). //8.8//

The measure of decrease-increase is obtained as quotient on dividing the difference between the widths of the first central (indraka) and the last central (indraka) by the number of the centrals (indrakas) as reduced by unity. //8.19//

te rāśi 62 | 4400000 | 1 |

Seventy thousand nine hundred sixty-seven yojanas and twenty-three parts out of thirty-one parts of a yojana is the successive decrease relative to first central (indraka) and the very amount is the successive increase relative to the last central (indraka). //8.20//

70967 23
31 |

The measure of width of the Vimala central (indraka) is related to be forty-four lac twenty-nine thousand thirty-two yojanas and eight parts divided by thirty-one parts of a

yojana. //8.21//

4429032 8

31

The width of the Candra central (indraka) is related to be forty-three lac fifty-eight thousand sixty-four yojanas and in excess of sixteen parts (of a yojana). //8.22//

4358064 16

31

The width of Prītiṅkara central (indraka) is said to be two lac forty-one thousand nine hundred thirty-five yojanas and fifteen parts of a yojana. //8.79//

241935 15

31

The width of the Āditya central is one lac seventy thousand nine hundred sixty-seven yojanas and twenty-three parts. //8.80//

170967 23

31

The width of the Sarvārthasiddhi central (indraka) is one lac yojanas. Thus the widths of sixty-three centrals (indrakas) have been related for the knowledge of the disciples. //8.81//

100000 |

The first pair is in one hand half rājus above the Meru plane, and as much above the preceding in one and half rājus is the second pair. //8.118//

Ahead of this, every one of the six pairs, is in half rāju successively. In this way, the position of the Kalpa has been shown. The Kalpātīta celestial planes are in slightly less than a rāju. //8.119//

– 3	– 3	–	–	–	–	–	–	–	–
14	14	14	14	14	14	14	14	14	7

In the eastern etc. directions of the Āditya indraka are four excellent sequence-ordered celestial planes, Lakṣamī, Lakṣamīmālinī, Vajrā and Vairocinī. And in other directions-

subdirections, there are four miscellaneous (scattered) celestial planes: Saumārya, Somarūpa, Aṅka and Sphaṭika. //8.123-124//

In the extension of slightly less than one and half rāju over the Kanakādri or the peak of the Meru, is kalpa-pair named as Saudharma-Īśāna. //8.129//

$$14\frac{3}{-}$$

The slightly less amount is one lac forty yojanas as in excess of a fore-hair of the Uttarakuru human. //8.130//

100040 |

In order to find out the sequence ordered measure for eight Saudharma etc., four Ānata etc., and lower, middle, upper Graiveyaka as well as Anudiśa etc. two, the measures of the first term are respectively one hundred eighty-six, sixty-two, seven less one hundred, thirty-one, ninety-six, eighty, seventy-two, sixty-eight, sixty-four, forty, twenty-eight, sixteen, four and four. //8.155-157//

186 | 62 | 93 | 31 | 96 | 80 | 72 | 68 | 64 | 40 | 28 | 16 | 4 | 4 |

For the Saudharma etc. four Kalpas, the common-difference is three, one, three and one, and in the remaining kalpas four digits be given to each. //8.158//

3 | 1 | 3 | 1 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |

In twelve such places, the number of terms be placed as follows, thirty-one, seven, four, two, one, one, six, three, three, three, one and one. //8.159//

31 | 7 | 4 | 2 | 1 | 1 | 6 | 3 | 3 | 3 | 1 | 1 |

The number of terms is multiplied by the common-difference and the product is reduced from the sum of the twice the first term and common difference, the remainder so obtained is multiplied by half of the number of terms. The result is to be understood here as the sum of the series. //8.160//

In the kalpa (imaginative) named Saudharma, there are forty-three hundred seventy - one sequence-ordered and thirty-one central ones. //8.161//

4371 | 31 |

In the Īśāna imaginative (kalpa) there are fourteen hundred fifty-seven sequence-ordered. In the third imaginative (kalpa) there are five hundred eighty-eight sequence-ordered

and seven central ones (indraka). //8.162//

1457 | 588 | 7 |

In the Māhendra there one hundred ninety-six sequence-ordered. In the Brahma there are three hundred sixty sequence-ordered and four central ones. //8.163//

196 | 360 | 4 |

In the sixth imaginative (kalpa), i.e. in Lāntava, there are one hundred fifty-six sequence-ordered and two central ones, and in the Mahāśukra imaginative, there are seventy-two sequence-ordered and one central. //8.164//

156 | 2 | 72 | 1 |

In the Sahasrāra, there are sixty-eight sequence-ordered and one central, and in the four, Ānata etc., there are three hundred twenty-four sequence-ordered and six central one. //8.165//

68 | 1 | 324 | 6 |

The number of sequence-ordered celestial planes of the lower, intermediate and upper Graiveyakas is respectively, one hundred eight, seventy-two and thirty-six. //8.166//

108 | 72 | 36 |

In every one of those Graiveykas there are three central ones. In the Anudiśa and the Anuttara there are four sequence-ordered and one indraka in each. //8.167//

There are no scattered celestial planes in lower Graiveya. In the intermediate Graiveya, thirty-two and in the upper one there are fifty-two scattered celestial planes. //8.176//

0 | 32 | 52 |

Ahead of this, in the Anudiśas, there are four scattered celestial planes. In the sixty-third disc there is no scattered plane, and there exist only sequence-ordered planes. //8.177//

There are sixteen thousand family deities with beautiful and unparalleled form, for each one elder deity of Saudharma and Īśāna indras . //8.308//

There are eight thousand, four thousand, two thousand, and one thousand family deities for each one elder deity of the Sānatkumāra and Māhendra, Brahmendra, Lāntavendra and Mahāśukra indras, respectively. //8.309//

There are five hundred, two hundred fifty family deities for each elder deity of the Sahasrāra and Ānatendra etc. four, indras, respectively. //8.310//

16000 | 8000 | 4000 | 2000 | 1000 | 500 | 250 |

Ahead of this, upto the Ānata etc. four, those elderly deities are able to perform twice as many activities in extra (vikriyā), this should be related in such order. //8.315//

32000 | 64000 | 128000 | 256000 | 512000 | 1024000 |

In the south row of the thirty-eighth Cakra indraka from the first , Sānatkumāra indra is situated in the sixteenth out of twenty-five sequence-ordered. //8.341//

In the northem direction of this central one (indraka), there is situated the Māhendra Indra in the sixteenth sequence-ordered out of twenty-five sequence-ordered. //8.342//

The maximal age in the Ṛtu indraka is sixty-six lac crore sixty-six thousand crore six hundred six crore over sixty-six lac sixty-six thousand six hundred sixty-six and three as well as two divided by three part palyas. The very age is also to be known for their sequence-ordered and the scattered. //8.461-463//

$$666666666666666 \left| \begin{matrix} 2 \\ 3 \end{matrix} \right|$$

The maximal age of the Ṛtu disc plane is multiplied by the measure digits of chosen disc plane, and the maximal age measure be taken out. //8.464//

In fourteen places, three in the numeral order, and one, palyas and one part is the maximal age in the Vimala indraka. //8.465//

$$133333333333333 \left| \begin{matrix} 1 \\ 3 \end{matrix} \right|$$

In numeral order, zero in fourteen places and two, such is the measure in palya of the maximal age in Candra indraka and its sequence-ordered and the scattered. //8.466//

2000000000000000 |

In numeral order, in fourteen places there are six, and two, such is measure in palya along with two parts as the maximal age in the Valgu indraka. //8.467//

$$266666666666666 \left| \begin{matrix} 2 \\ 3 \end{matrix} \right|$$

The maximal age in the Vanamāla indraka is three sāgaropama and three parts, and that in the Nāga plane is four sāgaropama and one part. //8.495//

Sā $3\frac{3}{7}$ | ka $3\frac{1}{7}$ | sā $4\frac{1}{7}$ |

Out of these, in the first, the age of the body-guards is two and half palyopama, and in the subsequent above, the age of the body-guards of the all indras is one palya in excess in a sequence. //8.518-519//

$5\frac{2}{2}$ | $7\frac{2}{2}$ | $9\frac{2}{2}$ | $11\frac{2}{2}$ | $13\frac{2}{2}$ | $15\frac{2}{2}$ | $17\frac{2}{2}$ | $19\frac{2}{2}$ |

The age of the parişada deities in the first pair as external, middle and internal, is respectively three, four, and five palya. Above this, the age is one palya in excess. //8.520//

3,4,5 | 4,5,6 | 5,6,7 | 6,7,8 | 7,8,9 | 8,9,10 | 9,10,11 | 10,11,12 |

During the first kalpa, the age of the female deities is five palyas. Ahead of this, in every kalpa, there has been an increase of two palyas, (successively). This has been related in the Lokāyanī. //8.530//

5 | 7 | 9 | 11 | 13 | 15 | 17 | 19 | 21 | 23 | 25 | 27 | 29 | 31 | 33 | 35 |

This measure of the maximal, intermediate and minimal longevity has been related with respect to bound longevity measure (baddhāyuşka). Now, other type (nature) is described relative to measure of strategic longevity (ghātāyuşka). //8.541//

Here, in the first disc, called Ṛtu, the minimal longevity is one and a half palyopama and the maximum age is half of sāgaropama. Here, the top (muha) is half sāgaropama and the base (bhūmi) is two and a half sāgaropama (maximal age of the last disc). The top is subtracted from the base, and the remainder is divided by the height (utsedha) or number of terms as reduced by unity. This gives the upper increase as the fifteenth part of a sāgaroprama. $\frac{1}{15}$ |

When this is multiplied by the number of the chosen disc and added to the top (muha), the measures of the ages in thirty discs, Vimala etc. are given out. Their symbolism (saṁdiṭṭhi) is as follows-

17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49
30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30

51	53	55	57	59	61	63	65	67	69	71	73	sā	5
30	30	30	30	30	30	30	30	30	30	30	30		2

There are seven discs (paṭala) in Sānatkumāra-Māhendra. In order to find out the age-measure, the top is two and a half sāgaropama, base is seven and a half sāgaropama, and height is seven . Their symbolism is-

3	3	3	13	4	9	5	5	6	1	6	11	7	1	sā
	14		14		14		14		14		14		2	

There are four discs in the Brahma-Brahmottara Kalpa. In order to find their age-measures, the top is seven and a half sāgaropamas, base is ten and a half sāgaropamas [and the height is four]. The symbolism for age-measures in these is

8	1	9	9	3	10	1
	4			4		2

The deity who lives for one sāgaropama period, takes divine, full of nectar, unparalleled, delicious and nutritional mental food in a thousand year. //8.551//

Whatever number of sāgaropama periods a deity lives, his food is taken in that very number of thousand years. The deity who lives for a palya, he takes food once in five days. //8.552//

There is situated a ring shaped black-corporeal (tamaskāya) or dark-matter, for numerals ordered as one, two, seven and one (i.e., for seventeen hundred twenty-one) yojanas of range in the sky above, in the corresponding part of the Aruṇa sea, after going ahead in the number of yojanas, as mentioned by Lord Jina, from the outer earth of the Aruṇavara island. //8.597-598//

1721 |

Having produced darkness or partial choices (deśa vikalpas) in the initial four kalpas, this dark matter (tamaskāya) has apporached the corresponding plane part of the first central (indraka) related with upper Brahma kalpa(?) //8.599//

Its width circumferene is finite yojanas at the base, innumerate yojanas in the middle, and innumerate yojanas above this . //8.600//

In the eastern direction of the dark-matter, beyond finite yojanas, there is Kṛṣṇarājī named darkmatter, having a sexagonal shape and extended in south-north. In the western part also there is the similar darkness. In the south and north portions , there is situated (for each of the two directions) a Kṛṣṇarājī having the same rectangle, quadrangle having extension in east-west (directions). These rājīs or rows do not touch each other as per rule. //8.601-603//

In the eastern direction of the rows (rājīs), entering for finite yojanas into the interior, there is rectangular-quadrilateral and extended norh-south, the Kṛṣṇarāji or black-row which touches the south row (rājī). There is other dark-matter touching the northern row in the western direction. //8.604-605//

In the southern direction of the row (rājī), entering for finite yojanas into the interior part, these is only one black row (kṛṣṇarājī). //8.606//

Similar to a portion of cross section of a barley region [figure] lengthwise, that row (rājī) is situated touching the western exterior rājī as per rule. //8.607//

In the direction, there is earlier-later rectangular dark-matter (?). There is a darkness (tama) touching eastern exterior rājī in the northern part. //8.608//

The interval measure of the interior rows (rājīs) dark-matter is finite times the interval between the outer earth of Aruṇavara island and dark-matter. The interior row (rājī) is finite times the preceding measure. The dark-matter is greater than the interior row (rājī). The outer row (rājī) is slightly less than the interior row (rājī). //8.609-611//

The interval of both rows (rājīs) is greater than outer rows (rājīs) . Thus is also the comparability in four directions. //8.612//

What so ever small-spiritual-powered deities move direction-deluded in this darkness, they are able to escape out only with the help of great-spiritual-powered deities. //8.613//

In the interval between rows (rājīs), there are finite many types of celestial planes. Whatever deities are born here are called the universe-ending (Laukāntika). //8.614//

As they are at the end of the unverse like the ocean of the world, hence these deities are meaningfully called the universe-ending (Laukāntika). //8.615//

The total measure of all these is four lac seven thousand eight hundred six. //8.634//

407806 |

In the central-most portion of this, there is a region named Īṣatprāgbhāra like the silver and gold and full of various gems. //8.656//

This region, beutifully shaped as a convex white umbrella, has width of forty-five lac yojanas. //8.657//

Its middle thickness is eight yojanas and in the end it is only one finger (aṅgula). The circumference of the region of the accomplished is situated in the eighth earth and is equal to the circumference of the human region. //8.658//

8 | aṁ 1 |

The power of vision of the Saudharma and Īśāna kalpa resident deities is upto the first earth, that of the Śānatkumāra-Māhendra kalpa resident is upto the second earth, that of Brahma and Lāntava kalpa resident is upto the fourth earth, that of Ānata, Prānata, Āraṇa and Acyuta kalpa resident is upto the fifth earth, that of nine types of Graiveya resident deities is upto the sixth earth, and that of the Anudiśa and Anuttara resident deity is for the whole universe-tunnel (loka nālī). Having divided the own Karmic fluent (Karma dravya) by infinity, one should be reduced from every one of its own region. [In this way, whatever set of molecules (skandhas) remains of in the end, that becomes the subject-matter fluent of the clairvoyance-knowledge (avadhijñāna) for that chosen deity. On having placed the clairvoyance-knowledge, screening, fluent with (without) the naturally accumulated fluent (visrasopacaya) of the Kalpa resident deities, that is to be divided by the constant-divisor (dhruvahāra) till the recknoning rods (śalākās) of their own regional points are not finished. On dividing through the above mentioned method, whatever set of molecules (skandhas) remains in the end, that much should be known as the measure of subject-matter fluent of their clairvayance-knowledge. //8.685-689//

The subject of clairvoyance of the Saudharma-pair deities, relative to time is innumerate years, and that of the remaining deities is conformally consistent innumerate part of a palya. //8.690//

Thus ends the description of clairvoyance-knowledge.

The number of deities in the Saudharma-Īśāna pair is third square root (square root extracted three times, successively,) of the cube-finger (ghanāṅgula) as multiplied by the universe-line (jaga-śreṇi). That of the second pair is a universe-line as divided by its eleventh square-root. //8.691//

3 | 11 |

The number of the deities in Brahma kalpa is a universe-line as divided by the ninth square root, of the universe-line. The number of the deities in the Lāntava kalpa is a universe-line as divided by the seventh square root of the universe-line. //8.692//

9 | 7 |

In the remaining two kalpa-pairs, the measure of deities in every one of them is innumerate part of a palya.

The number of deities in the Mahāśukra kalpa is a universe as divided by the fifth square-root of the universe-line. In the Sahasrāra kalpa, that is a universe-line as divided by fourth square-root of the universe-line. //8.693//

5 | 4 |

In the remaining two kalpa-pairs, the deities in every one of them is an innumerate part of a palya. The number of female deities is finite times that of the male-deities. //8.694//

| pa |
| ३ |

The number of deities in the lower Graiveya, middle Graiveya, upper Graiveya, and Anudiśa pair, is conformally consistent innumerate part of a palya. //8.695//

| pa |
| ३ |

Note: Here, it seems that the symbol for the innumerate has been shown as ३ which stands for the numerate, as usual.

Special mention is that in the Sarvārthasiddhi central (indraka) there are finite deities. In this way, the affection-less Lord has instructed the number of deities. //8.696//

The description of the number comes to an end.

✪✪✪

FIRST CHAPTER

PAḌHAMO MAHĀDHIYĀRO

INTRODUCTION

This chpater begins with definitions (vv.91-132) related with characteristics of universe-space (lokākāśa) and empty spac. The units of measuring various types of objects of the universe are given. The first type of measure is the simile measure (upamā pramāṇa) comprising of two sets of instants (samayas) of time, the indivisible units of time, the palyopama and the sāgaropama, often used for denoting the measure of existential sets, (v.93). The simile measure also comprises of six sets of points (pradeśas) of space, the indivisible units of space, the sūcyaṅgula, the pratarāṅgula, the ghanāṅgula, the jagaśreṇī, the lokapratara, and the loka (universe) often used for denoting the measure of existential sets.

The ultimate particle of matter (pudgala) is called a paramāṇu endowed with various characteristics. (vv. 95-101). The instant of time and the point of space are defined on the basis of the motion of the paramāṇu and the space it occupies. The two particles, whose constituents are the paramāṇus, are the uvasannāsanna and the sannāsanna which are used as base to define an aṅgula. (vv.102-106). The aṅgula is of three types, utsedhāṅgula, pramāṇa aṅgula and ātmāṅgula, each of which are used for different types of objects. (vv.107-113)

The aṅgula is then carried over to pāda, kośa and yojana. (vv. 114-116).

The three types of palya measure of instant-sets of time are then constructed as vyavahāra, uddhāra and addhāra palyas. (vv. 117-130).

Then, ultimately, the relation between the sūcyaṅgula set of points and the palya set of istants is established. Similarly, the relation between Jagaśreṇī and ghanāṅgula along with innumerate part of logarithm of palya to the base two is also established. (v. 131).

The pratarāṅgula is the square of aṅgula and ghanāṅgula is the cube of the aṅgula. Similarly, the square of jagaśrenī is lokapratara, the cube of it is the loka. The rāju is one seventh part of a jagaśrenī. (v.132).

Some of the verses carry symbols, given at the relevant verses,
eg. (vv.91, 93, 121 et seq.)

The description of universe through geometry of triangles, trapezium, circle, straight-line and through mensuration of solids in the shape of trapezoids, parallelopipeds, cylinder, etc. is through measure of length, breadth, height, areas and volumes. (vv.137-173)

The hells and heavens are the divisions given in measure through cosmological measure. (vv. 152-214)

The general universes has then been deformed in various shapes and their volumes calculated as the same in eight types of universes, geometrically. (vv. 215-266)

There are air and vapour envelops, enveloping the universe in three layers of dense-water-vapour-envelop, dense-air-envelop and thin-air-envelop. (vv. 267-283)

In this way, the definitions for various units of measures, the geographical, the astronomical and the cosmological, are given. Through the cosmological measures, the boundaries and measure of occupied areas and volumes have been calculated as a cosmos. The divisions of the lower universe into hells, the middle universe into human etc. regions and the upper universe into heavens are also geometrical and their mensuration has been described with cosmological units.

(vv.1. 68-70)

commentary

The generation of the Dharma Tīrtha was at the rise of the Abhijit constellation on the first of the dark half of the first month, Śravaṇa, of the year, when it was the fourth period of the hyposerpentine period (avasarpiṇī) and only thirty-three years, eight months and fifteen days had remained to be lapsed. (vv. 68-69)

This Yuga is said to have started in the first yoga of Abhijit constellation at the merital rise of the sun on Rudra muhūrta on the first day of the dark half of the Śrāvaṇa. (v. 70)

Criticism

This records the beginning of the Jaina Calendar. The details are available in the seventh chapter from verse 530 et seq.

The avasarpiṇī and the utsarpiṇī periods together form a kalpa. In the avasarpiṇī period there is a decrease in certain parameters of states of the existent objects, existent in certain regions. Reverse is the case with the state of these objects whose parameters go on increasing to a certain limit. The parameters may be of heights, longevities, pleasure and so on.

v.1.91

commentary

The cosmological unit is a universe-line or a jagaśreṇī. This is equivalent to seven rajjus or ropes. The length and breadth of the universe (loka) has been denoted by a universe-line (jagaśerṇī) or seven rajjus. Cosmological unit of length is universe-line or jagaśreṇī and that of area is universe-line a square or jagapratara. That of volume is universe-line cube or ghana loka or simiply loka.

The space is infinite in every direction and the universe-space (loka-ākāśa) is in the very central portion of the whole infinite space (ākāśa).

symbolism

≡ 16 Kha Kha Kha

A single horizontal bar denotes a universe-line (−) or jagaśreṇī. The jagapratara has been denoted by (=) and the cubic nuiverse (ghanaloka) is denoted by (≡), as above. This is the universe space (lokākāśa) located in the very centre of the non-universe-space, or space as a whole. The universe (loka) or ≡ is contained in the universe-space it self. 16 denotes the number of souls in the universe. 16 Kha denotes number of matter-ultimate particles in the universe. 16 Kha Kha denotes the number of instants in the past, future and present time. 16 Kha Kha Kha denotes the number of points in the whole space.

Then there are two more fluents, the aether fluent (Dharma dravya) and the anti-aether or non-aether fluent (Adharma dravya) pervaded as a continuum, coincident with the universe-space, hence their volume for each is the same as that of the universe-space (lokākāśa) i.e. ≡ or cube of the universe line, − , (jagaśreṇī) or cube of seven rājus i.e. 343 cubic rājus.

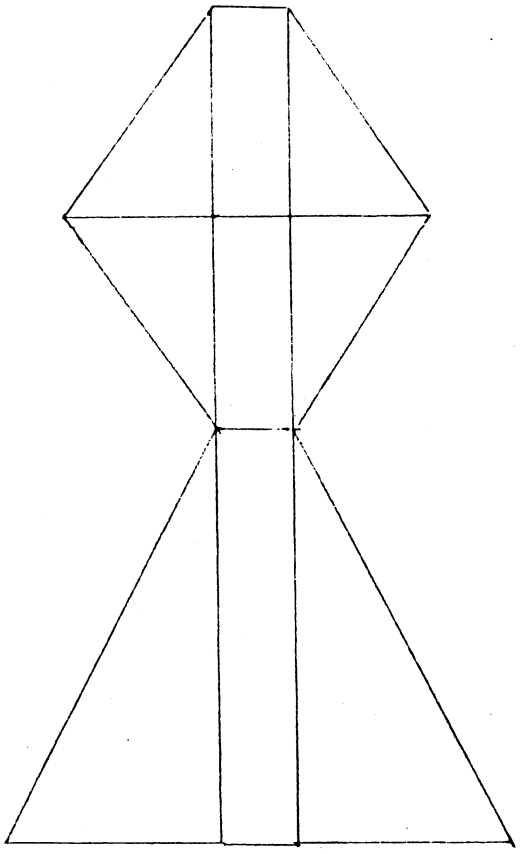
Thus ≡ is a point-set (Pradeśa rāśi) to which is equivalent the point-set in the aether and non-aether fluents. 16 denots the complte or whole bios-set, 16 Kha is the whole matter

(particle) set. Similarly, 16 Kha Kha is the set of all instants in past, present and future time. 16 Kha Kha Kha denots the whole point-set (pradeśa rāśi) of all space as a point-set. In Devanāgarī script. These are, respectively, given by ≡ १६ ख ख ख .

1.92

The five fluents, the bios (jīva), the matter-particles (pudgala) which take part in the fission and fusion, the aether being instrumental in the motion of the bios and matter, where as the non-aether is instrumental in the rest state of the bios and matter. These as well as time (kāla) as points are existent fluents, pervading the whole universe-space which is thus a limited world with boundaries as will be shown ahead.

The figure of universe space is as shown below-



the universe-sapce

(lokākāśa) containing

five fluents (dravyas),

matter-particles (pudgalas),

time-particles (kālāṇus),

bios (jīvas),

aether (dharma), and

non-aether (adharma),

the whole space being also the sixth fluent

figure 1.1

vv.1.93 -1.132

Purpose

In order to determine the universe (loka) which is cube of the universe-line (jagaśreṇī), certain technical terms have been defined in the verses to follow.

Table T-1

Symbolism	Devanāgarī	original	Remarks
Palya	Pa o 1	प० १	1]Vide the script in Kannada (Kānarī)
Sāgara	Sā o 2	सा० २	at shrimati Rama Rani Jaina
Sūcyaṅgula	Sū o 3	सू० ३	Research Institute,
Pratarāṅgula	Pra o 4	प्र० ४	Shri Digambara Jaina Matha,
Ghanāṅgula	Gha o5	घ० ५	Mudbidri texts 498 and 643
Jagasedhi	ja o 6	ज० ६	for symblism.
lokapratara	lokapra o 7	लोक० प्र० ७	2] Here, the words appear to
Loka	Loya 8	लोय ८	have been abbreviated through the first or initial letter.

(v. 1.93)

The fraction is written in the form 19 |

24 |

In Devanāgrī it is १९ |

२४ | . In kānarī script vide the manuscript loc. cit. Here 19 is the numerator and 24 is the denominator. The numerator is written just above the denominator. (v. 1.118)

The product of the following with 19 | has been expressed as

24|

Ʃ 0 | 96 | 500 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
Ʃ 0 | 96 | 500 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
Ʃ 0 | 96 | 500 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

This has been the conventional expression for the product given by

$$\frac{19}{24} \times (4)^3 \times (2000)^3 \times (4)^3 \times (24)^3 \times (500)^3 \times (8)^{21} ,$$

which gives the number given by

413452630308203177749512192 000 000 000 000 000 000 .

(v 1.123-124)

In the above, so represents three zeros to be added after the product of the first second and the third row. (v. 1-122)

Further sū 02 expresses linear finger (sūcyaṅgula), representing the number of points (pradeśas) contiained in the linear width of a finger unit of length. Similarly, jaga 0 expresses linear universe-line, where jaga 0 represents jagaśreṇī, zero meant for filling up the gap or abbreviated word as jaga. The number of points contiained in this length wich is a cosmological unit of length, has been shown by the dash like bar '–' .

In Devanāgarī script, this is expressed as

सू० २ | जग० – | (v.1.131)

Similarly, the symbol for square and cube of the linear finger, representing the number of (spatial) points contained in the square and cube, area and volume is so built, from the linear finger (sūcyaṅgula). They are given, respectively by

4 and 6, or ४ and ६ in Devanāgarī,

Similarly, the symbol for square and cube of the linear universe-line (jaga-śreṇī) representing the number of points contained in the square and cube, or area and volume so built, from the universe-line (jagaśreṇī), they are given, respectively as

= and ≡ (v.1. 132)

Commentary

The details of the units of the simile-measure are given as follows

The determination of the measure of the cube of the universe-line (jagaśreṇī) or the universe (loka), various definitions are given.

The measure is of two types: the simile measure (upamā pramāṇa) and the number measure (saṁkhyā pramāṇa). The simile measure is of eight types: pit (palya), sea (sāgara), finger-linear, finger-squared, finger-cubed (sūcyaṅgula, pratarāṅgula, ghanāṅgula), universe-

line, universe-square, universe-cube (jagaśreṇī, loka-pratara, loka or ghana loka).' (v. 1.93)

Palya : There are three types of palya period of time.

i. practical pit measure (vyavahāra palya Pramāṇa)

ii. picking pit measure (uddhāra palya Pramāṇa)

iii. life-time pit measure (addhā palya Pramāṇa)

The first is used to measure number, the second is used to measure the islands and seas, and the third is used to measure the life-time of karmas. (v. 1.94)

In order to define length units, the nature of the molecule (skandha), particle (deśa), subparticle (paradeśa) and the ultimate particle (paramāṇu) defined which constitute the length in the following way.

The moecule is that which is all round capable, its half part is particle, half the particle is subparticel and the indivisible part of the molecule is the ultimate particle. (v. 1.95)

The ultimate particle (paramāṇu) can not be any further divided, can not be destroyed by water, fire etc. It has one taste (out of five), one colour (out of five colours), one odour (out of two), two touch (one out of unctuous) and antiunctuous, and one out of cold-warmth), thus totalling to fire properties or controls (guṇas). Further, it is the cause of sound although it is not in the form of sound, constituting a molcule. That ultimate particel is a fluent (fllowing through its controls and events), without the end, beginning and middle, single pointed, unperceivable through senses and without division. (vv.1.96-98)

Like the molecules, the ultimate particles take part in fusion and fission, hence called fusion-fission (pudgala) constituent, and take part also in the five types of above mentioned controls through fusion-fission at all times. (vv.1.99-100)

The ultimate particle is relatively ostensive as well as relatively non-ostensive (amūrta) on being studied through specific purport relations. 'v. 1.101)

The unit of length now starts with the molecule called the uvasannāsanna whose width defines the least unit of length, which is constituted of endlessly endless or infinite-infinite (anantānanta) ultimate-particles (paramāṇus) of various kinds of these fluents (dravyas).

Table - T.2

Table for the related units

8	uvasannāsanna skandha	=	1	sannāsanna skandha
8	sannāsanna skandha	=	1	truṭireṇu skandha
8	truṭireṇu skandha	=	1	trasareṇu skandha
8	trasareṇu skandha	=	1	rathareṇu skandha
8	rathareṇu skandha	=	1	fine bhogabhūmi bālāgra
8	fine bhogabhūmi bālāgra	=	1	medium bhogabhūmi bālāgra
8	medium bhogabhūmi bālāgra	=	1	gross bhogabhūmi bālāgra
8	gross bhogabhūmi bālāgra	=	1	karmabhūmi bālāgra
8	karmabhūmi bālāgra	=	1	līka
8	līka	=	1	jūṁ
8	jūṁ	=	1	jau
8	jau	=	1	aṅgula

Such an aṅgula is called a sūcyaṅgula or linear finger. It is also called utsedha aṅgula or height finger, used for measuring height of body etc.

The aṅgula is of three types: utsedhāṅgula (height-finger), pramāṇa aṅgula (measure-finger), and ātma-aṅgula (self-finger). (v. 1.107). The utsedha aṅgula is obtained through the above mentioned set of definitions. The pramāṇa aṅgula is equal to five hundred utsedha aṅgula measure. The ātma-aṅgula is the name of the fingers of the persons living in that very period of human beings belonging to the Bharata and the Airāvata regions. The utsedha aṅgula is used to measure the heights of deities, human beings, subhuman beings, and hellish beings for their bodies, as well as the measure of their residence and cities etc. The pramāṇa aṅgula is used to measure the various cosmological or macro-regions, like those of island, sea, mountain, river, etc. Similarly ātmāṅgula is used to measure the small apparatus, instruments, auspicious worship-material etc. as well as their number reckoning. (v. 107-113)

Table - T. 3

Formulas for finding value of yojana

6	aṅgla	=	1	pāda
2	pāda	=	1	vistasti
2	vitasti	=	1	hātha
2	hātha	=	1	rikku
2	rikku	=	1	daṇḍa
1	daṇḍa	=	1	dhanuṣa | mūsala | nālī
2000	daṇḍa | dhanuṣa	=	1	kośa
4	kośa	=	1	yojana

If we take 2 hātha = 1 gaja, then 1 yojana is rougly equal to 8000000 gaja, or 4545.45 miles. The thickness of hair-forepart as $\frac{1}{200}$ inches to $\frac{1}{500}$ inches produce ten times as much measure of a yojana. Hence we have it as a fundamental unit.

The approach is principle theoretic. We give a comparative note for the length units- (Vide Lishk, ss., Jaina Astronomy, pp. 25 et. seq.)

Historical note on the length unit

In India, Humāṁyuṁ had set the length of a yard to be equal to the sum of diameters of forty-two Sikandarī coins or forty-two finger widths. Further, (29.63 inches) was the length of a yard settled by Akabar, called an Ilāhī gaz, having a width of forty-one fingers. The British, however fixed the Ilāhī gaz to be thirty-three inches. Then, 1760 yards were fixed as a mile, in 1878. Similarly, the cubit had different values nation-wise, for example

Egyptian Royal Cubit	=	20.63 inches
Greek Olympic Cubit	=	18.3 inches
Sumerian Cubit	=	19.50 inches

With slight difference in names of units in the Anuyogadvārasūtra and the Tiloyapaṇṇattī, every type of yojana, the utsedha, the pramāṇa, is of 768000 corresponding aṅgulas.

The Pauliśa Siddhānta has the following table of linear measure

TABLE - T.4

8	yavas	=	1	aṅgula
24	aṅgulas	=	1	hasta
4	hastas	=	1	daṇḍa
2000	daṇḍas	=	1	kośa
4	kośas	=	1	yojana

The Siddhāntic units of length used by Śrīpati, etc.

8	trasareṇus	=	1	reṅu
8	reṇus	=	1	bālāgra
8	bālāgras	=	1	likṣā or poppyseed
8	likṣās	=	1	yūka (louse)
8	yūkas	=	1	yava (barley-corn)
8	yavas	=	1	aṅgula
12	aṅgulas	=	1	vitasti
2	vitastis	=	1	hasta
4	hastas	=	1	daṇḍa
2000	daṇḍas	=	1	kośa
4	kośas	=	1	yojana.

Here also, 1 yojana = 768000 aṅgulas

On comparisan

1 aṅgula	=	8^{10}	trasareṇus (Anuyogadvārasūtra units)
	=	8^{9}	trasareṇus (Tiloyapaṇṇattī units)
	=	8^{6}	trasareṇus (Siddhāntic units)

whereas the yojana has the same value 768000 aṅugulas.

The table of Buddhistic units of length is

TABLE - T.5

7	paramāṇu-rajas	=	1	reṇu
7	reṇus	=	1	truṭi
7	truṭis	=	1	vata yava-raja
7	vatayava-rajas	=	1	śaśa-raja
7	śaśa-raja	=	1	aidaka-raja
7	aidaka-rajas	=	1	go-raja
7	go-rajas	=	1	likṣa-raja
7	likṣa-rajas	=	1	sarṣapa
7	sarṣpas	=	1	yava
7	yavas	=	1	aṅgula-parva
12	aṅgula-parvas	=	1	vitasti
2	vitastis	=	1	hasta
4	hastas	=	1	dhanuṣa
1000	dhanuṣas	=	1	kośa
4	kośas	=	1	yojana

Thus we find that

1 Bnddhistic yojana = 384000 × 7 yavas

and 1 Jaina yojana = 768000 × 8 yavas

$\therefore$ 1 Busddhistic yojana = $\frac{7}{16}$ Jaina yojana

If it is assumed that 1000 dhanuṣas make a Buddhistic kośa, actually denoting half-kośa, as half-sine concept.

Then,

1 Busddhistic yojana = $\frac{7}{8}$ Jaina yojana

(Anuyogadvāra sūtra units)

= 7 Tiloyapaṇṇatti units yojanas

Table - T. 6

Megasthenes report on the length units of India is (4th century B.C.)

24 aṅgulas = 1 hasta (fore arm or cubit)

4 hasta = 1 dhanuṣa

100 dhanuṣas = 1 nalwa

10 nalwas = 1 kośa

Here 1 kośa = 96000 aṅgulas

and 1 dhanuṣa = 96 aṅgulas

100 aṅgulas are taken in place of 96 aṅgulas, according to Strabo.

Here, 1 kośa = 96000 aṅgulas or $\frac{768000}{8}$ aṅgulas

or 8 kośas = 768000 aṅgulas

= 1 yojana

Arthaśāstra refers to a hasta of 28 aṅgulas.

The tabel for the Ɓaudhāyana śulba units of length is

TABLE - T. 7

1	aṅgula	=	24 aṇus	=	35 tilas
1	kṣudrapada	=	10 aṅgulas		
1	pāda	=	15 aṅgulas		
1	prakarma	=	2 pādas	=	30 aṅgulas
1	aratni	=	2 pradeśas	=	24 aṅgulas

1	puruṣa	=	1 vyāma	= 5 aratnis	= 120 aṅgulas
1	vyāma	=	4 aratnis	= 96 aṅgulas	
1	prthā	=	13 aṅgulas		
1	bāhu	=	36 aṅgulas		
1	jānu	=	30 or 32 aṅgulas		
1	iṣā	=	108 aṅgulas		
1	akṣa	=	104 aṅgulas		
1	yuga (yoke)	=	88 aṅgulas		
1	samyā (pin of a yoke)	=	36 aṅgulas		
1	aṅgula	=	$\frac{3}{4}$ inch (approximately)		

Yojana in British Miles

According to dvivedi, if a yojana actually, denoting half-yojana, contains five miles, the diameter of earth as enunciated by Brahmagupta (c. 628 A.D.) and Bhāskarācārya comes out to be 7905 miles, or roughly very near to actual value of 8000 miles. An actual yojana would contain ten miles. Further, Dvivedi opines that a kośa contains two miles, hence a yojana contains eight miles. alberuni also describes a yojana as equal to eight miles.

It may be noted also that

Pādaśāhī kośa or punjabī kośa	=	$1\frac{1}{4}$ miles	
Gangetic provinces kośa	=	$2\frac{1}{4}$ miles	(roughly)
kośa	=	4 miles	(roughly)
Bundelakanda, south of the Jamuna, Mysore and south India			
Hence 1 Pādasāhī yojana	=	5 miles	

1 Gangetic region yojana = 9 miles

and 1 Bundelakhaṇḍa yojana = 16 miles

In the opinion of D.A. Somayaji, a yojana containg 5 miles. Fleet's estimate of the value of a yojana apears as $9\frac{1}{11}$ miles. This is also the estimate of Sir John Bellentine. L.C.Jain has estimated this to be 4545.45 miles which is 500 times $9\frac{1}{11}$ miles.

Hence 1 ātma yojana = $9\frac{1}{11}$ miles. ----(1)

1 pramāṇa yojana = 4545. 45 miles ----(2)

and 1 utsedha yojana = $4\frac{6}{11}$ miles. ----(3)

One more method for finding out this value has been put up by Lishk as follows (loc. cit.)

When the sun occupies the innermost maṇḍala its distance from samatala bhūmi (earth having a place surface, denoting a circular area with centre at the projection of pole of ecliptic) is 800 tiloyapaṇṇatti yojanas or 800 Y_T. The sun at this juncture lies on the periphery of Jambū dvīpa of radius equal to 50000 anuyogadvāra yojanas or 50000 Y_A. Hence on the summer solstice, the distance D_S of the sum from the axis of meru (placed at the centre of Jambūdvīpa) is

D_S = 50000 Y_A

= 100 Y_P (pramāṅa yojanas, anuyogadvāra units)

= 800 Y_T

Thus, 50000 Y_T = 800 Y_A or 1 Y_A = $\frac{8}{500}$ Y_T.

Radius of meru on the flat earth is given as 5000 Y_A or 80 Y_T. Here the distance between true axis of the earth and the sun describing the innermost maṇḍala is given as

= radius of Jambūdvīpa – radius of meru on flat earth

$= 800\ Y_T - 80\ Y_T$

$= 720\ Y_T$

Now the celestial distance were, in fact, measured in terms of corresponding distances projected over surface of the earth. Let δ_{max} be the maximal declination of the sun. Then on the summer solstice, north polar distance of the sun is equal to the distance of the sun from true axis of the earth.

Thus $90^0 - \delta_{max} = 720\ Y_T$

Further, the sun traversed a distance of 510 Y_T from the innermost maṇḍala (sun's orbit on summer solstice day) upto the ontermost maṇḍala and viceversa.

Hence $2\ \delta_{max} = 510\ Y_T$

There two equation give δ_{max} = $23^0.5$ (exitus acta probat)

Now, 510 Y_T = 47 × 69.09 miles

(because 1' = 6080 feet,

1^0 = 69.09 miles)

giving 1 Y_T = 6.37 miles. ----------(4)

When Cunningham compared various chinese pilgrim's distances between prominent places along the British road distance, he found a yojana to be equivalant to 6.37 British miles, or 6 Li (Chinese length unit), or a yojana (= 6.37 miles) is equivalent to about 40 Li.

This topic is subjcet to further research as such.

1 pramāṇa unit = 500 ātma units = 1000 utsedha units. 1 ADS unit = 8 Tiloyapaṇṇati units = $\frac{7}{8}$ Buddhistic unit. The aṅgula and yojana, both are to be fixed in modern units, for further applications.

Calculation of Palya, the Set of Instants

In simile mesure, the palya and the sāgara are two sets of instants (samaya-rāśis), which are constrcution sets needed to denote the measure of some existential sets, needed in the theory of Karma.

For constructing the palya set, a pit with diameter of 1 yojana and depth also 1 yojana,

in form of a cylinder is taken. The formula for its volume is given as $\pi \frac{D^2}{4}$ h, where D is the diameter and h is the depth or hieght of the cylendrical pit.

formula for area of the base of the cylinder

Formula for volume of the cylenider $= \sqrt{(\text{diameter})^2 \times 10} \times \frac{\text{diameter}}{4}$ ------(5)

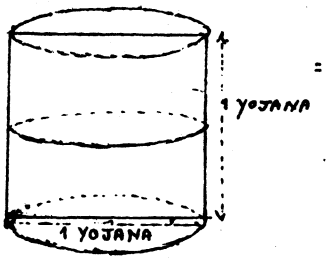


figure 1.2

$= \text{circumference} \times \frac{\text{diameter}}{4}$

$= \sqrt{10} \times \text{diemeter} \times \frac{\text{diameter}}{4}$ (square yojanas)

$=$ area of the base $\times$ depth of pit -------(6)

$= \sqrt{10} \left(\frac{\text{diameter}}{4}\right)^2 \times 10 \times$ depth (cube yojanas)

$= \sqrt{10} \frac{(1)^2}{4} \times 1$

$= \frac{19}{6} \times \frac{1}{4} \times 1 = \frac{19}{24}$ cubic yojanas

Here, $\sqrt{10}$ has been calculated through the rationale given by Mādhavacandra Traivaidya in his Sanskrit commentary of the Trilokasāra (v.1.19) detailed by R.C.Gupta, (Mādhavacandara's and other Octagonal Derivations of the Jaina Value $\pi = \sqrt{10}$, IJHS, 21, 131-139, 1986), as well as commented upon by Takao Hayashi et al., (Indian Values for π Derived from Āryabhatas Value, Hisitoria Scientiarum, No.37, 1-16, 1989).

It is known that $\sqrt{10}$ when treats by binomial theorem, gives the value $\frac{19}{6}$ approximately:

$$\sqrt{10} = \sqrt{1+9} = 3\sqrt{1+\frac{1}{9}} = 3\left(1+\frac{1}{18}\right) = \frac{19}{6}.$$

Here, $\frac{19}{6}$ cubic yojanas are converted into the hair-forepart of fine pleasure-land (uttama bhoga bhūmi bālāgra), through intermediate units the daṇḍa, pramāṇāṅgula, utsedhāṅgula, jau, jum̐, līkha, karma bhūmi bālāgra, jaghanya bhogabhūmi bālāgra, medium bhoga bhūmi bālāgra. It has been assumed that $\frac{19}{24}$ cubic yojanas of volume will contain as many fine bhoga bhūmi bālāgras as the conversion

$$\frac{19}{24}(4)^3\ (2000)^3\ (4)^3\ (24)^3\ (500)^3\ (8)^{21}$$

$$= 4134526303082031777495121 92\ (10)^{18}\ . \qquad \text{-------(7)}$$

This number is the number of palya, written in decimal notation, as 18 zeros, in the end, two, nine etc. from right to left. (vv. 1.121-124)

Vyavahāra palya is the period in simile measure obtained on completely exhausting the above pit (completely filled in by uttama bhoga bhūmi bālāgras as shown above), one by one, once in every hundred years. (v. 1.125)

The fine hair-set of vyavahāra palya is cut into as many sections as there are innumerate crore years set of instants, for every one of its hair and filled up in another pit (palya). It is then exhausted by taking out hair one by one, once in every instant. The period in which pit is exhausted in instants, is called uddhārapalya. (vv.1.126-127)

Each hair of the uddhārapalya fine hair-set, is cut into as many parts as there are instants in innumerate years, and filled up compactly in a third pit. It is then exhausted by taking out hair one by one, once in every instant. The period in which this pit is completely exhausted in instants, is called addhāpalyopama. (vv. 1.128-129)

In this way,

vyavahāra palyopama period of instants is

= 4134526303082031777495121 92 $(10)^{18}$ (100 years) .....(8)

uddhāra palyopama period of instants is

= 4134526303082031777495121 92 $(10)^{18}$ (100 years)

(innumerate crore years) .....(9)

addhā palyopama period of instants is

= 4134526303082031777495121 92 $(10)^{18}$ (100 years)

(innumerate crore years)^2 ....(10)

Further,

10 (crore)^2 vyavahāra palyopama = 1 vyavahāra sāgaropama

10 (crore)^2 uddhāra palyopama = 1 uddhāra sāgaropama

10 (crore)^2 aadhā palyopama = addhā sāgaropama (v.1.130)

The word ardhaccheda has been used here for logarithm to the base 2.

sūcyaṅgula = $[\text{palya}]^{[\log_2 \text{Palya}]}$ ..... (11)

Here, is the set of points, the sūcyaṅgula, of which measure is given in the number of instants given on the right hand side of the equation, palya is the addhāpalya, symbolically are may write.

$F = [P]^{\log_2 P}$,

where F is for sūcyaṅgula and P is for addhāpalya (v. 1.131)

Ancient symbols have already been given as 2 for F, later on, प or pa for P.

Similarly,

jagaśreṇī = $[\text{ghanāṅgula}]^{[\log_2 (\text{Palya})/_{\text{asṁkhyāta}}]}$ ------(12)

or $L = [F^3]^{[\log_2 P/A]}$

Where L is the universe-line, A is asaṁkyāta. Ancient symbol jagaśreṇī is ' – '

In the verses 131-132, the definitions of the sūcyaṅgula, pratarāṅgula and ghanāṅgula, as also of the universe-line, universe-line square, universe and rāju have been given. Elsewhere, (TPT (V)) p. 31, vol. 1, numerical symbol of the addhāpalya has been taken as

16. Its logarithm to base two is 4. When palya is multiplied by itself four times, the measure of sūcyaṅgula is obtained as

$$\text{sūcyaṅgula} = (16)^{\log_2 16} = 16^4 = 65536$$

Thus, pratarāṅgula $= (65536)^2$

ghanāṅgula $= (65536)^3$

Similarly, the measure of universe-line or jagaśreṇī is found out through numerical symbols. Addhāpalya is taken as 16, ghanāṅgula is $(65536)^3$ and innumerate is taken as 2. Hence

$$\text{jagaśreṇī} = [\text{ghanāṅgula}]^{\log_2 (\text{palya})/\text{asaṁkhyāta}}$$

$$= [(65536)^3]^{\log_2 (16)/2}$$

$$= [(65536)^3]^2$$

$$\text{again, rāju} = \frac{\text{jagaśreṇi}}{7} \qquad \text{.....(12)}$$

$$= \frac{[(65536)^3]^2}{7}$$

In all the treatments above, asaṁkhyāta is undefined, it may be madhyama asaṁkhyāta, a variable.

From the above, the numbers of space-points (pradeśas) contained in the square and the cube of the above point-sets, are used to denote the cardinal number of the existential sets, through the above equations in terms of the instant-sets (samaya rāśis).

We shall denote them as F^2, F^3 and L^2, L^3 whose ancient symbolism has already been given as (v. 1.132)

sūcyaṅgula ⟶ 2 or २ symbol

Pratrāṅgula = (sūcyaṅgula)^2 ⟶ 4 or ४ symbol

Ghanāṅgula = (sūcyangula)^3 ⟶ 6 or ६ symbol

Jagapratara = (Jagaśreṇī)^2 ⟶ =

$= (-)^2$

Ghanaloka $=$ (Jagaśreṇī)^3

$= (-)^3 \longrightarrow \equiv$

The seventh part of the universe line is a rāju $\longrightarrow \frac{-}{7}$

1.133 – 151

Commentary

These verses describe the structure of the frame of the universe in space, and the contents, with its lower, middle and upper parts, extensions in different directions, sections, various dimensions and shapes, as related in the Drṣṭivāda aṅga (vision-exposition branch).

Symbolism

$\Delta\ \nabla$ are the two figures, like two triangles, wide the figure 1.3, former being inverted of the latter. The word vetrāsana (trapazoid) has been used for the shape of lower universe and the shape of the middle universe has been shown to be in the shape of the upper part of the half the drum (mṛdaṅga), kept vertical. Actually both have the shape of a trapezoid, one being inverted of the other, as will appear from the following figure. (v.1.137)

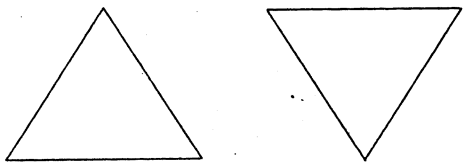
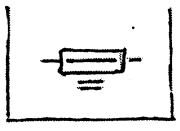


figure 1.3

Then there is another symbol written as sṁdiṭṭhi-bādaraṁ

(symbol-gross)  figure 1.4

The upper-universe has been stated to be like vertically standing drum, and the shapes of these three types of universes have been related ahead. This figure is not clear from these

verses 1.137 and 1.138. However, the description gives the form of the universe in the adjoining figure 1.5 .

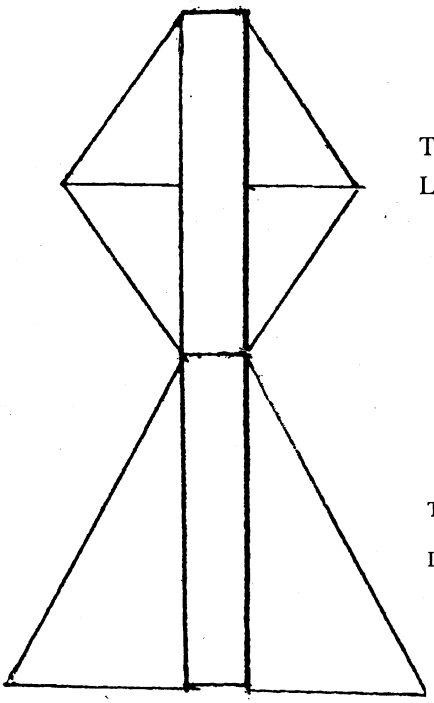


figure 1.5

When the whole universe is cut in the middle, the lower section is the lower universe with one rāju as the mouth and seven rājus as the base. (v. 1.139)

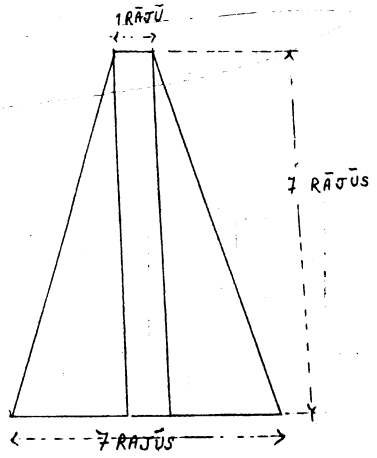


figure 1.6

First, the region extended both sides is taken and placed separate, and then in inverse order, they are joined, getting the extension and height both as seven rājus. (v. 1.140)

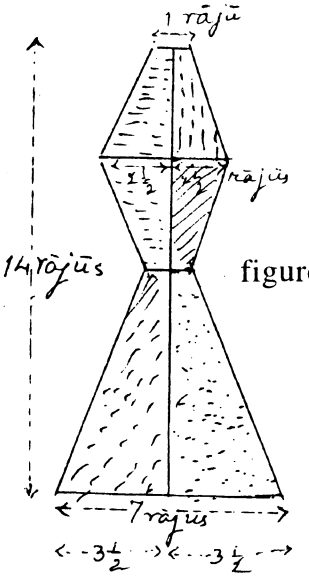


figure 1.7

scale 1 cm = 1 rāju

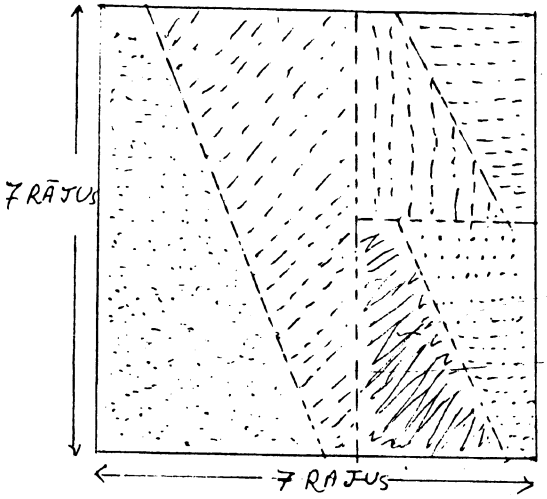


figure 1.8

scale 1 cm = 1 rāju

The above shape of the universe, with seven rājus of thickness or depth, appears as one and a half drum with a flag standing, having a height of fourteen rājus and a depth of seven rājus. In this way the diameter of the base and top of this universe, relative to east and west is seven, one, five, and one rāju respectively, with decrease and increase in the intermediate portion. (vv. 1.141-144)

The whole universe can be converted into the form of a cube, as the section of the universe (as shown in figure 1.7) could be brought in the shape of figure 1.8 first. Then as the depth is seven rājus, it could be raised up with layers, each with a thickness of one point (pradeśa), till the seven rājus of depth is exhausted. (vv. 1.145-147)

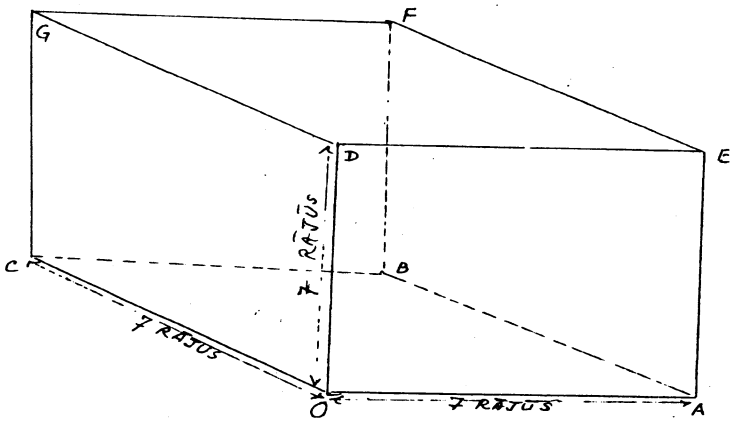


figure 1.9

In this way, in accordence with the version in the Dṛṣṭivāda the figure of the universe appears as follows

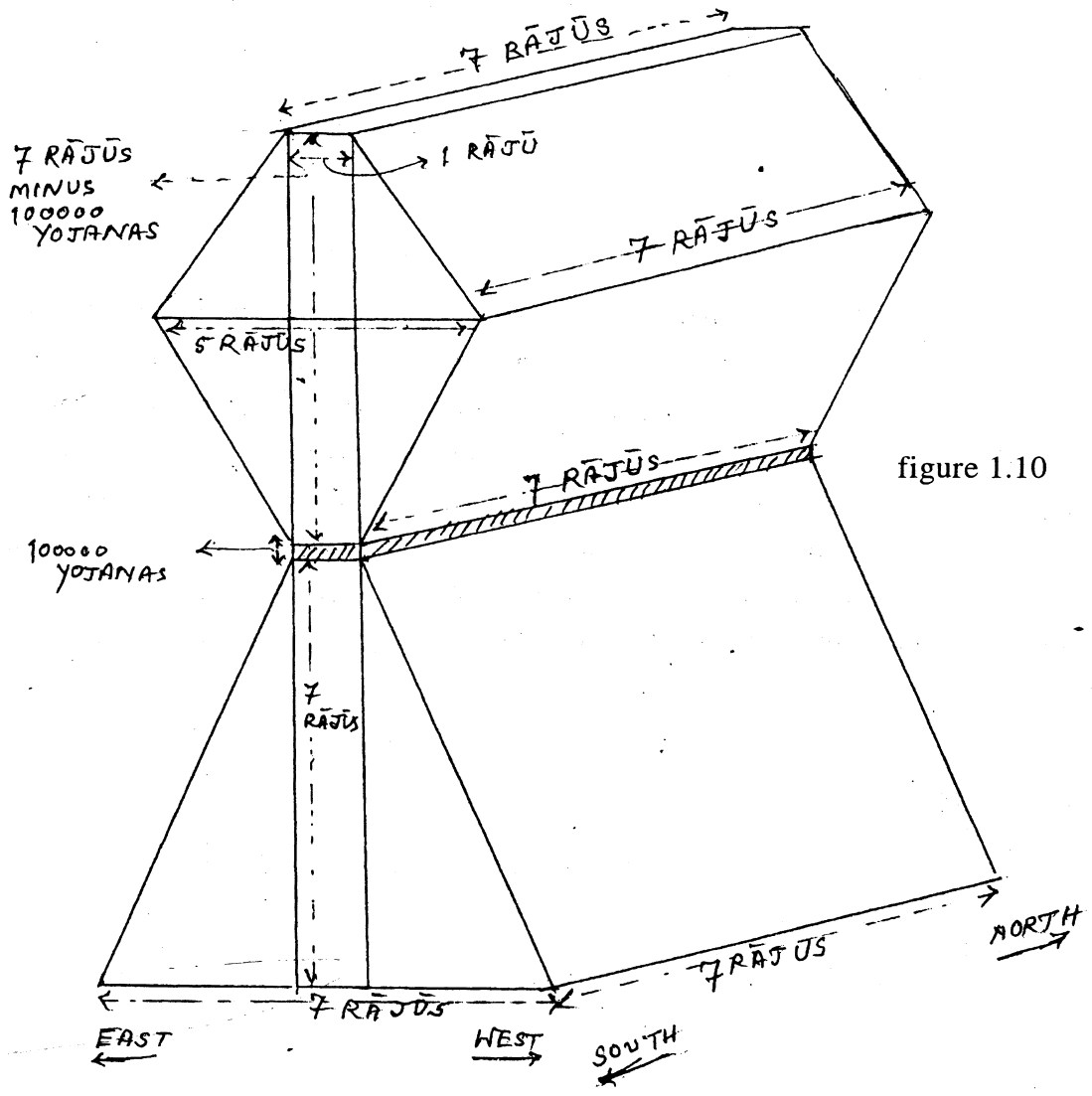


figure 1.10

The height of the lower universe is seven rājus, the height of the upper universe is one lac yojanas less than seven yojanas, the middle universe is 100000 yojanas in height.

Here, there are two more symbols worthy of attention. For minus sign the word riṇa in prakrit and for joyaṇa the symbol jo. appears in prakrit, as abbreviation. (vv. 1.150-151)

minus	riṇa	रिण
jayaṇa	jo.	जो.

For one rāju,

the symbol, $-\frac{1}{7}$ or $-\frac{१}{७}$ appears. The small horizontal bar denoted the universe-line and the denominator 7 reduces it into a rāju. Similarly, for five rājus the symbol is $-\frac{5}{7}$ or $-\frac{५}{७}$ (v.1-149)

1.154-191

Commentry

In these verses the measurements about various hellish earths in the lower universe are given and those about various heavenly celestial planes and the placing of all are given in rājus. Depths and heights are given relative to the middle universe, having lower boundary as well as upper boudary. Formula for findig out the base, top, height in any unknown is given. The method of finding out the volume of the lower universe is given. Various types of seetions of the universe are effected for finding out the volumes of the whole upper and lower universe. The increase or decrease (caya) in the tops above the bases of various horizontal residential strips is calculated through usual geometrical formulae for trapezoids, triangles etc.

Symbolism

one rāju $-\frac{1}{7}$, two rājus $-\frac{2}{7}$ and so on. (vv. 154 et seq.)

One and a half rājūs minus One lac yojanas $-3 \mid$ ri yo $100000 \mid \frac{}{14}$ (v. 1.158)

There are points after ri and yo in TPT but not in TPT (V). Note that here yo is given in place of jo as given earlier.

half rājus $\frac{-}{14}$ (v. 1.162)

cube-universe divided by 7 ≡ 4 ≡ ४

and multiplied by 4 7 ७

This gives the volume of the lower universe in cubic universe-line (jagaśreṇi) which is $\frac{4}{7}$th part of the volume of the whole universe (loka). (v.1-166)

cube-universe divided by 7 ≡ 3 ≡ ३

and multiplied by 3 7 ७

This gives the volume of the upper universe in cubic universe-line (jagaśreṇī) which is $\frac{3}{7}$th part of the volume of the whole universe which has a special symmetrical structure with respect to a vertical plane bisecting it.

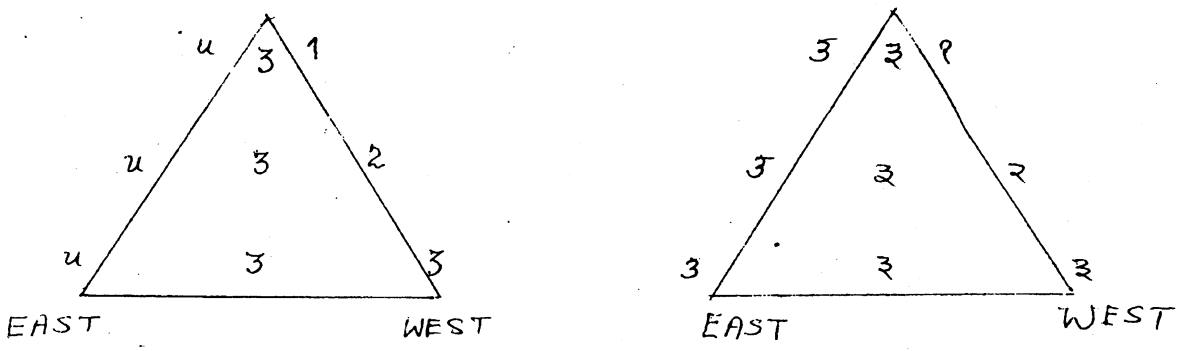


Figure 1.11

This symbolism represents the measurements of heights when there is a proportionate entry from both, east and west sides, through three, two and one rājus. The heights there by are given respectively, as one universe-line (jagaśreṇī), two by three jagaśreṇī, and one by three jagaśreṇī. (v. 1.180)

u stands for height.

≡ 63 ≡ 133 milide ≡ 196 equation given in cubic rājus

343 343 343 the volume of lower universe.

or ≡ ६३ ≡ १३३ मिलिदे ≡ १९६ [" □

३४३ ३४३ " "]

The above is an equation where on the left of the word milide (on adding or on being

added) means that the two terms are to be added and the right side term denotes the result of addition. (v. 1.191)

Formulas

The area of a trapezium (vetrāsana section) which is the face of a trapezoid (vetrāsana), is founa out from the formula:

$$\frac{\text{top + base}}{2} \times \text{height}. \qquad \text{---- (13)}$$

$\therefore$ The volume is then given by

$$\frac{\text{top + base}}{2} \times \text{height} \times \text{extension}. \qquad \text{(v. 1.165)}$$

The mobile bios channel (tras-nālī) is a cuboid, a vertical column whose base is 1 rāju $\times$ 1 rāju or 1 square rāju as a square, and height is 14 rājus. Thus the formula used is.

volume of a cubiod = length $\times$ breadth $\times$ height. Thus, volume of the mobile bios channel is = 1 rāju $\times$ 1 rāju $\times$ 14 rājus = 14 cubic rājus. (vv. 1.168-173)

The formula for getting the lengths in a trapezium at a spectific height is obtained through the formulae for finding out the increase realtive to mouth or top (mukha) and for finding out the decrease relative to the base (bhūmi).

increase in top side of a trapezium at all depths is

$$= \frac{\text{base - top}}{\text{depth of the base from the top}} \qquad \text{----(14)}$$

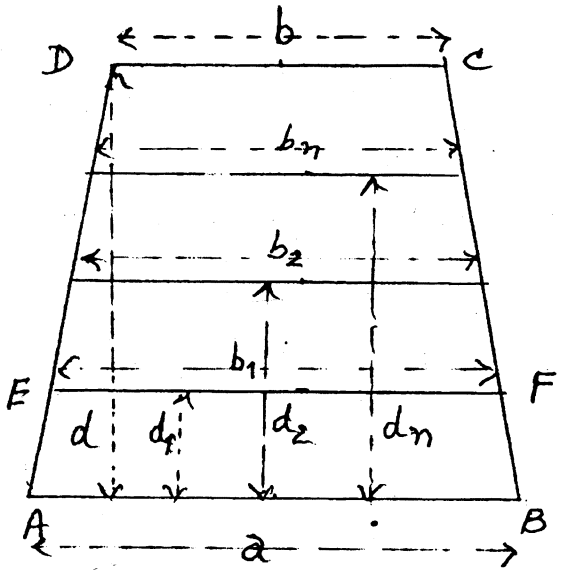
(v. 1-176)

Similarly, decrease in the base of a trapzium at a height above the base is

$$= \frac{\text{base - top}}{\text{height of the top above the base}} \qquad \text{----(15)}$$

vv.1.176-179

In the verses 1.176-179, there is given the principle of propotional parts as detailed below



In the figure, ABCD is a trapezium in which AB and CD are parallel, and AD as well as BC is equal to one another. AB measures a and CD measures b. AB is base and CD is top.

If the side EF or width or length b_1 is required to be found out, which is at a height d_1 above the base, then the following formula is given

Figure 1.12

$$b_1 = a - [\frac{a-b}{d}]\, d_1$$

Similarly, $$b_2 = a - [\frac{a-b}{d}]\, d_2$$

and $$b_n = a - [\frac{a-b}{d}]\, d_n, \quad \text{in general .} \qquad \text{-----(16)}$$

where d_n is any given height at which the width b_n is required to be found out.

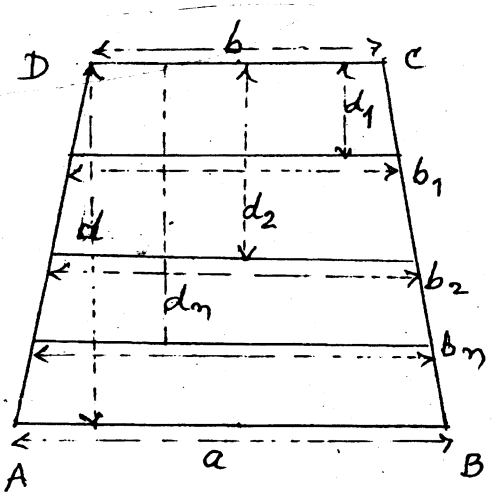


Figure 1.13

In this figure, ABCD is a trapezium, AB is parallel to CD and AD is equal to BC. The measures of the depths and lengths are as shown in the figure. In order to find the length in the intermediate space between AB and CD at different depths, the formulae are as under.

$$b_1 = b + [\frac{a-b}{d}]\, d_1$$

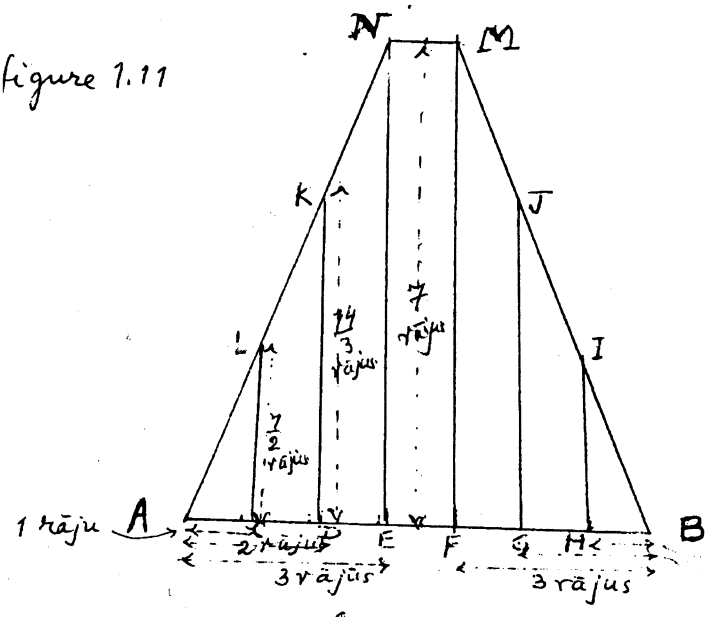
$$b_2 = b + [\frac{a-b}{d}]\, d_2$$

and $b_n = b + [\frac{a-b}{d}]\, d_n$ in general -----(17)

There is a method of calculating the volume of the lower universe through such horizontal strips, exhausting the figure. The base is 7 rājus (1 jagaśreṇ¢) the top is 1 rāju, the height is seven rājus. At every height or depth of 1 rāju the lower universe has been divided into seven types of the earths, and their widths and bases have been calculated through the above formulae. Then these volumes, as right prisms with trapezium as base, and height one rāju each, have been calculated. Thus, the total volume obtained on adding the seven volumes of the earths, is 196 cubic rājus.

In the verses 1.180 to 183, there is another method of finding out the volume of the lower universe

vide figure 1.11



Scale - 1cm. = 1 rāju

Figure 1.14

In the figure from the end points A and B of the lower universe, from both sides AN and BM directions, entry is made inside through three rājus, two rājus and one rāju respectively, getting the heights 7 rājus, $\frac{14}{3}$ rājus and $\frac{4}{7}$ rājus respectively.

In this way, the lower universe figure is divided into vertical sectional figures exhausting the area and the volume of the lower universe. These figures are the prisms with triangles and trapeziums as bases, whereas in the centre, a cuboid with rectangle as a base EFCD.

For finding out the areas of the plane figures as bases, two formulae have been given as follows

For finding out the area of ACL triangle, the formula for finding out the area of a trapezium has been used. This formula has been given by Mahāvīrācārya in GSS, VII, v.50. If the side AC be taken as the base, the opposite side, top, will be zero, and height will be CL. Hence the area of this right angled triangle

$$= \left[\frac{1+0}{2}\right] \frac{7}{3} = \frac{7}{6} \text{ square rājus.}$$

The second formula is evaluated as follows. The perpendicular side CL gives the area ACL, where base (vyāsa) is AC and the perpendicular (lamba bāhu) is CL. Then the area is equal to $\frac{\text{perpendicular} \times \text{base}}{2}$.

For the remaining areas, the formula, "bhuja-paḍi bhuja milidaddham---" may be used.

In this way, the first internal area is ACL, second is CDKL, and third is FENK, whose areas are, respectively, $\frac{7}{6}$, $\frac{7}{2}$ and $\frac{35}{6}$ square rājus. The lower universe is extended for one universe-line or 7 rājus north-south, hence the volumes of the prisms corresponding to these areas as bases and a stretch of 7 rājus will have the measures as $\frac{7}{6} \times 7 = 8\frac{1}{6}$, $\frac{7}{2} \times 7 = 24\frac{1}{2}$, and $\frac{35}{6} \times 7 = 40\frac{5}{6}$ cubic rājus, respectively. Similarly, the areas

BHI, HIJG and GJMF from right to left (east to west), are again $\frac{7}{6}$, $\frac{7}{2}$ and $\frac{35}{6}$ square rājus and the corresponding volumes of the prisms are, respectively, $8\frac{1}{6}$, $24\frac{1}{2}$ and $40\frac{5}{6}$ cubic rājus. Further, the volume of the central cubiod EFMN is $1 \times 7 \times 7 = 49$ cubic rājus. The total volume of the sections is thus

$$2\,[8\tfrac{1}{6} + 24\tfrac{1}{2} + 40\tfrac{5}{6}] + 49 = 196 \text{ cubic rājus.}$$

The third method for finding the volume of the lower universe, is given in the verses 1.184-191. This is also based on the method of exhaustion, through divisions into appropriately convenient sections.

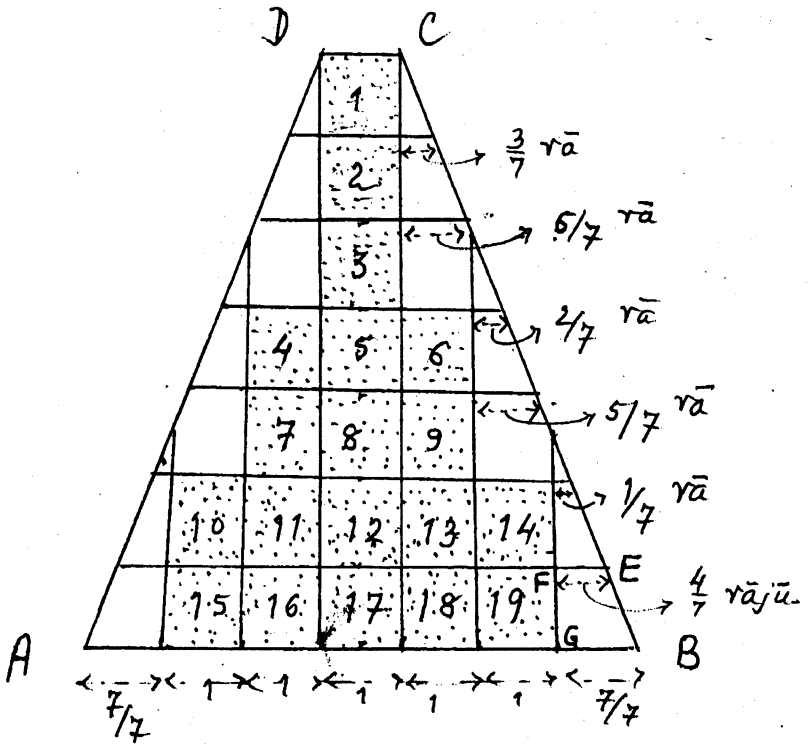


figure 1.15

From the area ABCD, nineteen squares, having area of 1 square rāju each, are separately worked out for finding out the area of ABCD, the trapezium. Then the area of the remaining figures are found out. At the end, all the areas are multiplied by the height of the prism (extension or height of 7 rājus), and all are totalled, getting the volume of the lower

universe. The dotted squares are shown separate in the above figure1.15.

The remaining arms are calculated through the theory of proportions. They are given, taken from the above, $\frac{3}{7}, \frac{6}{7}, \frac{2}{7}, \frac{5}{7}, \frac{1}{7}, \frac{4}{7}$ and in the end $\frac{7}{7}$ or 1 rāju respectively. The area of the figure at the end of the universe, BEFG, has the area.

given by $[\{(\frac{3}{7} + \frac{7}{7}) \div 2\} \times GF]$ square rājus, and

the volume is given by $[\{(\frac{4}{7}+\frac{7}{7}) \div 2\} \times 1 \times 7]$ cubic rājus.

In this way, the total area of the remaining areas is found to be a sum of 63 cubic rājus. When the volume of nineteen separated squares as extended 7 rājus to form prisms, 19 $\times$ 7 = 133 cubic rājus, is added to the former 63 cubic rājus, then the total 133 + 63 = 196 cubic rājus, becomes the volume of the lower universe.

Calculations versewise

$1 + 7 \div 2 \times 7 = 28$ square rājus of area (v.1.165)

$343 \times 4 \div 7 = 196$ cubic rājus of volume of lower universe (v.1.166)

$343 \times 2 \div 7 = 98$ cubic rājus of volume of half of the lower universe (v.1.166)

volume of the mobile bios channel (trasa nālī) of lower universe

$= 7 \times 1 \times 1 = 7$ cubic rājus (v.1.167)

volume of the lower universe excluding that of trasa nālī

$= 343 \times 27 \div 49 = 189$ cubic rājus.

Here, 343 is the volume of the whole universe in cubic rājus. Volume of the lower universe in toto

$= 343 \times 4 \div 7 = 196$ cubic rājus. (v.1.168)

volume of the upper universe (ūrdhva loka)

$= 343 \times 3 \div 7 = 147$ cubic rājus.

volume of half of the upper universe

$= 343 \times 3 \div 14 = 73\frac{1}{2}$ cubic rājus. (v. 1.171)

volume of the mobile bios channel (trasa nālī)

$= 343 \div 49 = 7$ cubic rājus. (v. 1.172)

volume of the upper universe excluding that of the mobile bios channel (trasa nālī)

$= 343 \times 20 \div 49 = 140$ cubic rājus. (v. 1.173)

volume of the upper universe including that of the mobile bios channel (trasa nālī)

$= 343 \times 3 \div 7 = 147$ cubic rājus. (v. 1.173)

Note that 343 cubic rājus is the volume of the whole universe. It is the sum of the volumes :

volume of upper universe + volume of lower universe

= volume of the whole universe.

or

147 cubic rājus + 196 cubic rājus = 343 cubic rājus $= 7 \times 7 \times 7 = 343$ cubic rājus. (v. 1.174)

The measure of the increase and decrease

$= \frac{\text{base - top}}{2} \div \text{height} = \frac{7-1}{2} \div 7 = \frac{6}{7}$ rāju (v. 1.176)

volume of the first earth

$= \frac{\text{top + base}}{2} \times \text{height} \times \text{extensive depth}$

$= \frac{7}{7} + \frac{13}{7} / 2 \times 1 \times 7 = \frac{140}{14} = 10$ cubic rājus. (vv. 178-179)

Note : Suppose we are required to find out the width of the trapzium at the intermediate stage, say at the fourth place, where the decrease is $\frac{6}{7}$ rāju, then it is multiplied

by the height, 3 rājus of this place, and then the product is to be subtraced from the base.

Here, $\frac{6}{7} \times 3 = \frac{18}{7}$, and base $\frac{49}{7} - \frac{18}{7} = \frac{31}{7}$ rājus is the requisite width at the desired height. This is relative to base.

Similarly, the same width could be calculated relative to top.

$\frac{6}{7} \times 4 = \frac{24}{7}$, and top $\frac{7}{7} + \frac{24}{7} = \frac{31}{7}$ rājus is the requisite width at the desired depth from the top. (v. 1.177)

volume of the second earth, (note the increase $\frac{6}{7}$ rāju every time),

$= (\frac{13}{7} + \frac{19}{7}) \div 2 \times 1 \times 7 = \frac{224}{14} = 16$ cubic rājus

volume of the third earth

$= (\frac{19}{7} + \frac{25}{7}) \div 2 \times 1 \times 7 = \frac{308}{14} = 22$ cubic rājus

volume of the fourth earth

$= (\frac{25}{7} + \frac{31}{7}) \div 2 \times 1 \times 7 = \frac{392}{14} = 28$ cubic rājus

volume of the fifth earth

$= (\frac{31}{7} + \frac{37}{7}) \div 2 \times 1 \times 7 = \frac{476}{14} = 34$ cubic rājus

volume of the sixth earth

$= (\frac{37}{7} + \frac{43}{7}) \div 2 \times 1 \times 7 = \frac{560}{14} = 40$ cubic rājus

volume of the seventh earth

$= (\frac{43}{7} + \frac{49}{7}) \div 2 \times 1 \times 7 = \frac{644}{14}$ = 46 cubic rājus .

The total volume of the lower universe

= 10 + 16 + 22 + 28 + 34 + 40 + 46 = 196 cubic rājus . (v.1.179)

Now refer the figure 1.14. There are three internal section and symmetrical three on the other side of the central section.

volume of the first internal section = $\frac{343}{42}$ = $8\frac{1}{6}$ cubic rājus

volume of the second internal section = $\frac{343}{14}$ = $24\frac{1}{2}$ cubic rājus

volume of the third internal section = $\frac{343 \times 5}{42}$ = $40\frac{5}{6}$ cubic rājus

volume of the central section = 49 cubic rājus

Hence the total volume of the lower universe

$= 2\,(8\frac{1}{6} + 24\frac{1}{2} + 40\frac{5}{6}) + 49 = 196 = \frac{343 \times 4}{7}$ cubic rājus . (vv.1.180-183)

Now refer the figure 1.15 The small arms out of the squares columns are given by

$\frac{3}{7}, \frac{6}{7}, \frac{2}{7}, \frac{5}{7}, \frac{1}{7}, \frac{4}{7}, \frac{7}{7}$ rājus .

volume upto the end of the universe

$= (\frac{7}{7} + \frac{4}{7}) \div 2 \times 1 \times 7 = \frac{11}{2}$ cubic rājus

volume up to the end of the seventh earth

$= (\frac{4}{7} + \frac{1}{7}) \div 2 \times 1 \times 7 = \frac{5}{2}$ cubic rājus (v. 1.185)

volume upto the sixth earth, both external and internal

$= (\frac{8}{7} + \frac{5}{7}) \div 2 \times 1 \times 7 = \frac{13}{2}$ cubic rājus (v. 1.186)

volume of the external areas upto the sixth earth

$= \frac{1}{7} \div 2 \times \frac{1}{3} \times 7 = \frac{1}{6}$ cubic rājus

volume of the internal area upto the sixth earth

$= \frac{13}{2} - \frac{1}{6} = \frac{38}{6}$ cubic rājus (v.1.187)

volume of the area upto Dhūmaprabhā is

$= (\frac{5}{7} + \frac{2}{7}) \div 2 \times 1 \times 7 = \frac{7}{2}$ cubic rājus

volume of the external area upto the Paṅkaprabhā

$= \frac{2}{7} \div 2 \times \frac{2}{3} \times 7 = \frac{2}{3}$ cubic rājus (v.1.188)

volume of the internal portion upto the end of the fourth earth

$= (\frac{9}{7} + \frac{6}{7}) \div 2 \times 1 \times 7 - \frac{2}{3} = \frac{41}{6}$ cubic rājus (v.1.189)

volume upto the third earth is

$= (\frac{6}{7} + \frac{3}{7}) \div 2 \times 1 \times 7 = \frac{9}{2}$ cubic rājus

volume upto the second earth is

$= \frac{3}{7} \div 2 \times 1 \times 7 = \frac{3}{2}$ cubic rājus

Total of the above volumes

$$= 2\left[\frac{11}{2} + \frac{5}{2} + \frac{1}{6} + \frac{38}{6} + \frac{7}{2} + \frac{2}{3} + \frac{41}{6} + \frac{9}{2} + \frac{3}{2}\right]$$

$$= \frac{378}{6} = 63 \text{ cubic rājus} \qquad \text{(v. 1.190)}$$

Total volume of the 19 squares with depth of 7 rājus each

$= 1 \times 1 \times 19 \times 7 = 133$ cubic rājus

Hence, the grand total volume of the lower universe

$= 63 + 133 = 196$ cubic rājus (v. 1.191)

1.192-214

Comentry:

These verses deseribe the upper universe (ūrdhva loka), which is a double trapezoid, one trapezoid inverted below the other. The section is a double trapezium, one trapezium inverted below the other. Like the lower universe which has been divided into seven earths, so also the upper universe above the lower and middle universes, has been divided into parallel sections, one over the other, called paradises (svargas). Dimension of each section, each of them being a trapezoid, could be calculated through the formula already discussed in the previous verses.

Symbolism

The following expression

–	–		– 5	–	–
7	7	bhū	7	2	2

or

–	–	भू	– ५	–	–
७	७		७	२	२

that means,

above and below the upper universe is one rāju

or $\frac{}{7}$

base is five rājus

or $\frac{5}{7}$

height above the base is three and a half rājus

or $\frac{}{2}$

and depth below the base is similarly three and a half rājus

or $\frac{}{2}$

Formulae

Verse 1.193 gives the same formula for the measure of increase relative to top and decrease relative to base

(vide verse 1.176)

Similarly, verse 1.194 gives the width at a particular depth from the top or at a particular height from the bottom (base)

(vide verse 1.177)

Formulae are $\text{top} + \left[\frac{\text{base - top}}{\text{distance between parallel sides}}\right] \text{depth} = \text{required inter width}$

or $\text{base} - \left[\frac{\text{base} - \text{top}}{\text{distance between base and top}}\right] \text{height} = \text{desired nter width}$

calculation

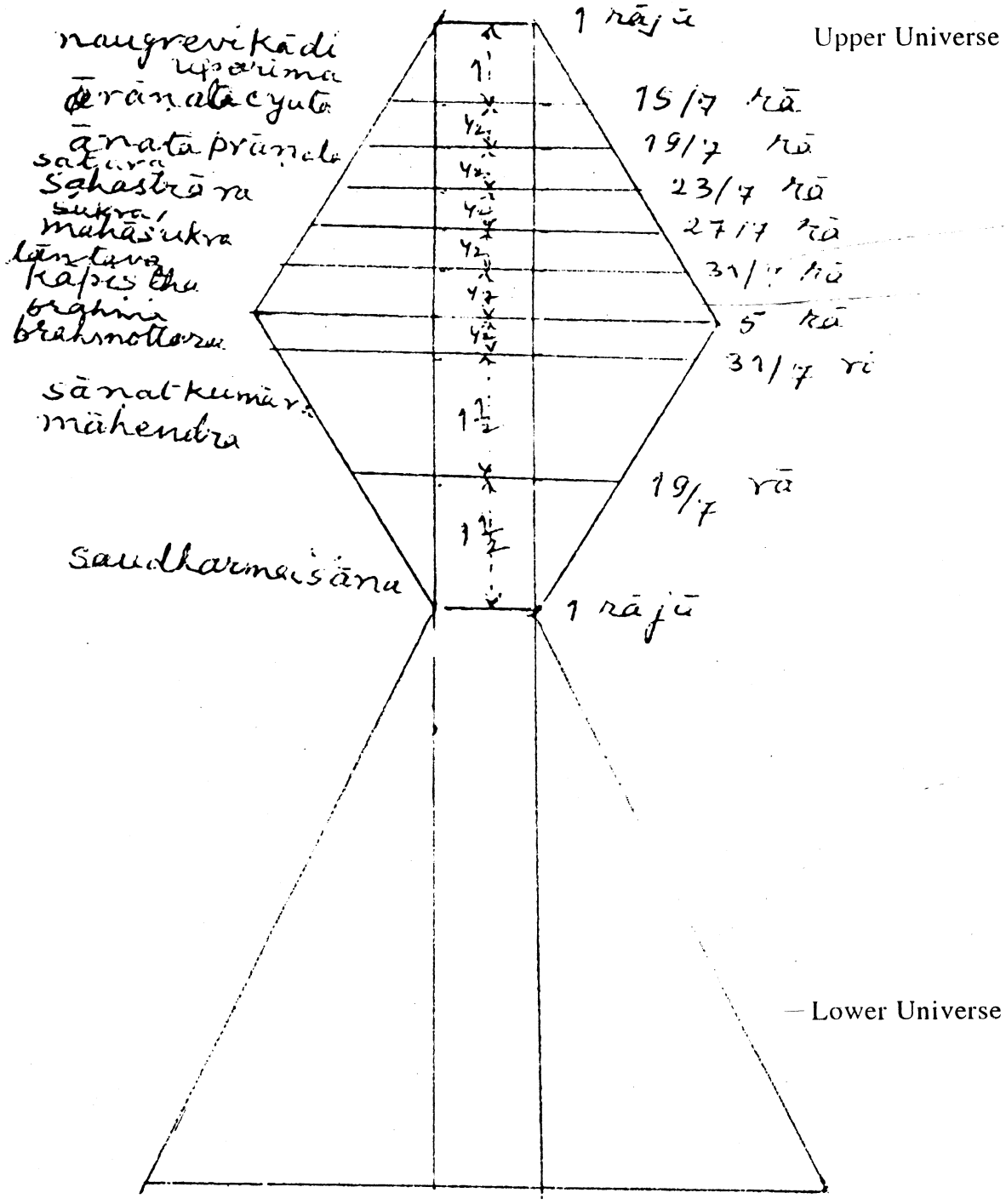


figure 1.16

According to the rules of proportional parts, the use of the above formula gives the intermediate bases and tops or lengths at specific depths or height, viz. $1\frac{1}{2}$, $1\frac{1}{2}$, $\frac{1}{2}$, $\frac{1}{2}$, $\frac{1}{2}$, $\frac{1}{2}$, $\frac{1}{2}$, $\frac{1}{2}$, and 1 rājus above the base, from which the calculated widths are $\frac{19}{7}$, $\frac{31}{7}$, 5, $\frac{31}{7}$, $\frac{27}{7}$, $\frac{23}{7}$, $\frac{19}{7}$, $\frac{15}{7}$ and 1, respectively corresponding to them. In figure 1.16, they have been illustrated. (vv. 1.193-199)

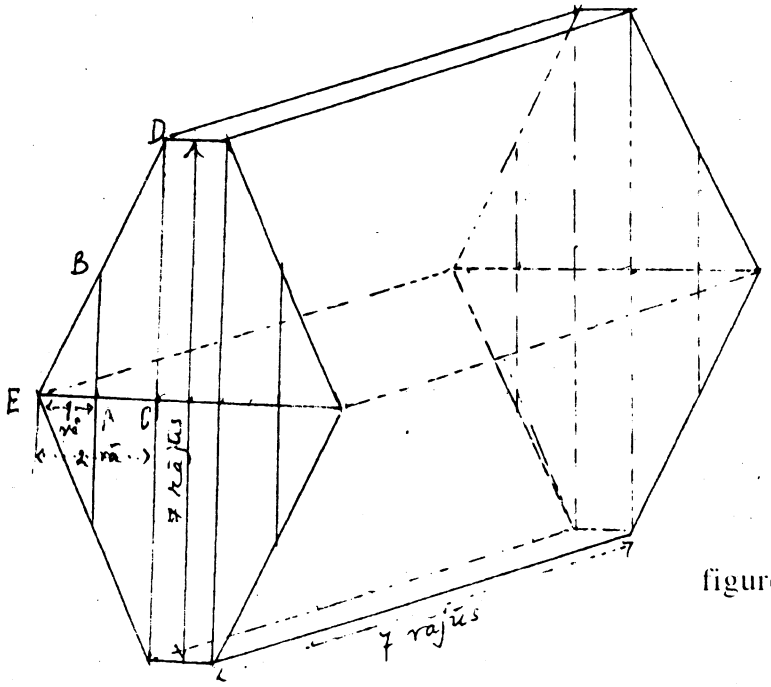


figure 1.17 (A)

In the figure, on having entry into the Brahma paradise from east and west by one rāju and two rājus through the upper portion, the heights of AB = $\frac{7}{4}$ rājus and CD = $\frac{7}{2}$ rājus are obtained. The remaining calculations are as follows

Area of the region EAB = $1 \times \frac{7}{4} \times \frac{1}{2}$ squre rājus.

Hence, the volume of the right prism with base EAB and length 7 rājus

$= 1 \times \frac{7}{4} \times \frac{1}{2} \times 7 = \frac{49}{8} = 6\frac{1}{8}$ cubic rājus

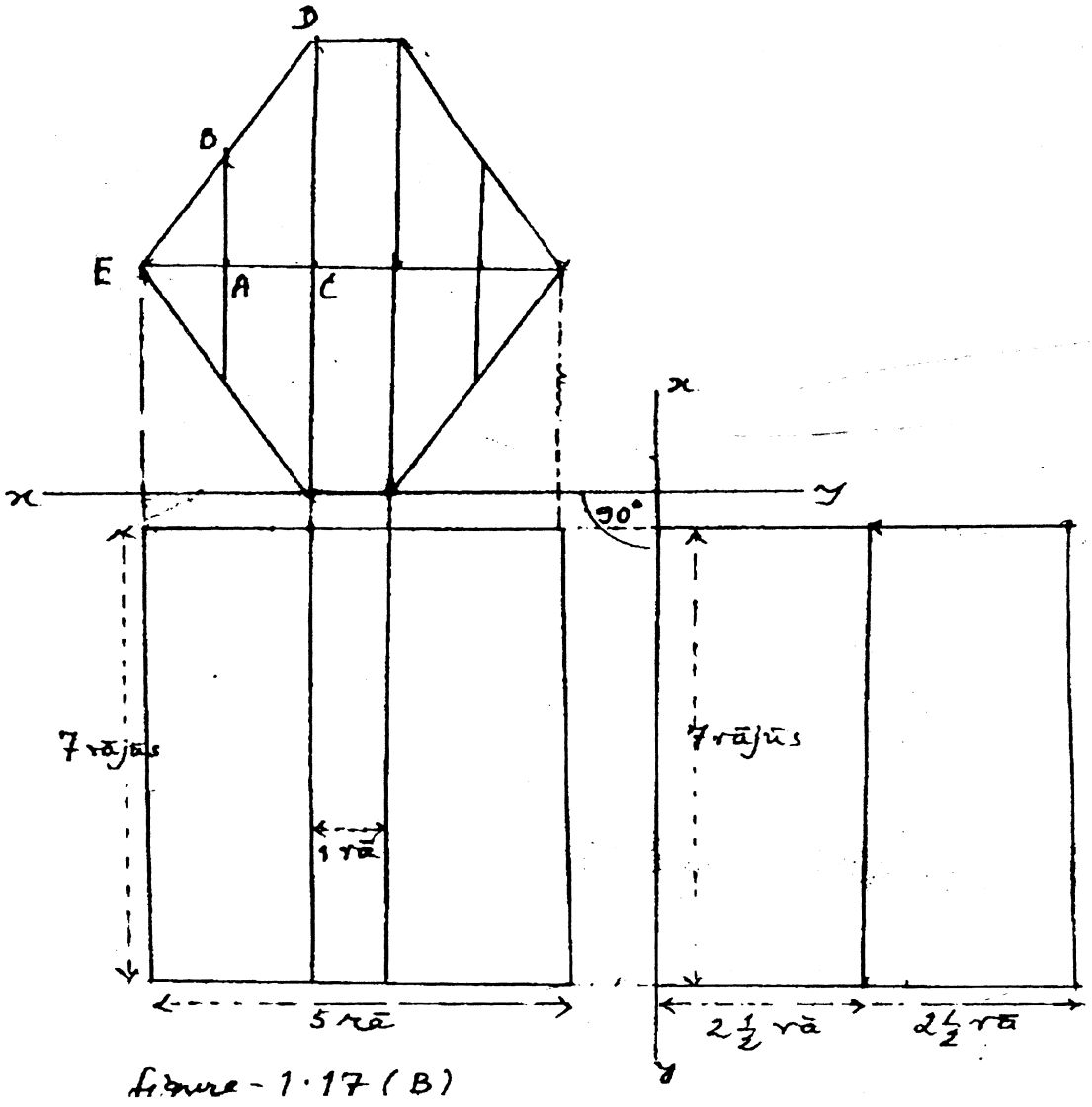


figure 1.17 (A)

Similarly the volume of the prism ABDC

$= [\frac{7}{4} + \frac{7}{2}]/2 \times 1 \times 7$ $= 18\frac{3}{8}$ cubic rājus

$= 3 \times$ (prism EAB)

On making the sum four times and on adding in it the volume of the remaining central portion, the volume of the upper universe has been obtained. (v.v 1.200-202)

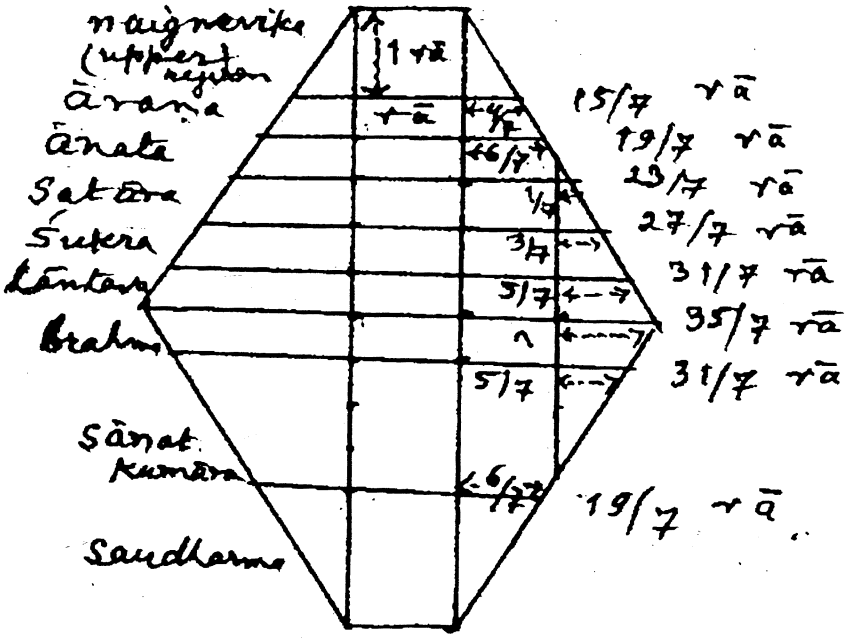


figure 1.18

This figure (1.18) is that of east-west sections of the upper universe (ūrdhva loka), when it is entered into for 1 and 2 rājus above the Brahmottara paradise, and the division is made through the colums, both on the right and the symmetric left hand side.

On making such a division the external small arms remain as shown in the figure. The following explanation will make the sectional method clear for finding out the volume of upper universe.

Every region has an extension (bāhalya) of 7 rājus.

Volume of external triangle of Saudharma.

$$= \frac{1}{2} \times \frac{7}{6} \times \frac{3}{2} \times 7 = 4\frac{1}{2} \text{ cubic rājus}$$

volume of external and internal regions of the Sānatkumāra

$$= \left(\frac{12}{7} + \frac{7}{6}\right)\frac{1}{2} \times 7 \times \frac{3}{2} = \frac{27}{2} = 13\frac{1}{2} \text{ cubic rājus}$$

and its volume of external triangle

$= \frac{5}{7} \times \frac{1}{2} \times \frac{5}{4} \times 7 = \frac{25}{8} = 3\frac{1}{8}$ cubic rājus .

Here, height of $\frac{5}{4}$ rājus is worthy of mention for its evaluation,

which is $\frac{1}{4}$ raju above Māhendra base upto the Brahmottara base.

$\therefore$ volume of internal region $= \frac{27}{2} - \frac{25}{8} = \frac{83}{8}$ cubic rājus

volume of Brahmottara region $= \frac{1}{2}(\frac{5}{7} + 1) \times \frac{1}{2} \times 7 = 3$ cubic rājus

The same is volume of the Kāpiṣṭha.

volume of Mahāśukra $= (\frac{5}{7} + \frac{3}{7}) \frac{1}{2} \times \frac{1}{2} \times 7 = 2$ cubic rājus

external volume of Sahasrāra $= \frac{1}{2}(\frac{3}{7} + \frac{1}{7}) \times \frac{1}{2} \times 7 = 1$ cubic rājus

external and internal volume of Ānata $= (\frac{8}{7} + \frac{6}{7}) \frac{1}{2} \times \frac{1}{2} \times 7 = \frac{7}{2}$ cubic rājus

external volume of Ānata $= \frac{1}{7} \times \frac{1}{2} \times \frac{1}{4} \times 7 = \frac{1}{8}$ cubic rājus

$\therefore$ internal volume $= \frac{7}{2} + \frac{1}{8} = \frac{27}{8} = 3\frac{3}{8}$ cubic rājus

volume of Āraṇa $= (\frac{6}{7} + \frac{4}{7}) \frac{1}{2} \times \frac{1}{2} \times 7 = \frac{5}{2}$ cubic rājus

volume of navgraiveyakādi $= \frac{4}{7} \times \frac{1}{2} \times 1 \times 7 = \frac{4}{2}$ cubic rājus

The volumes of the above mentioned totals 35 cubic rājus, hence the volume of such regions of both sides is 70 cubic rājus. Apart from this, volume of half cube rājus

$= 2 \times 4 \times [\frac{1}{2} \times 1 \times 7] = 28$ cubic rājus .

The volume of the central portion (trasanālī) = $1 \times 7 \times 7 = 49$ cubic rājus.

Hence total volume = $28 + 49 + 70 = 147$ cubic rājus.

(vv. 1.200-214)

However, the same result has also been found through the direct use of the formula, "muha bhūmi joga dale....." i.e.

$$\text{vol.} = \frac{\text{base + top}}{2} \times \text{height} \times \text{north south extension.}$$

Hence

1. volume of Saudharmādi pair $= (\frac{19}{7} + \frac{7}{7}) \div 2 \times \frac{3}{2} \times 7 = \frac{39}{2} = 19\frac{1}{2}$ cubic rājus

2. volume of Sānatkumāra pair $= (\frac{31}{7} + \frac{19}{7}) \div 2 \times \frac{3}{2} \times 7 = \frac{75}{2} = 37\frac{1}{2}$ cubic rājus

3. volume of Brahma pair $= (\frac{31}{7} + \frac{35}{7}) \div 2 \times \frac{1}{2} \times 7 = \frac{33}{2} = 16\frac{1}{2}$ cubic rājus

4. volume of Lāntava pair $= (\frac{35}{7} + \frac{31}{7}) \div 2 \times \frac{1}{2} \times 7 = \frac{33}{2} = 16\frac{1}{2}$ cubic rājus

5. volume of Śukra pair $= (\frac{31}{7} + \frac{27}{7}) \div 2 \times \frac{1}{2} \times 7 = \frac{29}{2} = 14\frac{1}{2}$ cubic rājus

6. volume of Satāra pair $= (\frac{27}{7}+\frac{23}{7}) \div 2 \times \frac{1}{2} \times 7 = \frac{25}{7} = 12\frac{1}{2}$ cubic rājus

7. volume of Ānata pair $= (\frac{23}{7}+\frac{19}{7}) \div 2 \times \frac{1}{2} \times 7 = \frac{21}{2} = 10\frac{1}{2}$ cubic rājus

8. volume of Āraṇa pair $= (\frac{19}{7}+\frac{15}{7}) \div 2 \times \frac{1}{2} \times 7 = \frac{17}{2} = 8\frac{1}{2}$ = cubic rājus

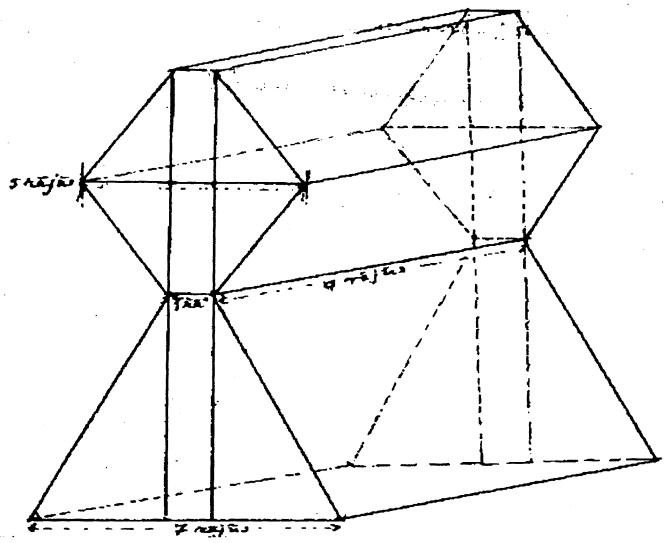
9. volume of Navagraiveyaka etc. $= (\frac{15}{7}+\frac{7}{7}) \div 2 \times 1 \times 7 = \frac{77}{7} = 11$ cubic rājus

Total of the above = 147 cubic rājus (vv. 1.198 -199)

1.215-1.266

The following solids have the smae volume as the natural, ariginal universe. In order to known more about the volume of the universe, it has been converted into seven other types of solides, but having the same volume as the natural universe (sāmānya loka), i.e. 343 cubic rājus or a universe-line cube. Whatever remaining seven solid figures have been given here, have been given as a gesture, because in the original text, the figures have not been given.

1. Commonor natural universe (sāmānya loka)

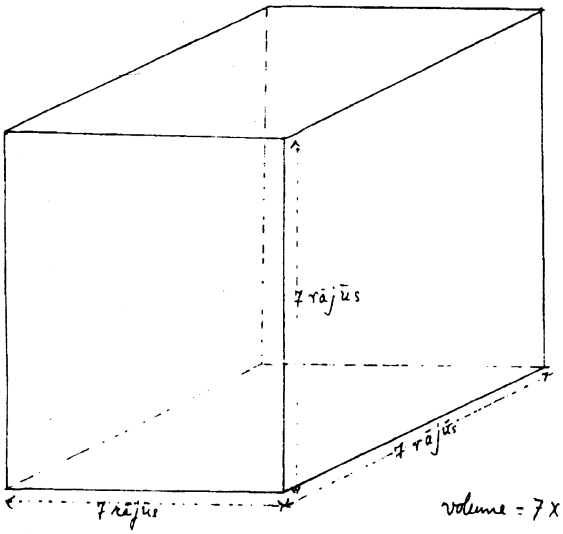


scale 1 cm = 1 rāju,

figure - 1.19

volume of the universe = 343 cubic rajus = universe-line cubed (v. 1.216)

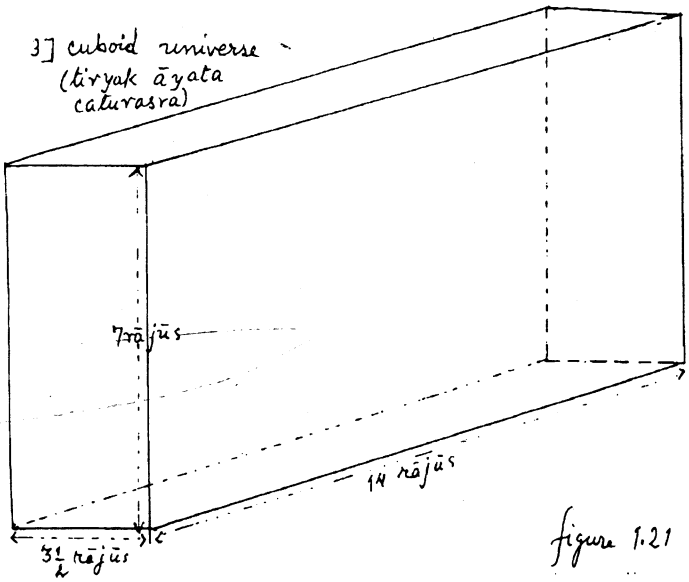
2. Cubic universe (ūrdhva āyata caturasra)



Scale 1 cm = 1 rāju

figure-1.20

volume = 7 × 7 × 7 = 343 cubic rājūs



scale 1 cm = 1 rāju

figure 1.21

volume = height × length × breadth = (vedha × koṭi × bhujā) = $7 \times 3\frac{1}{2} \times 14 = 343$ cubic rājus (v. 216)

4. Barley-drum universe (yavamuraja)

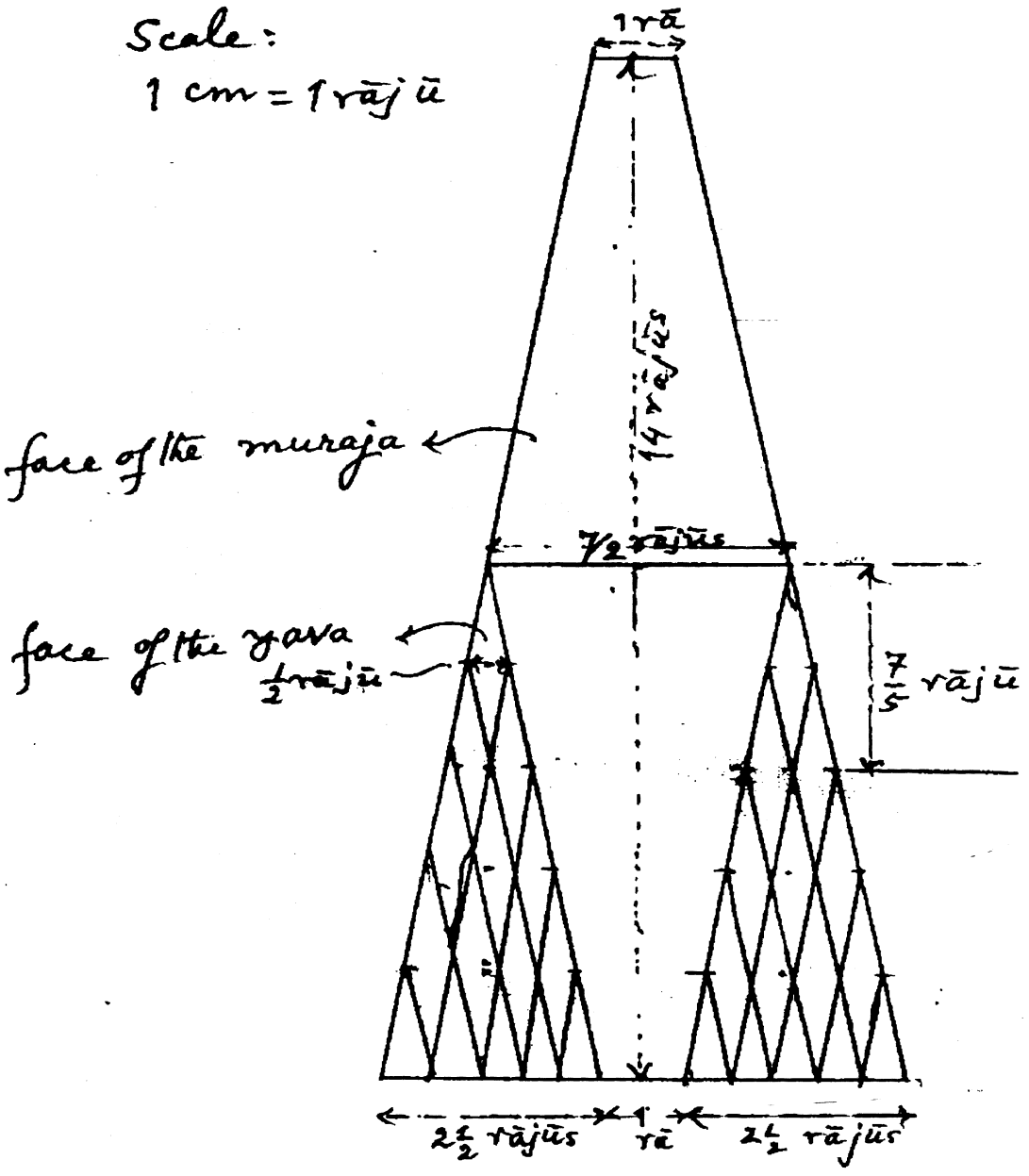


figure - 1.22

This figure, a vertical section of a trapezoid, this figure has been thought of by Ratana chand Mukhtar (Saharanpur). The figure is in the shape of a drum (muraja), surrounded in the

half below portion by double triangles (yavas) and has five triangles each side, in the vertical section.

Total number of triangles = 50.

Full yavas are 20 and half yavas are 10, the muraja or drum, is 1 rāju at the top (mukha) and 1 rāju at the base, the central width being $\frac{7}{2}$ rājus. Thus, the muraja is composed of two trapezoids, with face made up of two trapeziums, one inverted below. Hence the depth north south may be imagined as seven rājus.

The area of the face of the muraja (section of the drum).

$= \{(\frac{7}{2} + 1) \div 2\} \times 14 = \frac{63}{2}$ square rājus

$\therefore$ the volume of the muraja $= \frac{63}{2} \times 7 = 220\ \frac{1}{2}$ cubic rājus

The yava is a double triangel. The total number of full yavas may be taken to be 25.

Area of one yava (barley) $= \frac{1}{2} \div 2 \times \frac{15}{4} = \frac{7}{10}$ square rājus

or $\frac{49}{70}$ or = square rājus or square universe-lines,

70

hence volume of one yava $= \frac{7}{10} \times 7 = \frac{49}{10}$ cubic rājus $= \frac{343}{70}$

or $\equiv$ cubic rājus

70

hence volume of 25 yavas $= \frac{49}{10} \times 25 = \frac{245}{2}$ = cubic rājus

or 25 $\equiv$ cubic universe lines

70

Grand total = $220\frac{1}{2} + 122\frac{1}{2} = 343$ cubic rājus or ≡ cubic universe lines.

This gives the total volume of the universe, composed by such as drum and the barleys.

5. The yavamadhya o barley-middle universe [barley-half]

The figure on the next page gives the idea of such a figure as the universe completely divided into barley shpaed double triangles at the face and on inverted triangle at the top, and six triangles at the bottom, the top is one rāju, the bottom is six rājus, total height is fourteen rājus, and each triangle has a height of $\frac{14}{5}$ rājus.

scale 1 cm = 1 rāju

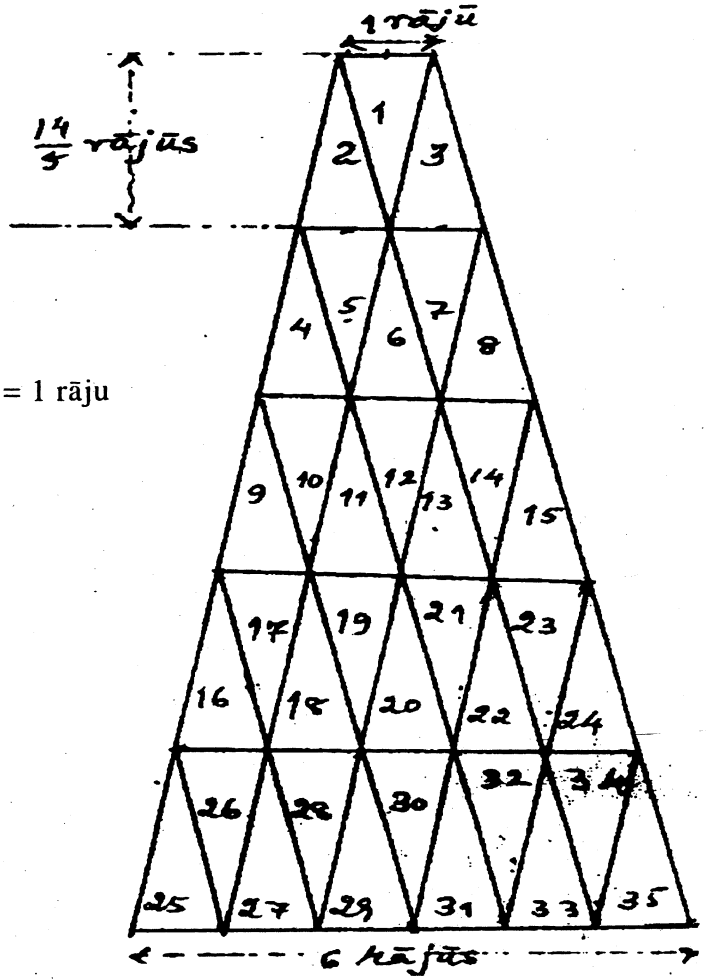


figure - 1.23

This shape was also suggested by R.C. Mukhtara. the total number of triangles is 35. The barley may be taken as half, and hence representing a triangle, totalling to 35. The whole solid figure is thus a prism, a right triangular prism, extending back wards by an amount of seven rājus. The adjoining figure is a vertical, section of the trapezoied, with a back ward thickness of 7 rājus.

The area of the barley half $= (1+2) \times \frac{14}{5} = \frac{7}{5}$ square rājus, hence the area of 35 barley-half figures

$= \frac{7}{5} \times \frac{35}{1} = 49$ square rājus

Thus the volume of the 35 barley half figures

$= 49 \times 7 = 343$ cubic rājus,

the volume of one barley half being $= \frac{343}{35} = 9\frac{28}{35}$ cubic rājus, or $9\frac{4}{5}$ cubic rājus.

Symbolism

After the verse there is the symbolic representation.



The volume of a barley-half is $\frac{343}{35}$ or $\equiv$ cubic rājus or cubic universe lines.

35

The next symbol means that the height of 14 rājus has to be divided into five parts, and thirty-five barley-half are to be obtained. (vv. 1.217-219)

In the TPT (V), however, the symbol is

$\equiv 2 \quad \equiv$

35 (v. 1.221)

figure is the same, but the symbol is meant for division by the volume of a whole barley whose volume, naturaly will be double that if its half. That is volume of a yava is

$\frac{343}{35}$ cubic rajus or $\equiv$ [illegible]^2

2 35 cubic universe lines. The symbol given ahead is meant for the volume of the whole universe, which could be obtained by multiplying the volume of a yava by the number of yavas which is $\frac{35}{2}$ in this case. Hence the volume of the whole universe is $\frac{343}{35} \times \frac{35}{2}$ = 343 cubic rajus or $\equiv$ cubic universe-lines.

6. Trapezoid-universe shape region(mandarakāra kṣetra)

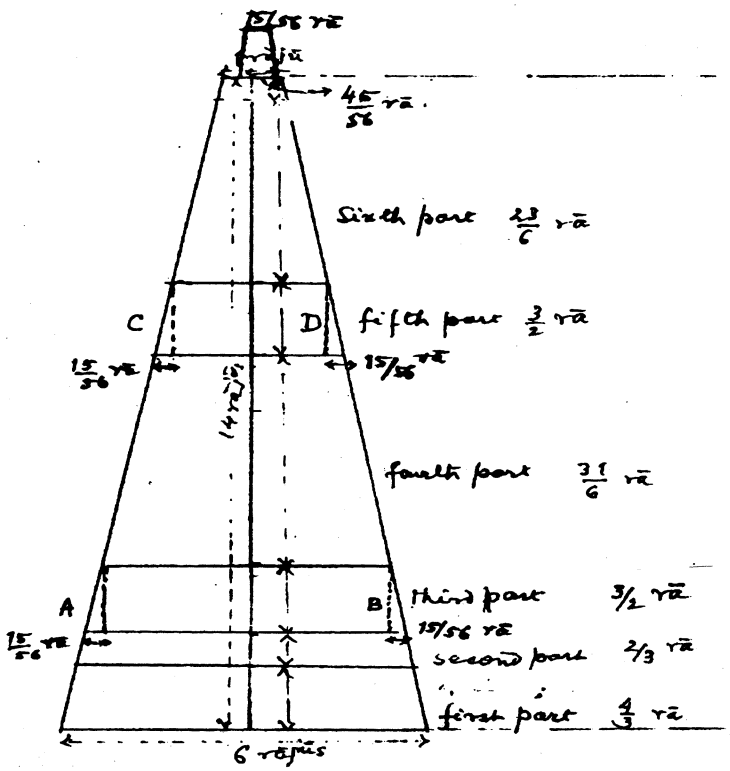


figure 1.24

When the side triangles are removed on being cut at requisite heights, the figure takes the shape of the mandara or meru mountain, hence the name - mandara shaped. This is the trapezoid with top one rāju, bottom 6 rājus, thickness 7 rājus as north south.

The height is taken form the base for making six divisions, given respectively as $\frac{4}{3}$ rājus, $\frac{4}{3}+\frac{2}{3}$ rājus,

$\frac{4}{3}+\frac{2}{3}+\frac{3}{2}$ rājus, $\frac{4}{3}+\frac{2}{3}+\frac{3}{2}+\frac{31}{6}$ rājus and

$\frac{4}{3}+\frac{2}{3}+\frac{3}{2}+\frac{31}{6}+\frac{3}{2}$ rājus, as well as $\frac{4}{3}+\frac{2}{3}+\frac{3}{2}+\frac{31}{6}+\frac{3}{2}+\frac{23}{6}$ rājus.

These are $\frac{4}{3}$, 2, $\frac{7}{2}$, $\frac{52}{6}$, $\frac{61}{6}$ and $\frac{84}{6}$ = 14 rājus.

The area of the mandarākāra region

$= \frac{6+1}{2} \times 14 = 49$ square rājus,

volume of the trapezoid

$= 49 \times 7 = 343$ cubic rājus.

Now the volumes of the six divisions will be found out.

When the height is taken to be $\frac{4}{3}$ rājus, the width at the height, as per rule, is

$= 6 - [\frac{6-1}{14}] \times \frac{4}{3} = \frac{116}{21}$ rājus, similarly.

Hence fo rth, when the height is taken to be two rājus, the width is found to be

$= 6 - [\frac{6-1}{14}] \times 2 = \frac{111}{21}$ rājus.

In this way, through the same method and rule, the widths at the various given heights are $\frac{399}{84}, \frac{244}{84}, \frac{199}{84}, \frac{84}{84}$, respectively. The last measure $\frac{84}{84}$ or 1 rāju, is the top (mukha) of the mandara shaped region and base (bhūmi) is $\frac{126}{21}$ or 6 rājus, In this way, the volumes of the six various divisions are as follows, starting from below,

1. volume of first region

$$= \frac{1}{2}\left[\frac{126}{21} + \frac{116}{21}\right] \times \frac{4}{3} \times 7 = \frac{484}{9} \text{ cubic rājus}$$

2. volume of second region

$$= \frac{1}{2}\left[\frac{116}{21} + \frac{111}{21}\right] \times \frac{2}{3} \times 7 = \frac{227}{9} \text{ cubic rājus}$$

3. volume of third region

$$= \frac{1}{2}\left[\frac{111}{21} + \frac{399}{84}\right] \times \frac{2}{3} \times 7 = \frac{843}{16} \text{ cubic rājus}$$

4. volume of fourth region

$$= \frac{1}{2}\left[\frac{399}{84} + \frac{244}{84}\right] \times \frac{31}{6} \times 7 = \frac{19933}{144} \text{ cubic rājus}$$

5. volume ot fifth region

$$= \frac{1}{2}\left[\frac{244}{84} + \frac{199}{84}\right] \times \frac{3}{2} \times 7 = \frac{443}{16} \text{ cubic rājus}$$

6. volume of sixth region -

$$= \frac{1}{2}\left[\frac{199}{84} + \frac{84}{84}\right] \times \frac{23}{6} \times 7 = \frac{6509}{144} \text{ cubic rājus}$$

The total of the six regions -

= 484/9 + 227/9 + 843/16 + 19933/144 + 443/16 + 6509/144

= 343 cubic rajus = volume of the common universe.

Note : The method of finding out the volumes of the third and the fifth regions does not tally with the method of the original verses. Explanation is as follows -

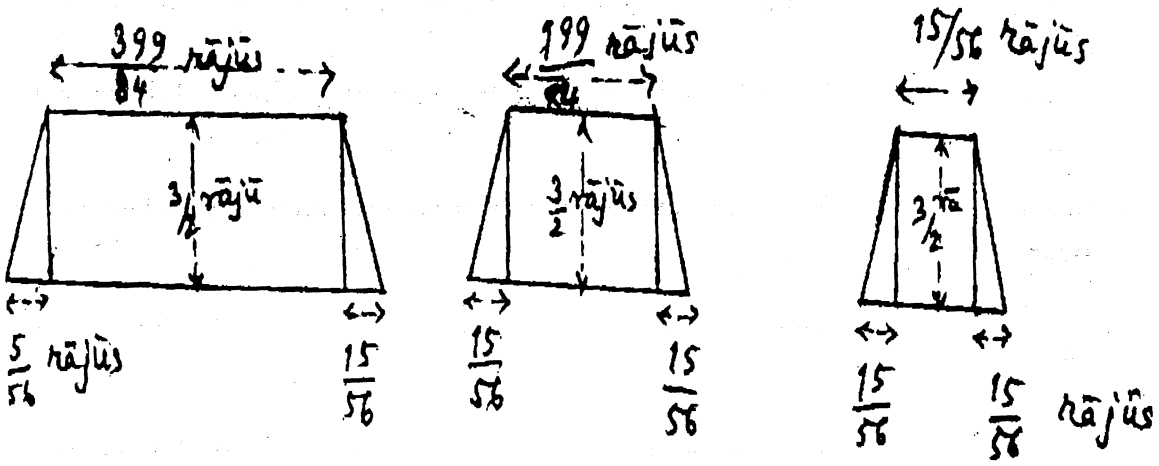


figure 1·25 (A) fig. 1·25 (B) fig. 1·25 (C)

from the third region and the fifth region, the iternal triangular portaions are removed code kepts as in figure 1.25 (c), giving the volume ṅ [15/56 + 45/56] x 3/2 x7 = 45/8 cubic rajus. In this way the auther appears to have taken out the form such triangles from the third and the fifth regions (each having 15/56 rajus as base and 3/2 rajus as height) and established at the top of the figure 1.24, (vide TPT (v), p. 78), shown in green, from the third region, when the volume $2 \times (\frac{15}{56} \times \frac{3}{2}) \times \frac{1}{2} \times 7$ or $\frac{45}{56}$ cubic rajus is subtracted, $\frac{843}{16} - \frac{45}{16}$ or $\frac{399}{8}$ cubic rajus remain. This measure is given in the original verses. The symbolism may be interrupted as follows :

3 – 15 means $\frac{3}{14} \times 7$ is the height and $\frac{15}{392} \times 7$ is the base.

14 392

The meaning of the triangle with 1 at the top is not clear. However the figure has been further explained:

3 – 15 The figure 1.26 is the vertical section of the mandara shaped region.

14 3(

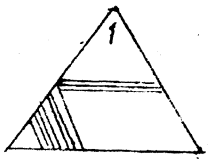


Figure 1.26

This has been constituted such that its peak (figure1.27) is the combination of four triangles A, B, C, D of the figure 1.24.

Every triangle has the base equal to $\frac{15}{56}$ rājus and the height is $\frac{9}{6}$ rājus. Out of the four triangles, three regions become of a combined base of the peak $(\frac{15}{56} \times 3) = \frac{45}{56}$. With the base $\frac{15}{56}$ has been built up the width $\frac{15}{56}$ rājus of the peak (triangle).

(vv. 1.220-231)

15/56 rājus

peak (cūlikā)

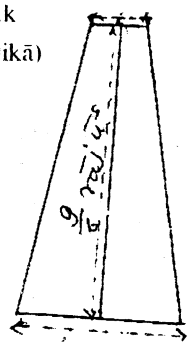


figure 1.27

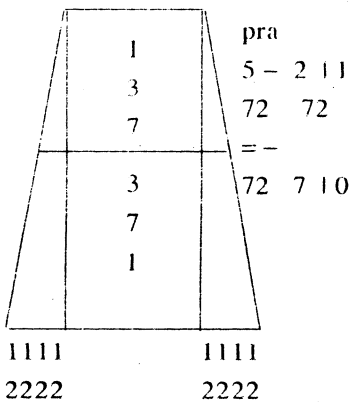
After the figure, 1.26 in v.1.220, there is given a figure of trapezium with some numeral and geometric symbols.

The only meaning which could be made out of this is that

5 – 2 11

72 72

is $\frac{5\times7\times2}{7\times2} \times \frac{1}{7\times2}$ or $\frac{5}{14}$ which is the decrease or



pra

5 – 2 11

72 72

= –

72 7 10

increase measure of some quantity. The remaining figure is not clear. It may be, however, guessed that the top is 1 rāju, the base is 5 rājus, so divided through

$\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, 1, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}$ rājus. 7 may be the heights of the lower and upper portions, total being 14. The word pramāṇa might have been abbreviated as per, noted on the right hand side. 3 means the middle width in rājus.

It may be noted that the verses of the text mention seven volumes, the last being the combination of the extracted portion from third and fifth regions, the third and fifth regions in volumes being shown in the remainder forms:

$\equiv \frac{484}{343 \mid 9}$	$\equiv \frac{227}{343 \mid 9}$	$\equiv \frac{399}{343 \mid 8}$	$\equiv \frac{19933}{343 \mid 144}$	$\equiv \frac{199}{343 \mid 8}$
	$\equiv \frac{6509}{343 \mid 144}$	$\equiv \frac{45}{343 \mid 8}$		(v. 1.231)

Here, $\equiv$ 343 denotes a cubic rāju.

The total of the above is 343 cubic rājus.

(7) Camping tent universe (dūṣya kṣetra)

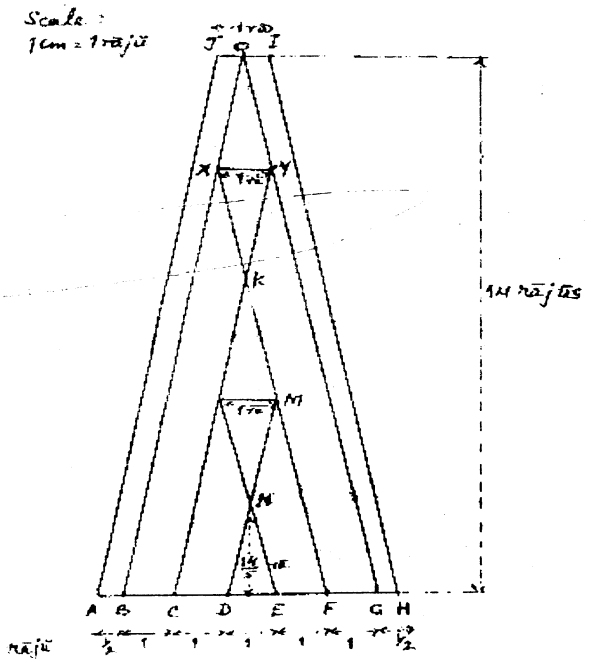


figure – 1.29' figure 1.29

This figure is a vertical section of a camping tent universe. It is seven rājus in north-south extension, not shown here.

The labels have been given for different points. Height is 14 rājus, top is 1 rāju, bottom or base is 6 rājus, with division on entry both sides as $\frac{1}{2}$, 1, 1, 1 and $\frac{1}{2}$, 1, 1, 1 rājus. The figure is divided into parallelopipeds, and barley's – whole and half.

volume of the outer both slant figures, parallelopipeds, (OJAB + OIHG)

$$= \frac{1}{2} \times 14 \times 7 \times 2 = 98 \quad \text{cubic rājus}$$

volume of the inner slant figures parallelopipeds, (XKCB + YKFG)

$$= \frac{49}{5} \times 7 \times 2 = \frac{686}{5} = 137\ \frac{1}{5} \quad \text{cubic rājus}$$

volume of the smaller inner slant parallelopipeds , (LNDC + MNEF)

$$= \frac{21}{5} \times 7 \times 2 = \frac{294}{5} = 58\frac{4}{5} \quad \text{cubic rājus.}$$

The total barley region $= \frac{5}{2}$ barley volume

$\therefore$ volume of barley region $= 2 + \frac{1}{2}$ barley (five triangles)

= OXK . + KLNM + NDE

$$= (\frac{28}{10} + \frac{28}{10} + \frac{14}{10}) \times 7 = 49 \text{ cubic rājus .}$$

Hence, the total volume of the four types of regions

$$= 98 + 137\frac{1}{5} + 58\frac{4}{5} + 49 = 343 \text{ cubic rājus} \quad \text{or} \quad \equiv \text{cubic universe-lines}$$

These have been expressed in the text as follows :

≡ 2 ≡ 2 ≡ 6 ≡ 7

7 5 35

which yield tl. above on replacing ≡ by 343. The sum is ≡ cubic universe-lines.

(8) Mountridge universe (girikaṭaka loka) :

In this figure, there are the mounts and the valleys or cuts, similar to the figure 1.23. This figure seems to be similar to the yavamadhya region. There, the elements have been barley and semi-barley figures and here only semi-barley or mounts and cuts, or valleys and mounts. Hence the range of mounts have been called, perhaps, as girikaṭaka loka. There are twenty mounts (giris) here and fifteen inverted mounts or cuts here, totalling to 35.

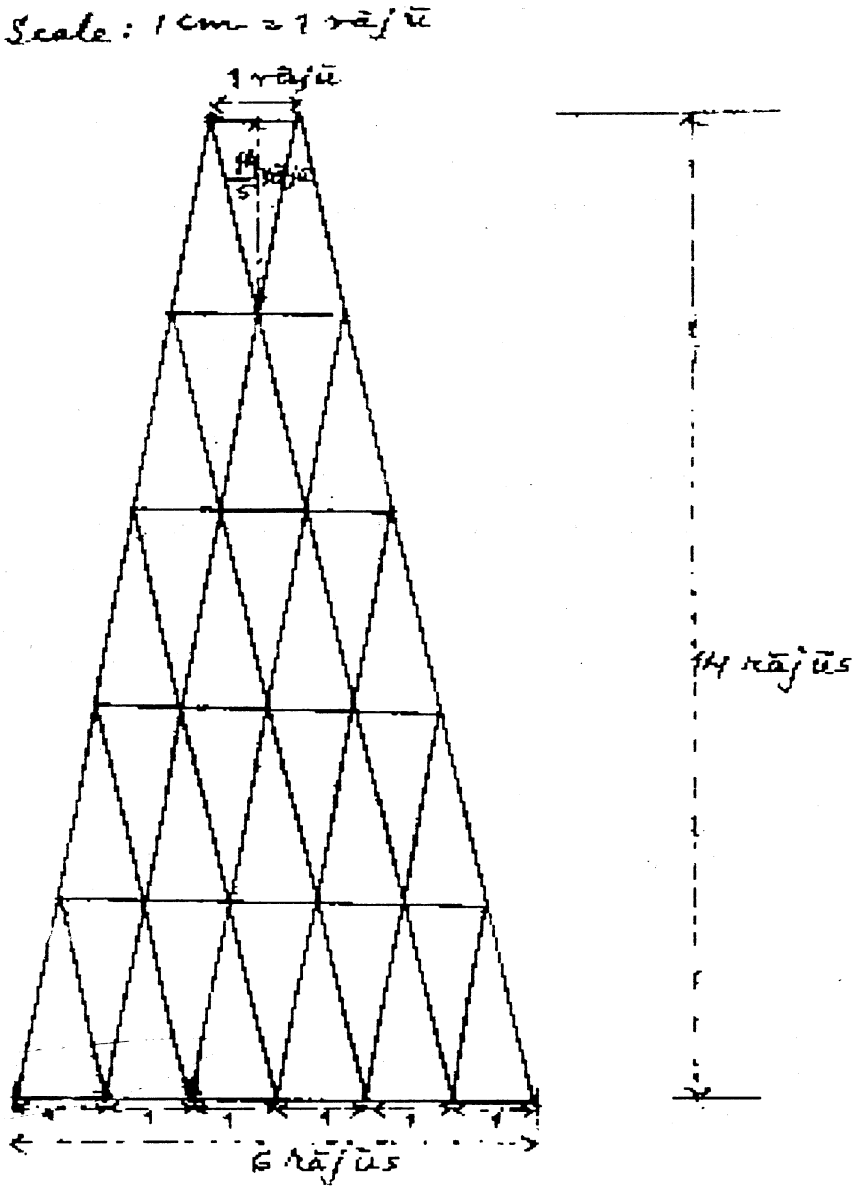


figure 1.30

It is clear from the figure that either a mount or a cut has a volume

$= \frac{1}{2} \times 1 \times \frac{14}{5} \times 7 = \frac{49}{5}$ cubic rājus, as the figure here, is the vertical section of

the trapezoid.

As there are 35 mounts and cuts in all, hence the volume of these will be given by

$= \frac{49}{5} \times 35 = 343$ cubic rājus.

In the text, volume of a single mount is given by $\equiv$

35

where $\equiv$ is the total volume of the universe, and 35 is the number of mounts and cuts.

vv.1.235-250

These verses describe the same type of eight figures as described above for the whole universe, in the case of the lower universe which is a trapezoid, with top 1 rāju, bottom 7 rājus and thickness 7 rājus.

1. Volume of common lower universe (sāmānya adholoka)

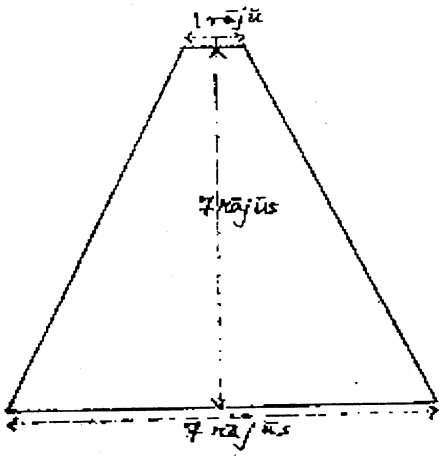


figure 1.31

scale 1 cm = 1 raju

The top is one rāju, the base is 7 rāju and the height is 7 rājus. Moreover, the backward extension of the trapezoid is 7 rājus.

Hence the volume of the common universe is

$= [\frac{7+1}{2}] \times 7 \times 7 = 196$ cubic rājus. The same is written as $\equiv$ 4

7

2. Volume of the Cuboid lower universe (ūrdhvāyata)

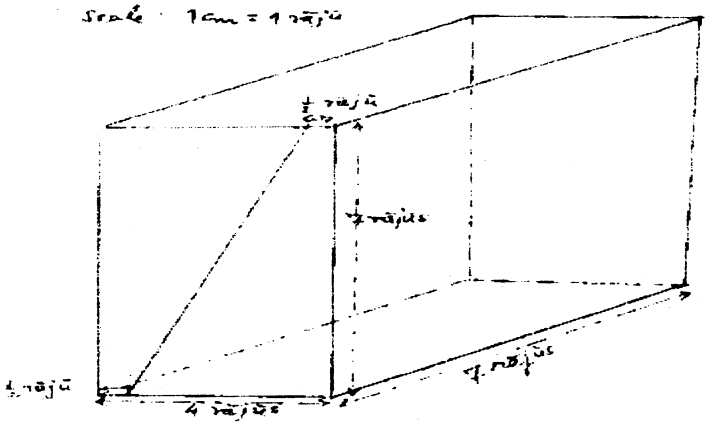


figure 1.32

As is clear, its volume = 4 × 7 × 7 = 196 cubic rājus. The measure of arm is ' – ' or 7 rājus, The height is ' – ' universe line or 7 rājus. The volume is given as

≡ 4 cubic universe line. where the breadth or koṭi is – 4 rājus.

7 7

3. Volume of the Oblique-rectangular (cuboid with broad base), figure of the lower universe (tiryak āyata)

Scale: 1cm = 1 rāju

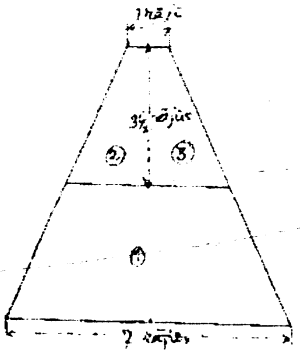


figure 1.33

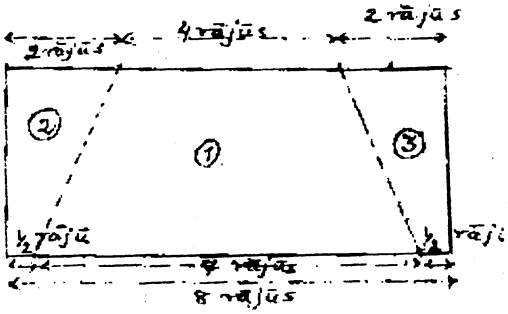


figure 1.34

The region which has a greater length and less height is called the oblique-rectangular (tiryak āyata) figure. Here is given the vertical section of the cuboid, whose depth is 7 rājus, length 8 rājus and height $3\frac{1}{2}$ rājus. This has been transformed from the original figure on

dividing the $3\frac{1}{2}$ rājus of portion into two equal parts and putting them together with the remaining lower trapezoid.

Thus, the volume of the cuboid is $= \frac{8}{1}\times\frac{7}{2}\times\frac{7}{1}. = 196$ cubic rājus.

This is the same as depicted in the symbol $\equiv$ 4 cubic universe-line.
7

4.Barley drum shaped lower universe (yavamuraja ākāra adho loka)

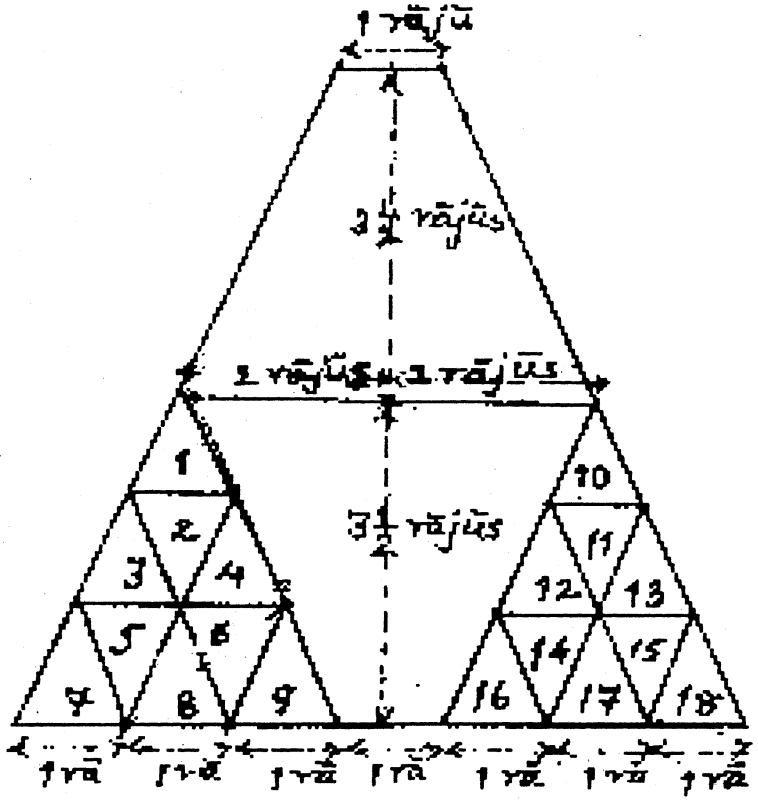


figure 1.35

This figure has the same outer dimensions, except that it has been divided into two parts. The lower part has the base divided into seven parts, each of one rāju and congruent triangles in shape of barley and half-barley are made on both sides of the lower portion, left being similar to the upper as shown in the figure.

The drum is a double trapezoid (muraja), with top and bottom each a rāju, and a width 4 rājus in the middle. Hence, with 7 rājus as a total height and 7 rājus depth, it has a volume

$$= 2\left[\frac{4+1}{2} \times \frac{7}{2} \times 7\right] = \frac{245}{2} = 122\frac{1}{2} \text{ cubic rājus.}$$

This is the same as $\equiv \frac{5}{14}$ cubic universe-lines

There are 18 half barley triangular prisms, each having a base of 1 rāju and a height of $\frac{7}{6}$ rājus and depth of 7 rājus. Hence, volume of one prism $= \frac{1}{1} \times \frac{1}{2} \times \frac{7}{6} \times \frac{7}{1} = \frac{49}{12}$ cubic rajus. There are such 18 prisms (semi-barleys), hence the total volume of all prisms $= \frac{49}{12} \times 18 = 73\frac{1}{2}$ cubic rājus.

When the universe is divided by 14 and multiplied by 3, that is $\equiv \frac{3}{14}$ gives the same volume in the cubic universe-line.

On adding both the volumes, the volume of the lower universe = $122\frac{1}{2} + 73\frac{1}{2} = 196$ cubic rājus.

The same is $\equiv \frac{5}{14}$ plus $\equiv \frac{3}{14}$ or $\equiv \frac{8}{14}$ or $\equiv \frac{4}{7}$ as usual. (v. 1.237)

5. Barley-half shaped lower universe (yavamadhya adholoka)

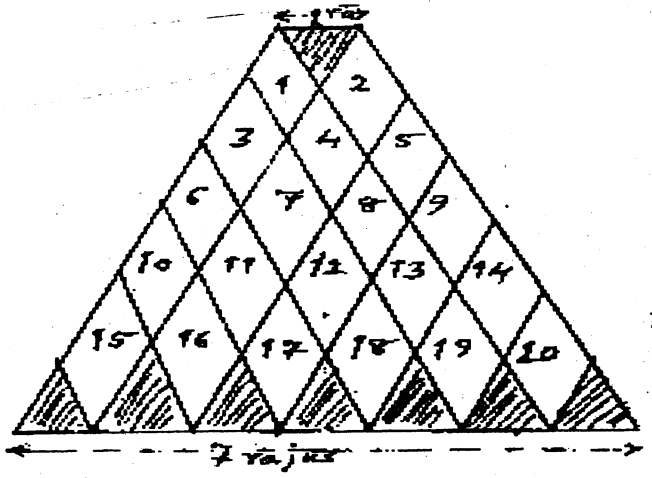


figure 1.36

In such a diagram which is a vertical section of the trapezoid, with bottom 7 rājus, top 1 rāju, height 7 rājus and depth 7 rājus. There are 20 full barley and 8 half-barleys each with

a base of 1 rāju and a height of $\frac{7}{3}$ of the full-barley. In all there are 20 + 4 = 24 full-barley.

The single full barley has the volume = $\frac{1}{1} \times \frac{1}{2} \times \frac{7}{3} \times \frac{7}{1} = \frac{49}{6}$ cubic rājus.

Hence, volume of 24 barleys = $\frac{49}{6} \times \frac{24}{1}$ = 196 cubic rājus

The same has been depicted as $\equiv \frac{4}{7}$ cubic universe-lines.

The volume of a barley has been shown to be $\equiv \frac{\text{cubic universe-lines.}}{42}$ (vv. 1.239-240)

6. Meru or mandara lower unuverse

scale 1 cm = $\frac{1}{2}$ raju

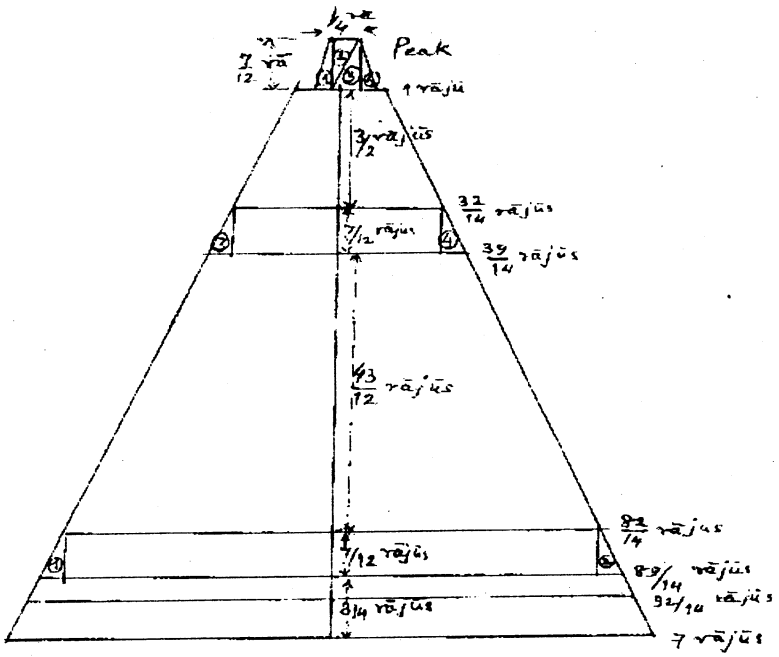


Figure 1.3

This transformed figure is obtained on converting the lower universe into the Sudarśana meru shape as shown in the figure.

The figure is the vertical section, with a depth of seven rājus. The division of height is

according to the shape of the meru.

There are seven divisions as shown above, the 1, 2, 3, 4 parts being cut from third and fifth parts and transferred at the top as the peak. Thus we have,

volume of the first part base 7 rājus, top $\frac{92}{14}$ rājus, height $\frac{1}{2}$ rāju and depth 7 rājus, hence

$$\text{volume} = (\frac{7}{1} + \frac{92}{14}) \times \frac{1}{2} \times \frac{1}{2} \times \frac{7}{1} = \frac{95}{4} \text{ cubic rājus}$$

volume of second part base $\frac{92}{14}$ rājus, top $\frac{89}{14}$ rājus, height $\frac{1}{4}$ rāju, depth 7 rājus, hence

$$\text{volume} = (\frac{92}{14} + \frac{89}{14}) \times \frac{1}{2} \times \frac{1}{4} \times \frac{7}{1} = \frac{181}{16} \text{ cubic rājus}$$

volume of third part base $\frac{82}{14}$ rājus, top $\frac{82}{14}$ rājus, height $\frac{7}{12}$ rājus and depth 7 rājus, hence

$$\text{volume} = (\frac{82}{14} + \frac{82}{14}) \times \frac{1}{2} \times \frac{7}{12} \times \frac{7}{1} = \frac{287}{12} \text{ cubic rājus}$$

volume of fourth part base $\frac{82}{14}$ rājus, top $\frac{39}{14}$ rājus, height $\frac{43}{12}$ rājus and depth 7 rājus, hence

$$\text{volume} = (\frac{82}{14} + \frac{39}{14}) \times \frac{1}{2} \times \frac{43}{12} \times 7 = \frac{5203}{49} \text{ cubic rājus}$$

volume of fifth part base $\frac{39}{14}$ rājus, top $\frac{32}{14}$ rājus, height $\frac{7}{12}$ rāju and depth 7 rājus, hence

$$\text{volume} = (\frac{32}{14} + \frac{32}{14}) \times \frac{1}{2} \times \frac{7}{12} \times \frac{7}{1} = \frac{28}{3} \text{ cubic rājus.}$$

[Note: The base of the third and fifth parts was $\frac{89}{14}$ and $\frac{39}{14}$ rājus, respectively, but due to removal of four triangles, the bases have been taken as $\frac{82}{14}$ and $\frac{32}{14}$ rājus only.]

volume of sixth part base $\frac{32}{14}$ rājus, top $\frac{14}{14}$ rāju, height $\frac{3}{2}$ rājus and depth 7 rājus, hence

$$\text{volume} = \left(\frac{32}{14} + \frac{14}{14}\right) \times \frac{1}{2} \times \frac{3}{2} \times \frac{7}{1} = \frac{69}{4} \text{ cubic rājus.}$$

volume of seventh part base $\frac{21}{28}$ rāju, top $\frac{7}{28}$ rāju, height $\frac{7}{12}$ rāju and depth 7 rājus, hence

$$\text{volume} = \left(\frac{21}{28} + \frac{7}{28}\right) = \frac{28}{28} \times \frac{1}{2} \times \frac{7}{12} \times \frac{7}{1} = \frac{49}{24} \text{ cubic rājus.}$$

In this way,

$$\text{total volume} = \frac{95}{4} + \frac{181}{16} + \frac{287}{12} + \frac{5203}{48} + \frac{28}{3} + \frac{69}{4} + \frac{49}{24} = \frac{9408}{48}$$

$$= 196 \text{ cubic rajus}$$

This has been expressed in the text as the sum of

$$\equiv 95 \quad \equiv 181 \quad \equiv 287 \quad \equiv 5203 \quad \equiv 28 \quad \equiv 69 \quad \equiv 49$$

$$343 \mid 4 \quad 343 \mid 16 \quad 343 \mid 12 \quad 343 \mid 48 \quad 343 \mid 3 \quad 343 \mid 4 \quad 343 \mid 24$$

or $\equiv 196 \mid$ cubic rājus

343

(vv. 1.243-249)

7. Camping tent lower universe (dūṣya kṣetra adholoka)

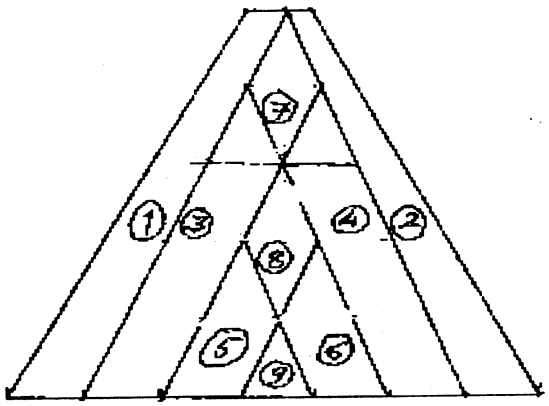


figure 1.38

This figure is a vertical section of the trapezoid and has been transformed in the form of a camping tent as shown divided into nine sections.

volume of part 1 and 2 base 1 rāju, top $\frac{1}{2}$ rāju, height 7 rājus, depth 7 rājus, hence

$$\text{volume} = [(\frac{1}{1} + \frac{1}{2}) \times \frac{1}{2} \times \frac{7}{1} \times \frac{7}{1}] \times 2 = \frac{147}{2} = 73\frac{1}{2} \text{ cubic rājus}$$

volume of internal both arms 3 and 4 base $\frac{28}{5}$, top $\frac{21}{5}$, height 1 rāju, depth 7 rājus, hence

$$\text{volume} = [(\frac{28}{5} + \frac{21}{5}) \times \frac{1}{2} \times \frac{1}{1} \times \frac{7}{1}] \times \frac{2}{1} = \frac{343}{5} = 68\frac{3}{5} \text{ cubic rājus}$$

volume of internal smaller arms 5 and 6 base $\frac{14}{5}$, top $\frac{7}{5}$, height 1 rāju, depth 7 rājus, hence

$$\text{volume} = [(\frac{14}{5} + \frac{7}{5}) \times \frac{1}{2} \times \frac{1}{1} \times \frac{7}{1}] \times \frac{2}{1} = \frac{147}{5} = 29\frac{2}{5} \text{ cubic rājus}$$

volume of $2\frac{1}{2}$ barleys; given by 7, 8, and 9 for a barley, base is 1 rāju, top is 0, height $\frac{14}{5}$ rājus, depth 7 rājus, hence total volume of $\frac{5}{2}$ barley is given by

$$\text{volume} = [(\frac{1}{1} + 0) \frac{1}{2} \times \frac{14}{5} \times \frac{7}{1}] \times \frac{5}{2} = \frac{49}{2} = 24\frac{1}{2} \text{ cubic rājus.}$$

The sum of all the four sets of volume is

$$= 73\frac{1}{2} + 68\frac{3}{5} + 29\frac{2}{5} + 24\frac{1}{2} = 196 \text{ cubic rājus.}$$

These have been given in symbolic form in the text as follows

≡ 3	≡ 5	≡ 3	≡
14		35	14

(vv. 1.248-249)

8. Mount-cuts lower universe (girikaṭaka adholok)

As the figure shows, the lower universe could be cut into 27 mounts and 21 cuts or

valleys. Each mount has base 1 raju, top 0, height $\frac{7}{6}$ rajus and depth 7 rajus.

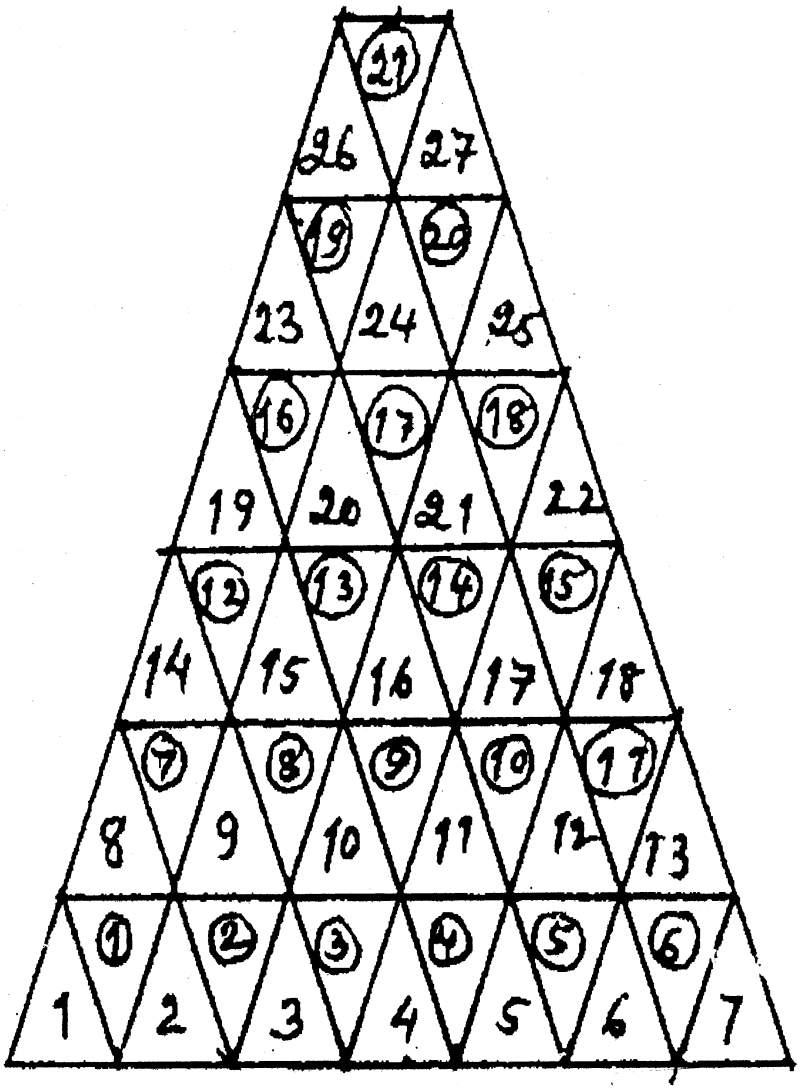


figure - 1.39

The lower universe is having base 7 rajus, top 1 raju, height 7 rajus and depth 7 rajus. The figure shows its vertical section and each mount is a prism so also the cut.

Each mount has base 1 rāju, top 0, height $\frac{7}{6}$ rājus and depth 7 rājus, hence volume of a single mount or a cut is

$$= (\frac{1}{1} + 0) \times \frac{1}{2} \times \frac{7}{6} \times \frac{7}{1} = \frac{49}{12} \text{ cubic rājus.}$$

This is shown as $\underset{84}{\equiv}$ in symbolic form.

Hence, volume of 27 + 21 mounts and cuts, being that of 48, is given by $\frac{49}{12} \times 48 = 196$ cubic rājus.

For mounts it is $\frac{49}{12} \times 27 = 110\frac{1}{4}$ and for cuts it is $\frac{49}{12} \times 21 = 85\frac{3}{4}$, that is, totalling to 196 cubic rājus. (v. 250)

vv.1.251-266

Just as there is description of the volume of the lower universe in eight types of transformed figures, so also is the case with the upper universe (ūrdhva loka)

1. Common upper universe (sāmānya ūrdhva loka)

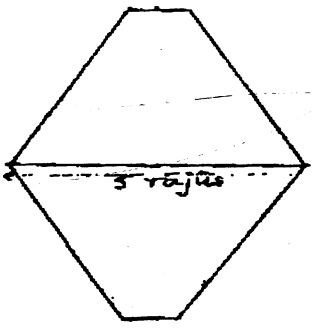


figure 1.40

Here, the drum shaped upper universe has top and bottom 1 rāju each and the central width is 5 rājus, total height is 7 rājus. This is vertical section of the double trapezoid, one over the other.

Hence, the total volume of the double trapezoid, with 7 rājus of depth is

$$= \quad [(5 + 1) \times \frac{1}{2} \times \frac{7}{2} \times \frac{7}{1}] \times 2$$

$$= \quad 147 \text{ cubic rājus.}$$

In symbol, this is $\equiv \frac{3}{7}$ cubic rājus or cubic universe-lines. (v.1.251)

2. Vertical-rectangular(ūrdhva āyata caturasra) or vertical-cuboid upper universe:

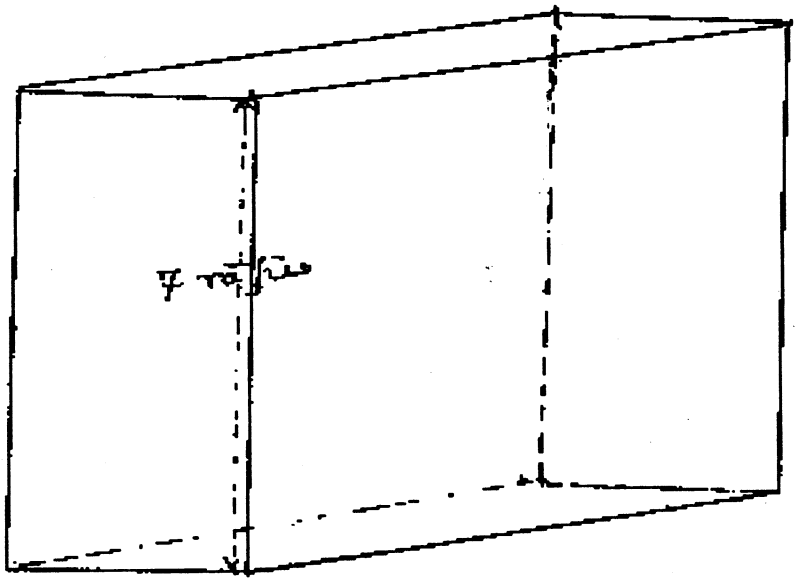


figure 1.41

This cuboid, as shown, has a base of 3 rājus, height 7 rājus, and depth 7 rājus.

Hence, its volume = $3 \times 7 \times 7 = 147$ cubic rājus

or $\equiv \frac{3}{7}$ cubic universe-lines.

3. Horizontal-rectangular, or horizontal-cuboid upper universe (tiryagāyata caturasra kṣetra)

scale 1 cm = 1 rāju

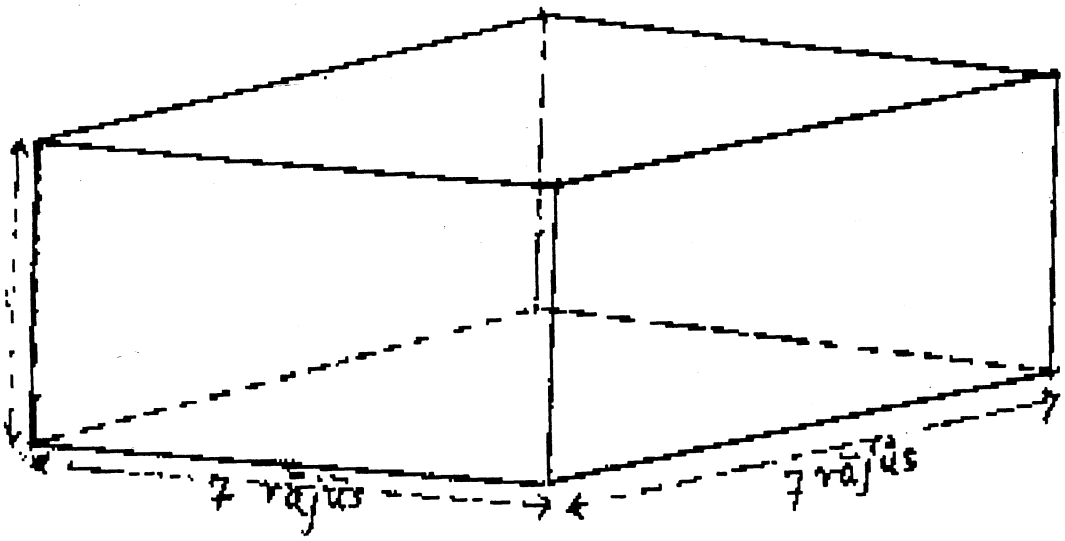


figure 1. 42

This cuboid has base as 7 rājus, depth 7 rājus and height 3 rājus. Hence its volume = $7 \times 7 \times 3$ = 147 cubic rājus.

4. Barley-drum upper universe (yavamuraja ūrdhva loka)

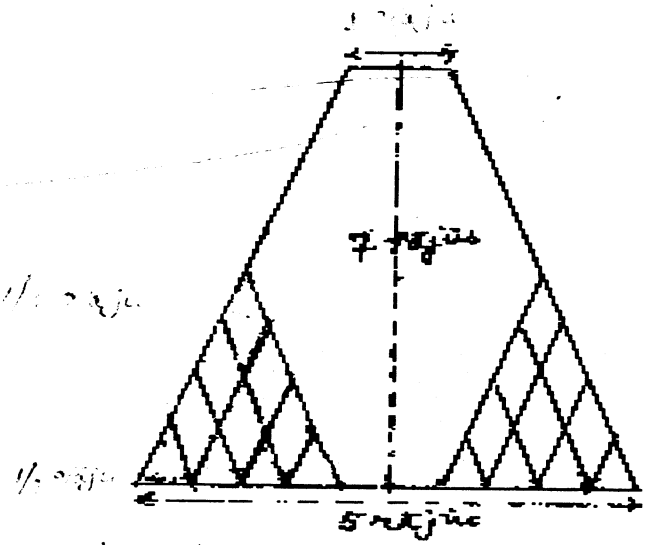


figure 1.43

This figure is the vertical section of the trapezoid with base as 5 rajus, top 1 raju, and depth 7 rajus. It is so transformed that one portion is a drum with top and bottom 1 raju and width of 3 rajus. In the lower half portion the barley are marked out having width of $\frac{1}{2}$ raju and a height $\frac{7}{4}$ rajus.

Half the barleys (yavas) are 32, hence the complete barleys may be taken to be 16 whose volume will be

$$16 \times \left[\frac{1}{2} \times \frac{1}{2} \times \frac{7}{4} \times \frac{7}{1}\right] = 16 \times \frac{49}{16} = 49 \text{ cubic rajus.}$$

$$\text{Volume of drum (muraja)} = 2 \times \left[\frac{3+1}{2} \times \frac{1}{2} \times \frac{7}{2} \times 7 \times 2\right] = 98 \text{ cubic rajus.}$$

Thus the total volume = 49 + 98 = 147 cubic rajus

5. Barley half upper universe (yavamadhya urdhva loka)

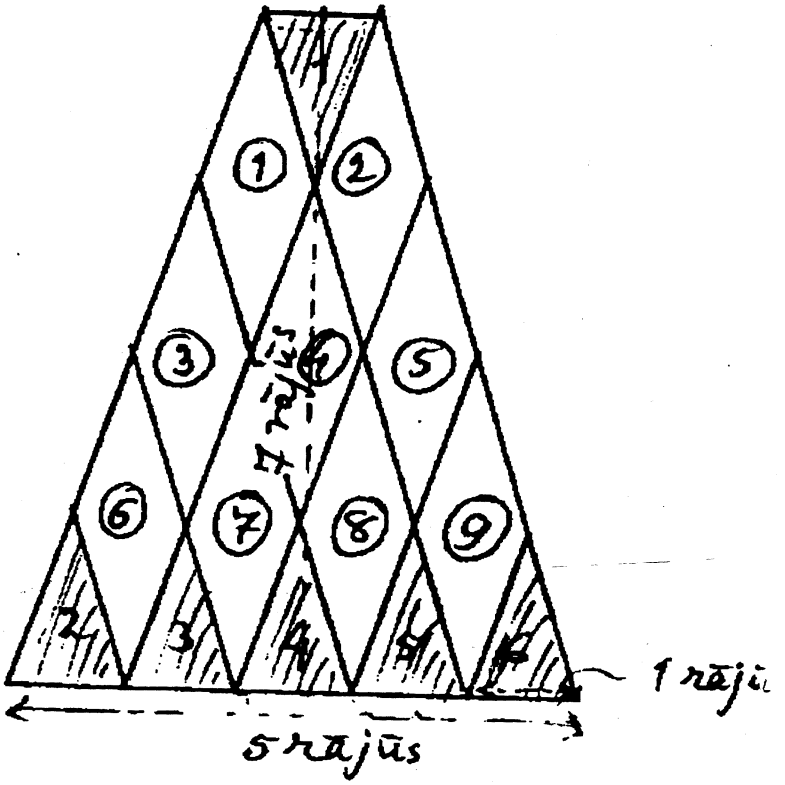


figure - 1.44

This is the vertical section of a trapezoid with 1 raju top, 5 rajus base, 7 rajus height and 7 rajus depth.

It is divided into triangular prisms, whose double are the full barleys, 9 in number in half barleys 6 in number. The full barley has a width 1 raju, height $\frac{7}{2}$ rajus and depth 7 rajus.

Volume of one barley = $\frac{1}{1} \times \frac{1}{2} \times \frac{7}{2} \times \frac{7}{1} = \frac{49}{4}$ cubic rajus.

Hence volume of $9 + \frac{6}{3}$ barleys or 12 full barleys = $\frac{49}{4} \times 12 = 147$ cubic rajus.

(v. 1.255)

6. Mandara mountain-upper universe (mandara urdhva loka)

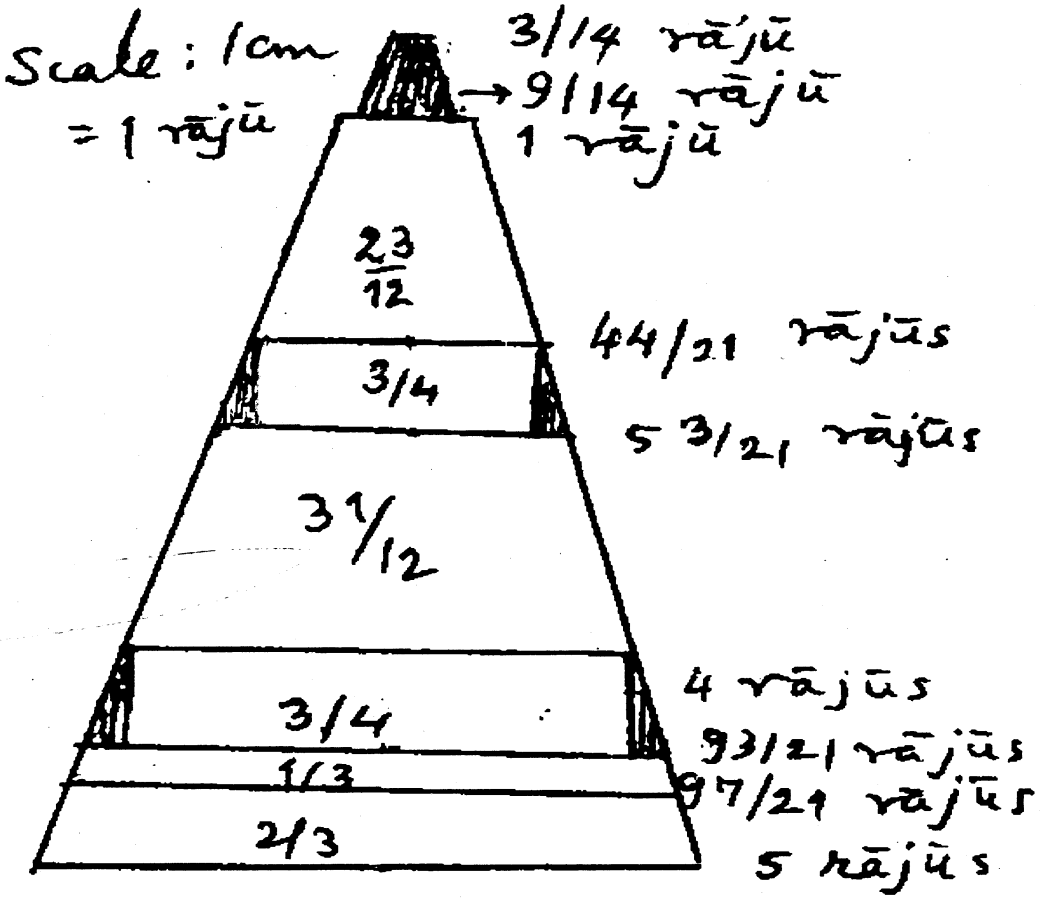


figure - 1.45

The figure is a vertical section of the trapezoid with top as 1 rāju, bottom 5 rājus, height 7 rājus and depth 7 rājus.

The section is divided by horizontal lines at heights of

$\frac{2}{3}, \frac{1}{3}, \frac{3}{4}, \frac{31}{12}, \frac{3}{4}, \frac{23}{12}$ rājus respectively. Four triangles (prisms, are taken out from third and fifth divisions, with width each of $\frac{3}{14}$ or $(\frac{7\times3}{98})$ rāju and height $\frac{3}{4}$ rāju.

Out of these four triangles, a peak is prepared in juxtapositioning, and kept at the top of the figure. The peak has a base as $\frac{1}{14}$ rāju, top $\frac{3}{14}$ rāju, height $\frac{3}{4}$ rāju, and depth 7 rājus.

The following are the volumes of the seven divisions so made, the last being the peak:

1. volume = $(\frac{105}{21} + \frac{17}{21})\ \frac{1}{2} \times \frac{2}{3} \times \frac{7}{1} = \frac{202}{9}$ cubic rājus

2. volume = $(\frac{17}{21} + \frac{13}{21})\ \frac{1}{2} \times \frac{1}{3} \times \frac{7}{1} = \frac{15}{6}$ cubic rājus

3. volume = $(\frac{84}{21} + \frac{84}{21})\ \frac{1}{2} \times \frac{3}{4} \times \frac{7}{1} = \frac{21}{1}$ cubic rājus

4. volume = $(\frac{84}{21} + \frac{53}{21})\ \frac{1}{2} \times \frac{31}{12} \times \frac{7}{1} = \frac{4247}{72}$ cubic rājus

5. volume = $(\frac{44}{21} + \frac{44}{21})\ \frac{1}{2} \times \frac{3}{4} \times \frac{7}{1} = \frac{11}{1}$ cubic rājus

6. volume = $(\frac{44}{21} + \frac{21}{21})\ \frac{1}{2} \times \frac{23}{12} \times \frac{7}{1} = \frac{1495}{72}$ cubic rājus

7. volume = $(\frac{9}{14} + \frac{3}{14})\ \frac{1}{2} \times \frac{3}{4} \times \frac{7}{1} = \frac{9}{4}$ cubic rājus

Total volume = $\frac{202}{9} + \frac{15}{6} + \frac{21}{1} + \frac{4247}{72} + \frac{11}{1} + \frac{1495}{72} + \frac{9}{4} = 147$ cubic rājus.

(v. 1.263)

7. Camping tent upper universe (dūṣya ūrdhva loka)

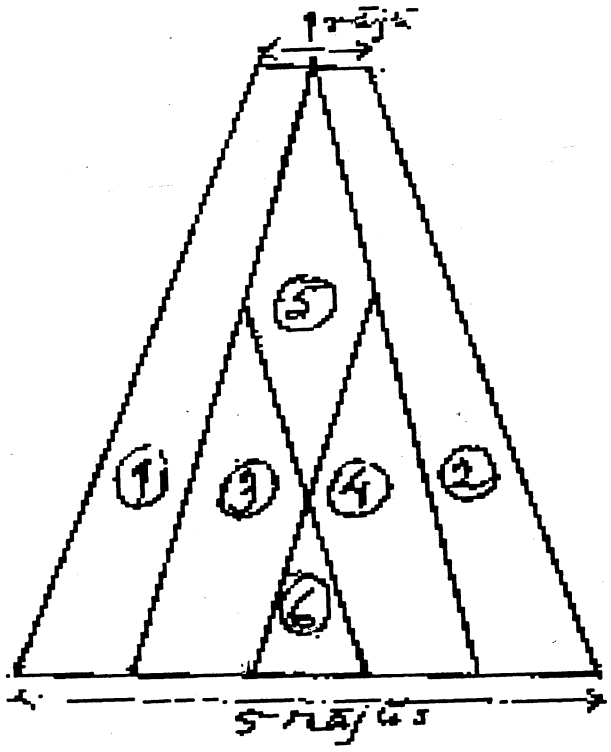


figure 1.46

The figure is the vertical section of a trapezoid with top 1 rāju, bottom 5 rājus, depth 7 rājus, height 7 rājus. It is divided into 6 divisions as shown in the figure, hence

volume of portions (1) and (2) = $[(1 + \frac{1}{2}) \frac{1}{2} \times \frac{7}{1} \times \frac{7}{1}] \times 2 = \frac{147}{2}$ cubic rājus

volume of portions (3) and (4) = $(\frac{14}{3} + \frac{7}{3}) \frac{1}{2} \times \frac{1}{1} \times \frac{7}{1}] \times 2 = 49$ cubic rājus

volume of portions (5) and (6) = $[(1 + 0) \frac{1}{2} \times \frac{14}{3} \times \frac{7}{1}] \times \frac{3}{2} = \frac{49}{2}$ cubic rājus .

Total volume = $\frac{147}{2} + \frac{49}{1} + \frac{49}{2} = 147$ cubic rājus .

(vv. 1.264-265)

8. Mount-cutting upper universe (girikataka urdhva loka)

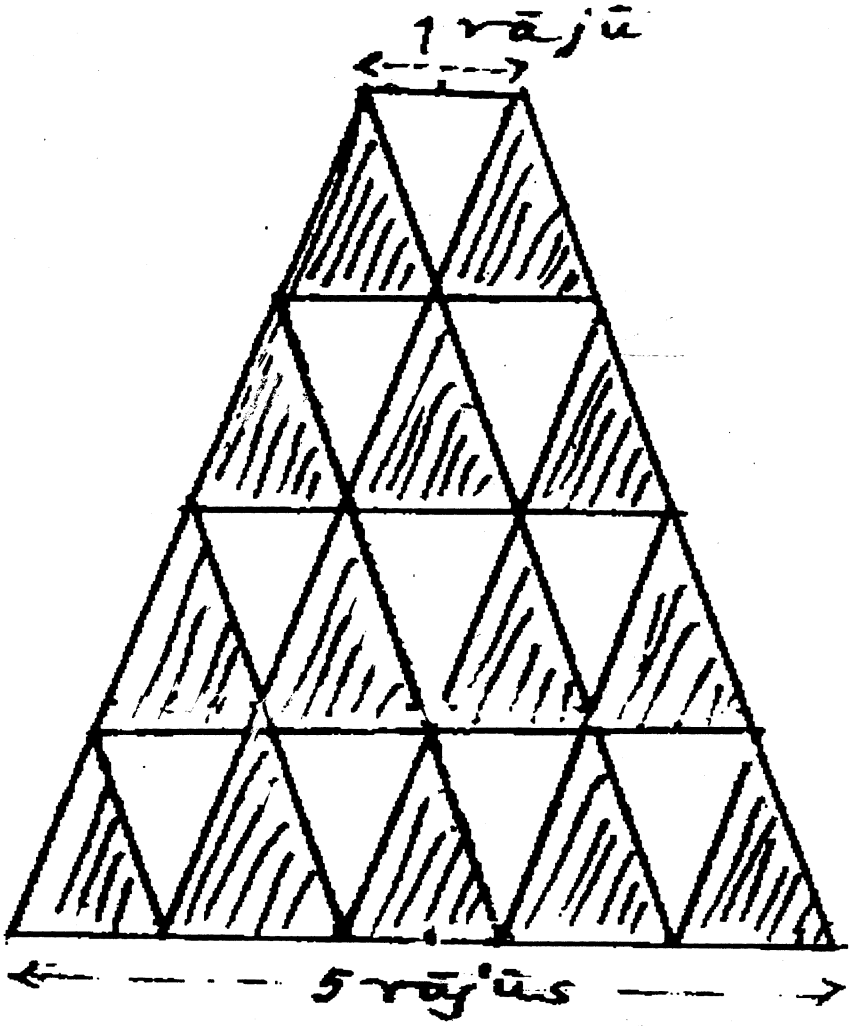


figure - 1.47

The figure is a vertical section of a trapezoid with 5 rajus as base, 1 raju as top, 7 rajus as height, 7 rajus as depth. The half barleys are the same as the mounts and cuts as shown, each having a dimension 1 raju as base, top 0, height $\frac{7}{4}$ rqjus, depth 7 rajus.Hence each mount or cut has a

$$\text{Volume} = (1 + 0)\ \frac{1}{2} \times \frac{7}{4} \times \frac{1}{1} = \frac{49}{8}\ \text{cubic rajus.}$$

There are 14 mounts and 10 cuttings out of which

volume of 14 mounts $= \frac{49}{8} \times 14 = 85\frac{3}{4}$ cubic rājus

volume of 10 cuttings $= \frac{49}{8} \times 10 = 61\frac{1}{4}$ cubic rājus.

Total volume $= 85\frac{3}{4} + 61\frac{1}{4} = 147$

In symbols, the volume of a mount is $\equiv$

$56\frac{7}{3}$ cubic universe lines

and the total volume of the mounts and the cuts is $\equiv$ 3 cubic universe lines.

All the above details of conversion are akin to the method of application of areas of the Greeks. (v. 1.266)

vv. 1.267- et seq.

The three types of universe- the lower and the upper are enveloped with air envelop (vātavalayas)

The diagram is shown as follows: The description of the universe's envelops of air etc. involves rājus as well as yojanas, hence, it is not possible to give scale here, in these diagrams. However, the universe has been drawn under the scale of 1 cm = 1 rāju and the yojanas, only to bring the picture without a comparative scale.

Now two diagrams, as below, will make the enveloped universe clear.

This is the vertical section of the enveloped universe which extends 7 rājus deep north and south. The envelops are dense vapour of water, dense air and thin air respectively, and having measures 7, 5, 4 and 5, 4, 3 yojanas all along 13 rājus above 1 rāju of the base.

Then there begin, 20000 yojanas each, respectively.

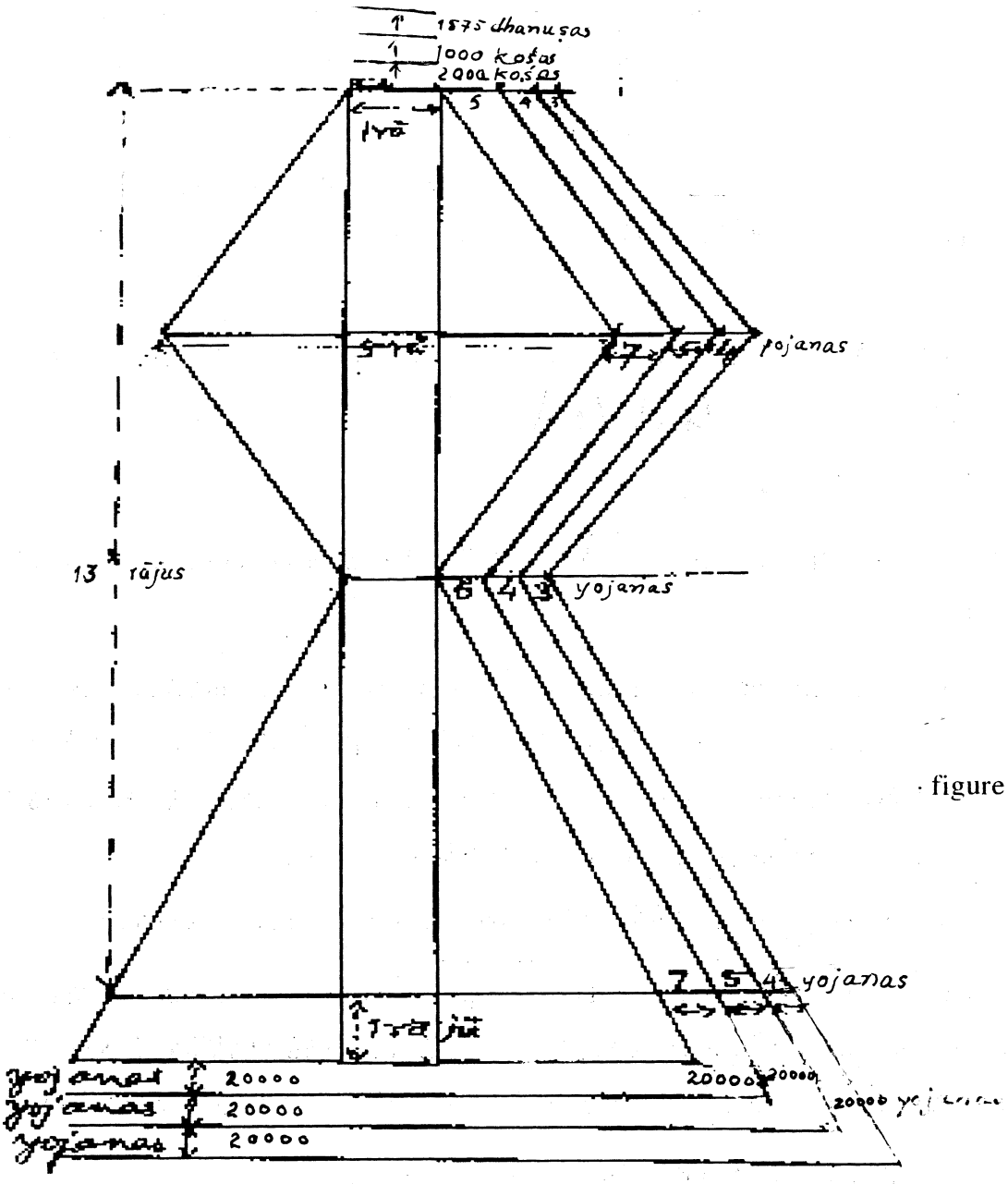

1575 dhanuṣas
1000 kośas
2000 kośas
1 rā
5
4
3
5 rā
7 6 5 yojanas
13 rājus
6 4 3 yojanas
7 5 4 yojanas
1 rā
1 rā
yojanas 20000
yojanas 20000
yojanas 20000
20000
20000
20000 yojanas

figure 1.49

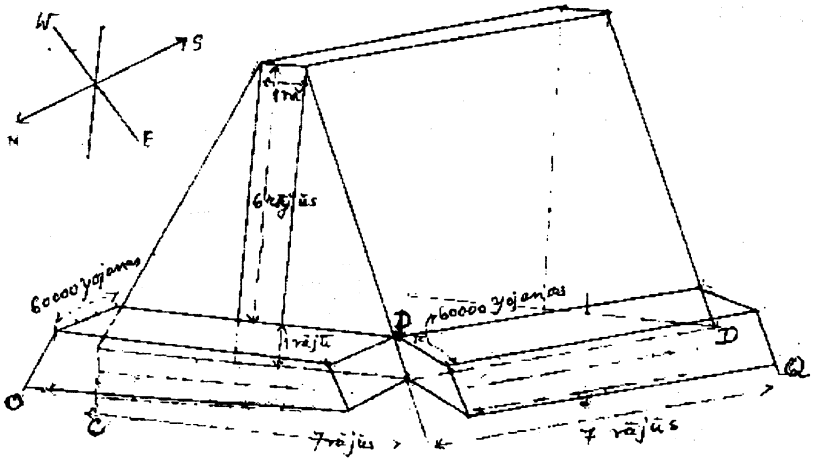


figure 1.50

First of all, the volumes of the enveloped regions below the lower universe are found out as shown in the figure 1.50

CD is a cuboid with length 7 rājus, breadth 7 rājus and depth 60000 yojanas. Hence, its volume

= 7 rājus × 7 rājus × 60000 yojanas

= 49 square rājus × 60,000 yojanas.

This has been symbolized as = 60000 .....(1)

Now taking the regions east and west, PQ in the east and similar to PQ in the west. PQ is a parallelopiped whose volume = length × breadth × height.

In this region, height is 1 rāju, length is 1 rāju, thickness (bāhalya) is 60,000 yojanas.

∴ volume of the envelop both the sides

= 2 [7 rājus × 1 rāju × 60000 yojanas]

= 7 square rājus × 120000 yojanas

$= 49 \text{ square rājus} \times \frac{120000}{7} \text{ yojanas}$

It has been symbolized as $= \frac{120000}{7}$ .....(2)

On adding the results (1) and (2), one gets

$49 \text{ square rājus} \times (60000 \text{ yojanas} + \frac{120000}{7} \text{ yojanas})$, ...(3)

or $49 \text{ square rājus} \times (\frac{540000}{7} \text{ yojanas})$.

This has been symbolized by the author as $= \frac{540000}{7}$ (I)

Now, relative to north-south, the portion of the air enveloped universe in front, OP, and frustrum of right prism, lying behind OP, equivalent to it are considered here. Height is 1 rāju, length at the bottom is 7 rājus top is $6\frac{1}{7}$ rājus and thickness (bāhalya) is 60000 yojanas.

$\therefore$ its volume is $2 \times \frac{1}{2} \times 1 \text{ rāju} \times (\frac{49}{7} + \frac{43}{7} \text{ rājus}) \times 60000 \text{ yojanas}$

$= \frac{92}{7} \text{ square rājus} \times 60000 \text{ yojanas}$

$= 49 \text{ square rājus} \times \frac{5520000}{343} \text{ yojanas}$

The author has expressed this as $\equiv \frac{5520000}{343}$.

When expression (3) is added to (I) then we get

$49 \text{ square rājus} \times (\frac{49 \times 540000}{343} + \frac{5520000}{343})$ yojanas ,

or 49 square rājus $\times \frac{31980000}{343}$ yojanas is obtained.

This has been expressed by the author as = $\frac{31980000}{343}$ (II)

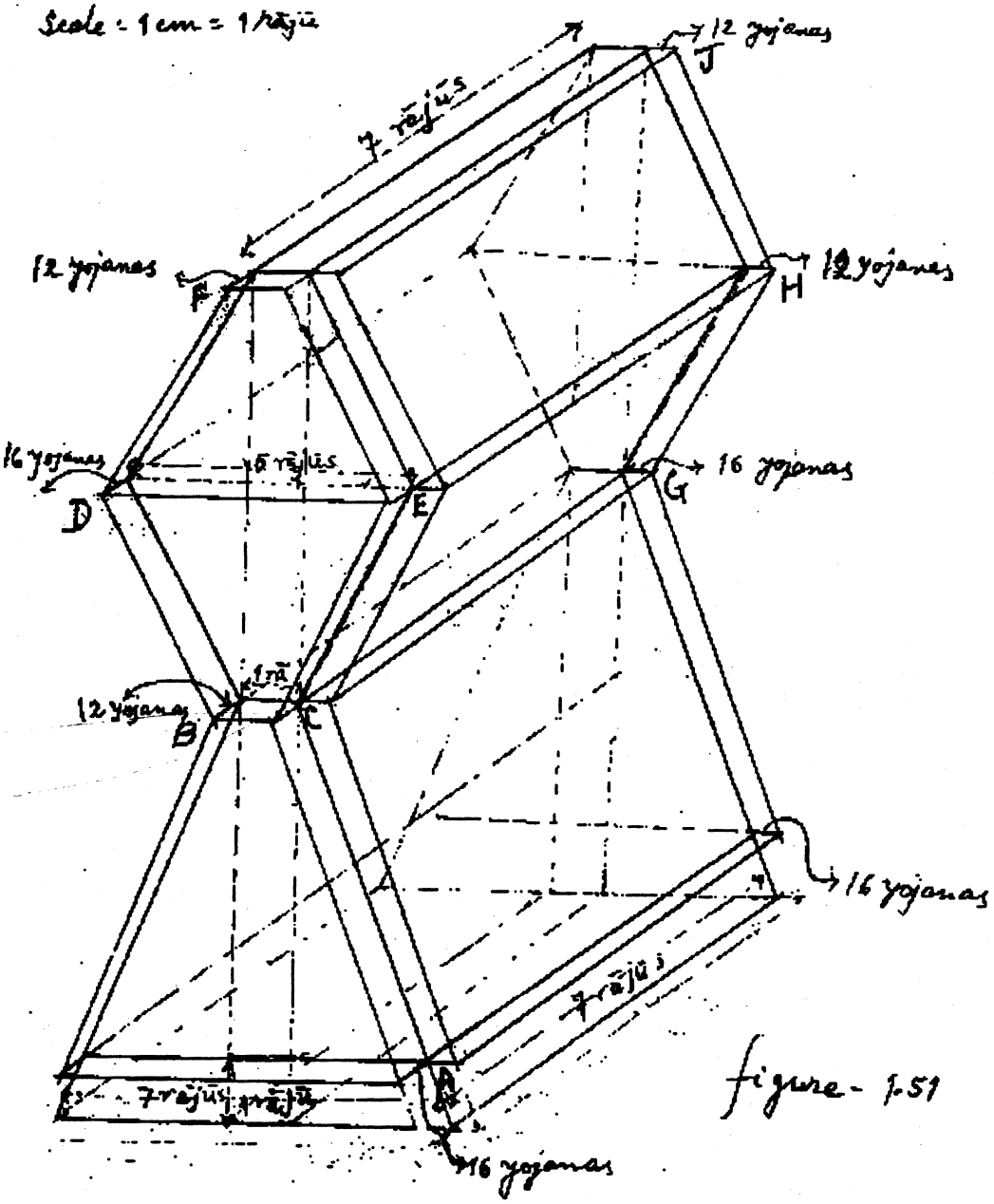


figure- 1.51

After having calculated the enveloped regions from the end of the lower universe for one rāju height, with their thickness layer of 60000 yojanas, now the upper enveloped portions are considered for the volumes of the layers of air etc.

In the east, there are the solids of air etc., AG, CH and EJ, and similar solids on the western side which are the frustrums of triangular prisms. Their total height is 13 rājus, decrease-increase is 16, 12, 16, 12 yojanas, respectively, and length is 7 rājus. Hence, the total volume

$$= 2 \times 7 \times 13 \text{ rājus} \times \left(\frac{16+12}{2} \text{ yojanas}\right)$$

$$= 2 \times 7 \times 13 \text{ rājus} \times \left(14 \times \frac{343}{343} \text{ yojanas}\right)$$

$$= 49 \text{ square rājus} \times \frac{17836}{343} \text{ yojanas.}$$

In this reckoning, the relation between rāju and yojana has not been expressed. This has been expressed by the author as $= \frac{17836}{343}$ .....(4)

Now, taking the solid air-envelops in the north and south, the solids are AB, CD, and EF. and similar to these are lying in the rear portion of the universe. They are also the frustrums of triangular prisms.

For the volume of the AB, height is 6 rājus, top is 1 rāju, base is $6\frac{1}{7}$ rājus and thickness are 16, 12 respectively, in yojanas, hence, the volume of this and a similar one at the rear of the universe

$$= 2 \times (6 \text{ rājus}) \times \left(\frac{6\frac{1}{7}+1}{2}\right) \times \left(\frac{16+12}{2} \text{ yojanas}\right)$$

$$= \frac{300}{7} \text{ square rāju} \times 14 \text{ yojanas} = 49 \text{ square rāju} \times \frac{4200}{343} \text{ yojanas}$$

This has been expressed by the author as $= \frac{4200}{343}$ .....(5)

Similarly, there are solids CD and EF in the north above the former and similar solids in the south of the universe. For calculation of their volumes, the total height is 7 rājus decrease-increase in width is 1, 5, 1 rājus and the thickness of air etc. layers have decrease-increase as 12, 16, 12 yojanas. The total volume of such frustra of prisms is

$$= \quad 2 \times 7 \text{ rājus} \times \left(\frac{5+1}{2} \text{ rājus}\right) \times \left(\frac{16+12}{2} \text{ yojanas}\right)$$

$$= \quad 42 \text{ square rājus} \times 14 \text{ yojanas}$$

$$= 49 \text{ square rājus} \times \frac{588}{49} \text{ yojanas.}$$

This has been expressed by the author as $= \quad \frac{588}{49}$ .....(6)

Now, the volume of the uppermost layer of air-envelop just over the universe (loka) is found out:

Scales are different. Only for rāju

1 cm = 1 rāju

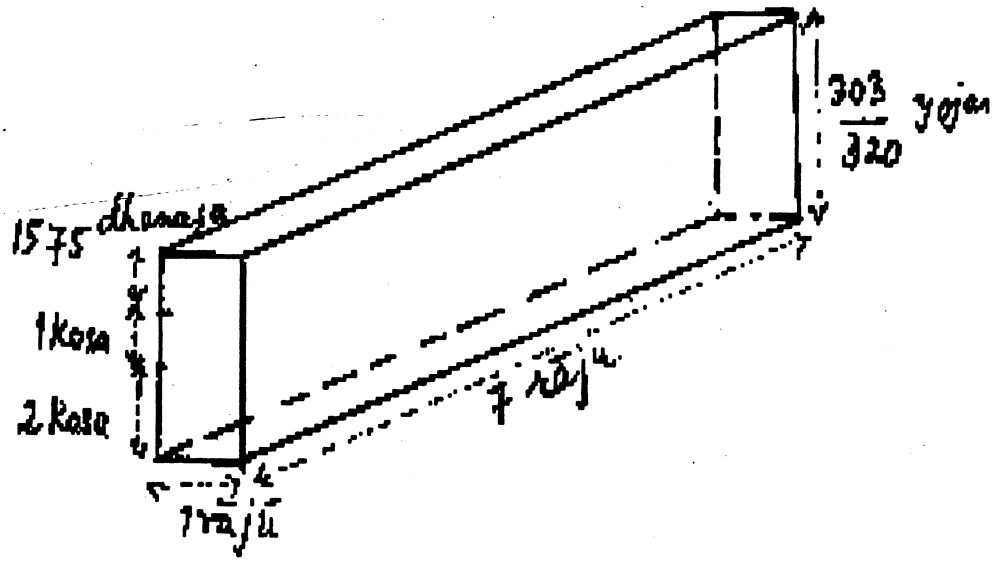


figure 1.52

Here, height is 2 kośa + 1 kośa + 1575 dhanuṣa = $\frac{7575}{8000}$ yojanas = $\frac{303}{320}$ yojanas. Further, length is 1 rāju, width is 7 rājus. Thus the volume of this envelop as cuboid is

$$= 1 \text{ rāju} \times 7 \text{ rājus} \times \frac{303}{320} \text{ yojanas}$$

$$= 49 \text{ square rājus} \times \frac{303}{2240} \text{ yojanas.}$$

This has been expressed by the author as = $\frac{303}{2240}$ .....(7)

For the remaining portions of the envelops, the author has not mentioned. Perhaps that volume might have been regarded as negligible.

The total of the above 7 volumes of the solids

$$= 49 \text{ square rājus} \times \frac{10241983487}{109760} \text{ yojanas.} \quad \text{.....(III)}$$

The author has expressed this as = $\frac{10241983487}{109760}$ .....(8)

Afterwards, the volumes of the air-envelops in the lower portion of the eight earths have been found out, whose calculation in the text is clear.

In the lower portions of all earths the volume is

$= 49 \text{ square rājus} \times (\frac{10920000}{49}$ yojanas) which has been expressed by the author as

$= \frac{10920000}{49}$ .....(IV)

The total volume of air envelops of eight earths is also clear in the text, which is

$= 49 \text{ square rājus} \times (\frac{43664056}{49}$ yojanas) this has been expressed by the author as

$$= \frac{43664056}{49} \quad \text{.....(V)}$$

When the sum of the volumes (III), (IV) and (V) is subtracted from the total volume of the universe (≡) then the remaining pure space is obtained and its symbol is not clear in the text. However, this in the Kannada script, stands for sesaṁ's first or initial alphabet "sa"

(vv. 282 et seq , p.50)



Figure 1.53

In TPT (V), however, this has been denoted as in the above figure. In Kannaḍa, the point is symbolized as O in place of a spec when it is used to stand for a nasal vowel. It also stands for a zero, hence it may be presumed that the remaining space without matter of air-envelop has been denoted as for lower and upper universe as such.

(v. 1.285, p.138, TPT(V)

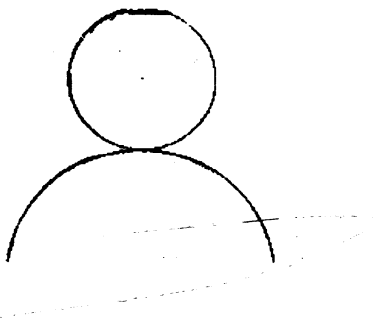


Figure 1.54

Remarks : (vv. 274 275).

Near the seventh earth, the thickness of the air envelopes are 7, 5, , totalling to 16; and 5, 4, 3 totalling to 12; hence 16 - 12 - 6 4/6 giving the decrease-increase, at one rāju as per sequence point (pradeśa-krama).

(pp. 46 et seq.) The volumes of air envelops in lower portions of the eight earths are

given respectively as follows

1st earth : $\frac{1 \times 7 \times 60000}{49} = \frac{49 \text{ square raju} \times 60000 \text{ yojana}}{7}$

2nd earth : $\frac{1}{7} \times \frac{13}{7} \times \frac{60000}{1} = \frac{49 \text{ square rāju} \times 780000 \text{ yojana}}{49}$

3rd earth : $\frac{7}{3} \times \frac{19}{7} \times \frac{60000}{1} = \frac{49 \text{ square rāju} \times 1140000 \text{ yojana}}{49}$

4th earth : $\frac{25}{7} \times 7 \times 60000 = \frac{49 \text{ square rāju} \times 1500000 \text{ yojan}}{49}$

5th earth : $\frac{31}{7} \times 7 \times 60000 = \frac{49 \text{ square rāju} \times 186000}{49}$

6th earth : $\frac{37}{7} \times 7 \times 60000 = \frac{49 \text{ square raju} \times 2220000 \text{ yojan}}{49}$

7th earth : $\frac{43}{7} \times 7 \times 60000 = \frac{49 \text{ square rāju} \times 2580000 \text{ yojan}}{49}$

8th earth : $1 \times 7 \times \frac{60000 \times 7}{7} = \frac{49 \text{ square rāju} \times 60000 \text{ yojan}}{7}$

The total of the above is $\frac{49 \text{ square rāju} \times 10920000 \text{ yojan}}{49}$

which has been expressed by the outher as $= \frac{10920000}{49}$

The volume of the eight earths are gives as

1st earth : $1 \times 7 \times 180000 = \frac{49 \text{ square rāju} \times 180000 \text{ yojana}}{7}$

2nd earth : $\frac{13}{7} \times \frac{7}{1} \times \frac{32000}{1} = \frac{49 \text{ square rāju} \times 416000 \text{ yojana}}{49}$

3rd earth : $\frac{19}{7} \times \frac{7}{1} \times \frac{28000}{1} = \frac{49 \text{ square rāju} \times 532000 \text{ yojana}}{49}$

4th earth : $\frac{25}{7} \times \frac{7}{1} \times \frac{24000}{1} = \frac{49 \text{ square rāju} \times 600000 \text{ yojana}}{49}$

5th earth : $\frac{31}{7} \times \frac{7}{1} \times \frac{20000}{1} = \frac{49 \text{ square rāju} \times 620000 \text{ yojana}}{49}$

6th earth : $\frac{37}{7} \times \frac{7}{1} \times \frac{16000}{1} = \frac{49 \text{ square rāju} \times 592000 \text{ yojana}}{49}$

7th earth : $\frac{43}{7} \times \frac{7}{1} \times \frac{8000}{1} = \frac{49 \text{ square rāju} \times 344000 \text{ yojana}}{49}$

8th earth : $\frac{7}{1} \times \frac{1}{1} \times 8 = 49 \text{ square rāju} \times \frac{8}{7} \text{ yojana}$

All the combind give $\frac{49 \text{ square rāju} \times 4364056 \text{ yojana}}{49}$

This has been expressed by the author as $= \frac{4364056}{49}$

v 1.282 et seq.

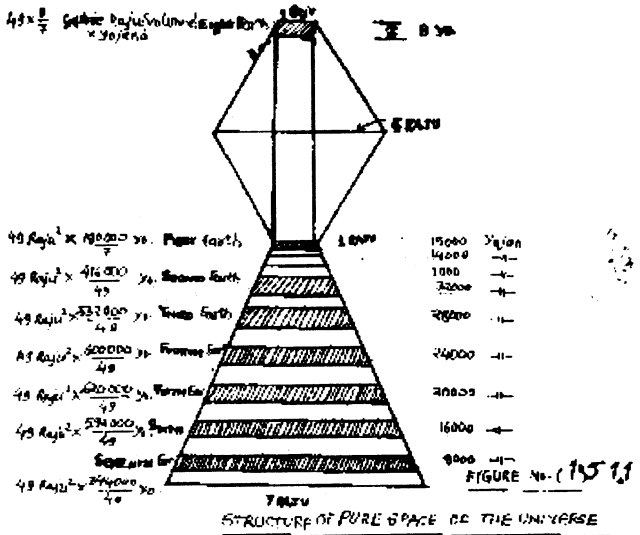


FIGURE No. (195 1.1

STRUCTURE OF PURE SPACE OF THE UNIVERSE

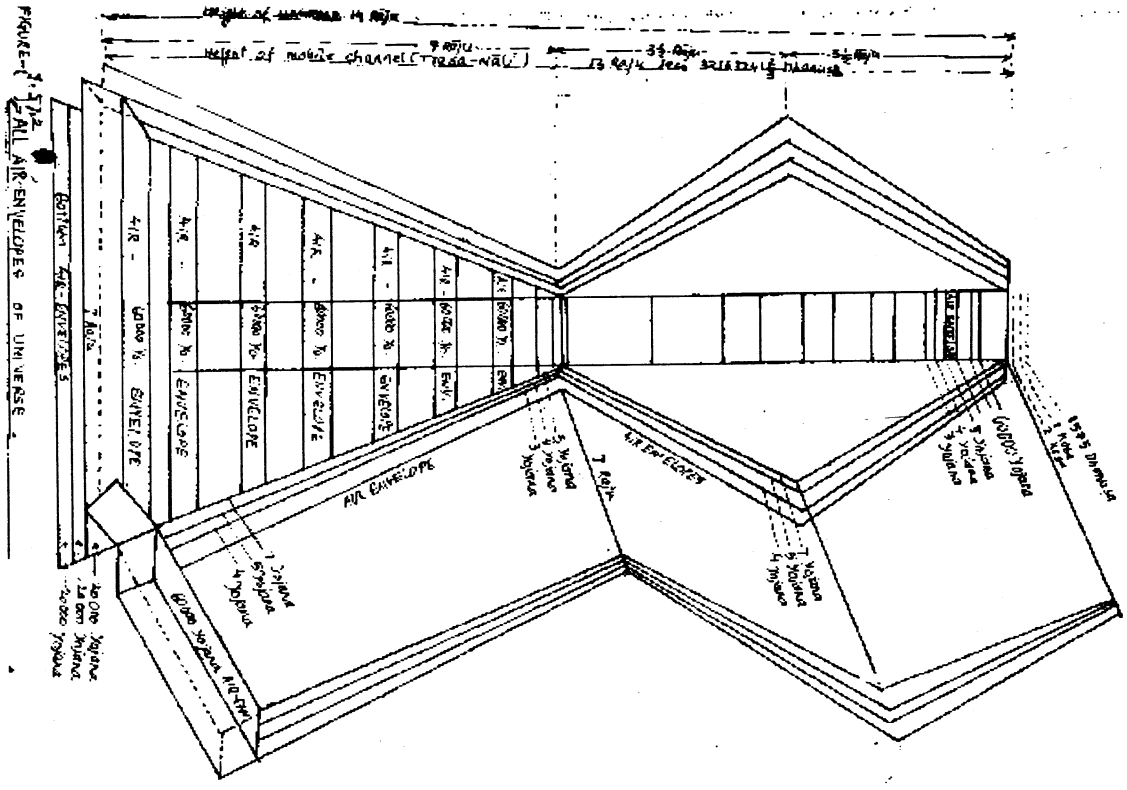


FIGURE-(195 1.2)

ALL AIR ENVELOPES OF UNIVERSE

The Universe, as envisages in Śwetāmbara School of JAIN ASTRONOMY AND COSMOLOGY. Cf. Muni Mahendra kumar, II, Viśva Praheliká (op.sit). This gives the volume of universe as calculated by the auther of this book. This also comes under Cartography.

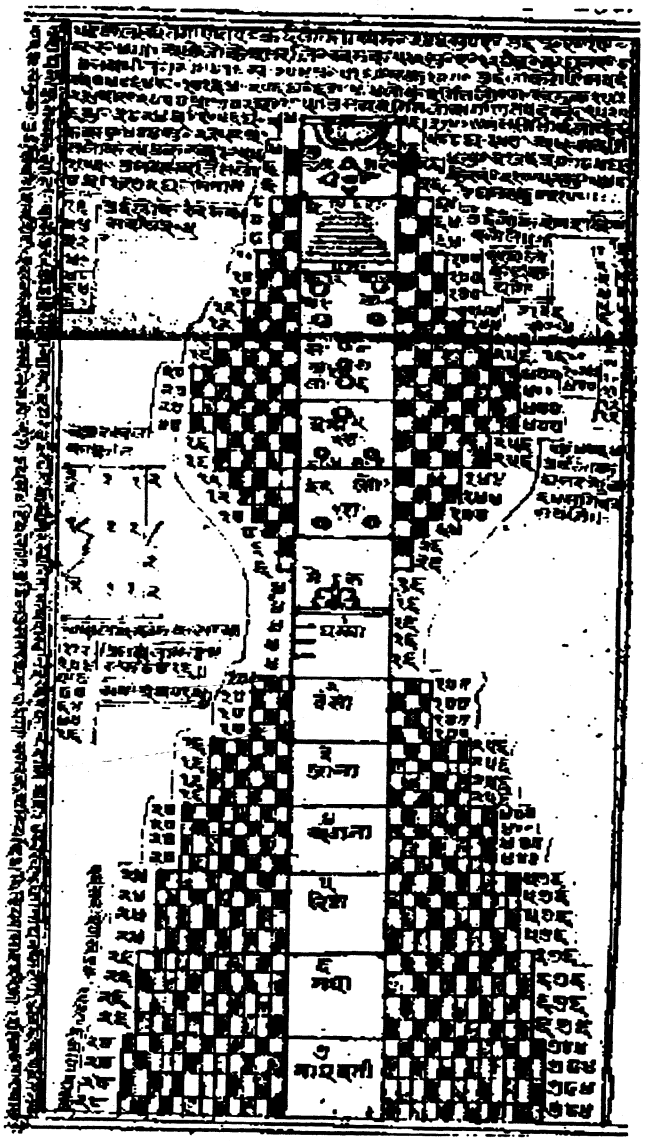


Figure - 1·51·4

SECOND CHAPTER

BIDUO MAHĀDHIYĀRO

INTRODUCTION

This chapter describes fifteen sections, out of which some contain mathematical description about the hells and hellish beings, regarding their residence, number, age, height, clairvoyance, number of born beings, measure of interval-time between birth-death, and so on. Cosmologically and cosmographically, there is a channel of mobile bios (trasa nālī). According to the thickness, there are corresponding number of holes in the hellish earths. There are different types of holes which serve as residence of hellish bios. The chief (indraka), the sequence-ordered (śreṇībaddha) and the scattered (prakīrṇaka). Their placing and distribution are separately described according to the specific earth. Method of finding out the number of sequentially-ordered holes in each earth is given. There are the first term (ādi), common difference (caya), number of terms (pada). They are used to find the total sum of the holes, through direct and alternate methods (vv.2.58 et seq.). Method for finding out the total sum as grand, for all the seven earths is given (v.2.69). These are repeated for the chief (indraka) and sequentially-ordered holes (vv.2.70 et seq). Then, there are formulae for finding the first term, common difference, and number of terms separately (vv.2.83 et seq). The number of scattered holes are found by getting the difference of the whole number and the chief and sequentially ordered holes (v.2.88 et seq).

For every one of the seven earths, extension is given regarding the chief holes, and then the thickness of the chief, the sequentially ordered and scattered holes (vv.2.95-158). Afterwards, the own-stationed and other-stationed (svasthāna-parasthāna) intervals between the chief etc. holes are obtained. (vv.2.159.-2.195)

After describing the number of the hellish bios in separate earths, their ages with some formulae are described. Symbolism etc. are given (vv.2.196 et seq). The discription of heights of their bodies are also worthy of research. (vv.1.217 et seq). Data are given separately in tables.

Symbolism The height of the channel of the mobile bios is given in decimal notation as three crore, twenty-one lac, sixty-two thousand, two hundred forty-one dhanuṣa and two out of three parts of a dhanuṣa

$$32162241\ \frac{2}{3} \quad \text{or} \quad ३२१६२२४१\ \frac{२}{३} \qquad \text{(v. 2.7)}$$

Similarly, zero in the place value notation is given, in the following terms as sixteen thousand, eighty-four thousand and eighty thousand yojanas

16000 | 84000 | 80000 | or १६००० | ८४००० | ८०००० |

In the same way, the vv.2.22, 2.23, 2.27, 2.31 etc. may be seen.

Six thousand four hundred ninety-nine yojana, two kośa alongwith eleven parts out of twelve parts

6499 | ko 2 11/12 |	or ६४९९ | को २ | ११/१२ |	here, ko stands for kośa (v. 2.167)

A rāju as reduced by two lac nine thousand yojanas is given by

	$\frac{-}{7}$ riṇa jo 209000 |	Here riṇa stands for minus jo stands for yojana (joyaṇa)
or	$\frac{-}{७}$ रिण जो २०९००० |	

Three thousand yojanas less one and four thousand seven hundred dhanuṣa (daṇḍa):-

	2999 |	daṇḍa	4700
or	२९९९ |	दंड	४७००

The number of hellish bios of the Gharmā earth is a universe-line as multiplied by second squre root of ghanāṅgula as slightly less :

| − 12 / 12 |	or	| − १२ / १२ | (v.195)

This symbol is not clear. However ' − ' shands for a universe-line. The symbol given in T.P.T (V) (v.2.196) is as follows

− 2 + / 1 / 12	or	− २ + / १ / १२

Here '−' stands for a universe-line (śreṇi), 2 stands for a sūcyaṅgula (linear-finger) and not for a ghanāṅgula (cubic-finger) ie. cubic of sūcyaṅgula of which the symbol is 6 or ६. But as we know that second squre root of the ghanāṅgula will be $[[F^3]^{1/2}]^{1/2}$ or $(F)^{3/4}$ approximately F or 2 has been taken in the taxt, further + stands for a symbol of subtraction or less. Thus 2 is to be subtracted by an amount 1 which is not clear at present. TPT(V) (v.2.196).

Now, the number of the hellish bios in the Vaṁśā earth is although innumerate part of a universe-line (jaga-śreṇī), its measure is the twelfth square-root of universe-line as dividing the universe-line itself. It has been symbolized as

$\overline{12|}$ or $\overline{१२|}$ **(v. 2.196)**

In the TPT(V), the same appears as

$\underline{12|}$ or $\underline{१२|}$

If we denote the universe-line by L , this should be denoted as

$$L \div [L]^{(1/2)^{12}}. \qquad \textbf{TPT(V)(v.2.197)}$$

Thus the symbol '–' denotes a universe-line and the symbol 12 denotes that '–' is divided by twelfth square-root of the universe-line itself.

Similarly following, are (vv.2.196 et seq).

Further in the (v.2.202), there is numerate (saṁkhyāta) years of age in the two discs (Sīmanta etc.), in the third there is numerate years and innumerate years of longevity, and in the ten discs ahead, as well as in the remaining discs the longevity of the hellish is innumerate years given by

2 | ı | 7 | 10 | 7 | or २ | १ | ७ | १० | ७ | .

(v. 2.202)

In this symbolism, 2 stands for two discs, 1 stands for numerate, 7 stands for innumerate, 10 stands for ten discs, and 7 again stands for innumerate. Actually, if the Kannaḍa script is consulted, the first alphabet a, or अ for असंख्यात is written as , it seems reasonable to stand for innumerate. But in TPT (V) , v. 2. 203 the same appears in the following form

7| 7 | 7 | ri | 10 | ri | se | ri or ७ | ७ | ७ | रि | १० | रि | से | रि |.

(v. 2.203)

Here ७ stands for the numerate, 10 stands for the tenth disc, रि stands for the innnumerate and से stands for the remaining. It seems that this symbolism is from a different place, from Kannaḍa region and Śravaṇabelagolā, where Kannaḍa script has been used in these texts. (vide TPT(V), introduction, pp.28, ff. Hence we presume a transcription from Kannaḍa to Devanāgari and interpret in terms of the Kannaḍa scripts or other south Indian script round about the period and the centre at Śravaṇabelagolā or Moodbidri, two more varieties of innumerate are ९ as well as a that will be referred later on.

The numerate also appears as ३ and in later works. The innumerate like रि has been the alphabet A in the form resembling the Manavallapuram inscriptions, 7th and 8th centuries A.D. (vide Indian Palaeography by A.H. Dani, New Delhi, 1986, Plate XVIIIa). Similar forms for numerate may be seen on the Plate XVIIIb.

Ninety lac is denoted by 90,00000 **(v.2.204)**

Further innumerate pūrva koṭi and one tenth part of a sāgaropama is given as follows:

$$\left|\begin{matrix}\text{puvva} \mid 2 \mid \text{sā} \mid 1 \\ 10\end{matrix}\right| \quad \text{or} \quad \left|\begin{matrix}\text{पुव्व} \mid २ \mid \text{सा} \mid १ \\ १०\end{matrix}\right| \quad \text{in}$$

TPT (V) (v. 205) and in TPT (V) (v.2. 206)

we have ४ $\left|\begin{matrix}\text{puvva} \mid \text{ri} \mid \text{sā} \mid 1 \\ 10\end{matrix}\right|$ or $\left|\begin{matrix}\text{पुव्व} \mid \text{रि} \mid \text{सा} \mid १ \\ १०\end{matrix}\right|$

Here puvva stands for pūrva koṭi, २ or रि stands for innumerate or asaṁkhyāta, सा stands for sea, set of instants, and as we have seen already that रि should be A alphabet as initial of the asaṁkhyāta.

In the verse 2.216, the following abbreviations appear

daṇḍa	—	daṁ	दं
hattha	—	ha	ह
aṅgula	—	aṁ	अं

The abbreviations are taken with the initial letter or alphabet of the technical term.

In the verse 2.219, the fraction $\frac{1}{2}$ appears as

$$\left|\begin{matrix}\text{bhā} \ 1 \\ 2\end{matrix}\right| \quad \text{or} \quad \left|\begin{matrix}\text{भा} \ १ \\ २\end{matrix}\right| \ ,$$

where the use of the abbreviated letter is again significant. Somewhere there is a slip, as for aṅgula in verse 2.221, the abbreviation is aṅgu or अंगु । The bhā abbreviation has been used profusely in the following verses.

In verse 2.242 the abbreviation of dhanuṣa appears as dha or ध ।

In verse 2.271 the abbreviation of kośa appears as ko or को ।

Similarly, in verse 2.287, the following abbreviation appear

muhutta	mu	मु
dina	di	दि
pakkha	di 15	दि १५
māsa	mā	मा

(Note the change here for pakkha or fortnight)

In verse 2.315, there appear for

joyana jo जो

and in all the above abbreviations the sound or voice is given through universal symbols of matras and not alphabets corresponding to them. The transcription to devanāgarī is quite evident, but the terms are apparently universal and creative as well as original in most of the cases.

In the verse 2-288, the symbols used were not correct for expressing d the number of the hellish of the earths, taking births and committed to deaths every instant (samaya) as being innumerate part of the existent bios respectively in them :

2 | 3 | 122 | 103 | 62 | 32 | 52 | (?)
1 2

This has appeared in correct from in TPT (V) as follows

−2 +	——	——	—	—	—	—
1						
12	12 ri	10ri	8ri	6ri	3ri	2ri

or

− २ +	——	——	—	—	—	—
१						
१२	१२ रि	१० रि	८ रि	६ रि	३ रि	२ रि

Note again that रि or ri as pronunciated, stands for asaṁkhyāta or innumerate. We shall put it as ri, although it may be something else before such a transcription in this edition of TPT(V).

In TPT(V), verse 2.103 , the following oexpression explicitly carries the symbol for asaṁkhyāta

599987 | a 2395580 |
or ५९९९८७ | अ २३ ९५५८० |

383

Place value : The verse 2.7 mentions the number

$$32162241 \;\Big|\; \begin{matrix} 2 \\ 3 \end{matrix} \;\Big|$$

in decimal place value from right to left as three crore (koḍi tiyaṁ), twenty one lac ekkavīsa-lakkha), sixty-two thousand (bāsaṭṭhiṁ ca sahassā), two hundred (dusayā), forty-one (igadāla), and two-third part (dutibhāyā).

The verse 2.23 mentions numbers in a different style as

$132000 = 66000 \times 2 = 66 \times 2000$	which has been related as sixty-six multiplied by two thousand , sixty-four multiplied by two thousand and so on.
$128000 = 64000 \times 2 = 64 \times 2000$	
$120000 = 60000 \times 2 = 60 \times 2000$	
$118000 = 59000 \times 2 = 59 \times 2000$	
$116000 = 58000 \times 2 = 58 \times 2000$	
$108000 = 54000 \times 2 = 54 \times 2000$	

In verse 2.27, the number 99995 has been expressed as one lac as reduced by 5 (paṇa-rahidekkaṁ lakkhaṁ)

In verse 2.31, the number 175000 has been expressed as seventy-five thousand and one lac (paṇahattari sahassā igilakkhaṁ). Similarly, in verse 2.55, the number 388 has been expressed as eighty-eight and three hundred (aṭṭhāsīdī judā ya tiṇṇi sayā), whereas in the verse 2.110, the style of expressing

$$4316666 \;\Big|\; \begin{matrix} 2 \\ 3 \end{matrix} \;\Big|$$

is forty-three lac, six hundred sixteen thousand, sixty-six, and two third part (tedālaṁ lakkhāṇiṁ chassaya-solasa-sahassa-chāsaṭṭhī du-ti-bhāgo). Note that six hundred comes before sixteen thousand disturbing the order of place value. Similar style is in the verse 2.134: the number $2116666 \;\Big|\; \begin{matrix} 2 \\ 3 \end{matrix} \;\Big|$ is expressed as sixteen thousand, six hundred, sixty-six, twenty-one lac and two third part (sola sahassaṁ chassaya-chāsaṭṭhi ekkavīsa-lakkhāṇiṁ doṇṇi kalā tadiyāe).

In verse 2.193, the expression for

4497 | daṇḍa 6500 has been expressed as ninety-seven yojanas forty-four hundred, and daṇḍa five hundred with six thousand (sattāṇaudī joyaṇa caudāla-sayāṇi [pañcama-khidīe], paṇa-saya juda-ca-sahassā daṇḍeṇa).

Commentary :

(vv. 2.6-7)

The channel of mobile bios (trasa nālī) has the height of 14 rājus, however, one rāju below the seventh hellish earth, there is an immobile bios (sthāvara loka), named Kalakalā, where the mobile bios do not exist, hence the channel has been said to be of 13 rājus in height. In this also, the hellish mobile bios are in the central part alone and not in the 3999 $\frac{1}{3}$ yojanas below.

Similarly in the upper universe, there is an interval of 12 yojanas (96000 dhanuṣas) between the Sarvārthasiddhi and the eighth earth, Īṣatprāgbhāra, and above this earth of 8 yojanas of thickness, there are three envelops of air of two kośas, one kośa and 1575 dhanuṣa thickness. Hence, the mobile bios channel is still further reduced by the total of (31994666$\frac{2}{3}$ dhanuṣas + 96000 dhanuṣas + 64000 dhanuṣas + 4000 dhanuṣas + 2000 dhanuṣas + 1575 dhanuṣas) or 32162241 $\frac{2}{3}$ dhanuṣas.

(v.2.22)

The thickness of the Śarkarā etc. earths have been given the thickness in yojanas as

32000 | 28000 | 24000 | 20000 | 16000 | 8000 |

Upto the last but one term, they form a sequence, reducing by the common difference of 4000.

(v. 2.27)

The holes upto the fourth earth have the number of holes forming an arithmetical sequence with a common difference of 500000, as follows:

3000000, 2500000, 1500000, 1000000.

There is extreme heat in these, totalling to 80 lac of holes as well as in 225000 of holes.

There is extreme cold in one fourth part of the remaining holes of fifth earth, upto the holes of the seventh earth, i.e., in $\left(\frac{300000 \times 1}{4}\right)$ = 75000 and in 99995 and 5 holes totalling to 175000 holes.

(v. 2.37)

The numbers of the central (indraka) holes in the seven earths have been given in an arithmetical regression with a common difference of minus two:

13 | 11 | 9 | 7 | 5 | 3 | 1 |

For the first indraka hole and second etc. indraka holes, vide the figures 2.1 (a) and 2.1(b).

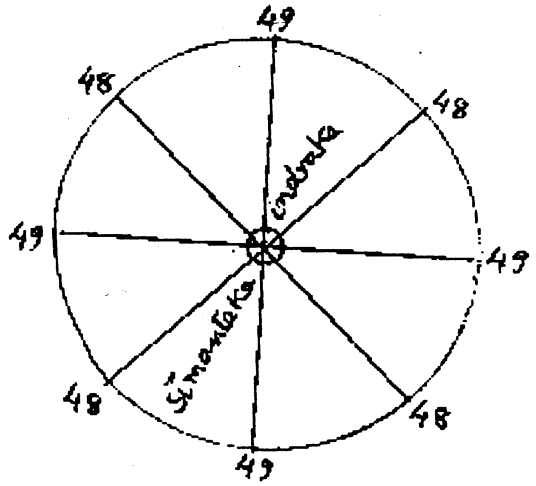


Figure 2.1 (a)

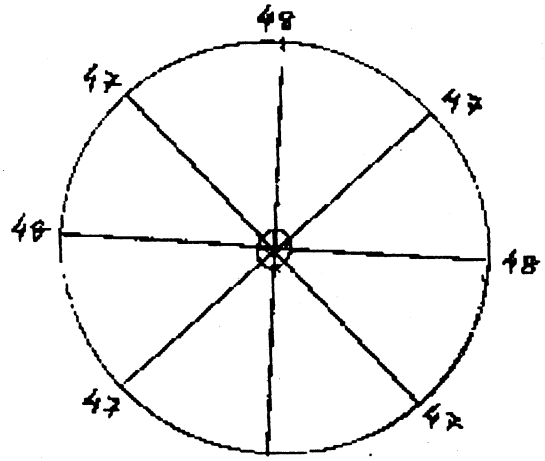


Figure 2.1 (b)

The holes are reducing in the sequence as shown above. In this way the total number of indrakas is 49 (v. 2.39)

(v. 2.55)

As shown in the first figure 2.1(a), 2.1(b), there are 13 discs in the first earth, and out of them the first indraka contains sequence ordered holes in four directions given by $49 \times 4 = 196$, and in four subdirections $48 \times 4 = 192$, totalling to $196 + 192 = 388$. When the indraka is added, the grand total of holes in the first disc of the first earth is $388 + 1 = 389$. This is the simantaka indraka.

(vv. 2.56 et seq.)

After the first disc, the number of holes go on decreasing as is evident from the second disk, till in the last indraka disc only 5 holes are left in the first earth. The measure of the sequentially ordered (śrenībaddha) holes can be found out in details through given formulae of the arithmetical progressions in the text.

Let there be the total number of holes **a** in the first disc. Then in every suceeding disc there is a successive decrease **d**, and thus the total number of holes in the nth disc could be calculated

through the formula for getting the sum of an arithmetical regression of progression.

$$S = \{a - (n - 1)d\} . \qquad \text{.....(2.1)}$$

Here, a = 389, d = 8, n = 4 then the number of holes including the indraka, in the fourth disc is given by

$$\{389 - (4 - 1)8\} = 365 \qquad \text{.....(v. 2.58)}$$

The author gives the following formula for finding out the number of sequentially ordered holes including the indraka in the first disc (pāthaḍa or paḍalā); when the number of holes sequentially ordered with indraka in the desired disc n is Sn' the disc is nth, and the number of all holes in the first disc is a ;

$$S_n = \left(\frac{a-5}{d} + 1 - n\right) d + 5. \qquad \text{...(2.2)} \qquad \text{.....(v. 2.59)}$$

Here, $\frac{a-5}{d} + 1 = \frac{389-5}{8} + 1 = 49 =$ pratara

This 49 has been used in the formula as the desired square (pratara). For n = 4, we have

$S_4 = (49 - 4)\ 8 + 5$

$= 360 + 5 = 365,$

the total number of holes in the fourth disc. This is the use of an important formula, and we shall use the symbol p for it as pratara. This is a desired pratara.

If the total number of sequentially ordered and indraka holes is a in the first disc, and the number of such holes in the nth disc is a_n , then the formula for finding out its indrakas is given by the author in the following form.

$$\text{indrakas} \quad \left[\frac{a-5}{d} + 1 - \frac{a_n - 5}{d}\right] \qquad \text{.....(2.3)}$$

For example, a = 389, d = 8, a_n = 365, then the number of indrakas in the n = 4 or fourth disc is given by

$$\frac{389-5}{8} + 1 - \frac{365-5}{8} = 48 + 1 - 45 = 4$$

We may say here that P_1 or monodimensional maximum holes in the first pratara = 48 + 1 and that P_4 or monodimensional maximum holes in the fourth pratara = 45 + 1 = 46. That is how the general formula is derived as above equation (2.3)

Note:

In verse 2.61, the definition of the terms corresponding to their own disc has been given.

Whatever is the order measure of the last indraka, it has been denoted as the initial term (ādi).

Every where, the common-difference (caya) is 8. Whatever is the measure of the disc in order, it is number of terms (gaccha or pada).

The initial is also called mukha or prabhava.

At several places there happens to be equal or uniform increase or decrease which is called the common difference (caya or uttara), and the total number of such increasing or decreasing term stations is called number of terms (gaccha or pada). **(v. 2.61)**

In the verse (2.64), the author has given a new formula for finding out the sum of all the holes in the first, second, upto the sixth earth, for which the indraka and sequence-ordered holes in the last disc are given, respectively, by 293, 205, 133, 77, 37, 13, being called a or first term, then 13, 11, 9, 7, 5, 3 as number of terms or indrakas and the common difference is 8 everywhere.

As the formula for finding out the sum total is general, the use of icchā is trivial, although one can place it in the formula to denote a particular earth, say e_1, e_2, and so on, upto e_6. The formula is given by

Se_r = [{(number of terms or indrakas – icchā) × common-difference} + {(icchā – 1) × common-difference} + first term × 2] × $\frac{\text{number of terms}}{2}$

or $$Se_r = [\{(n - e_r)d + (e_r - 1)\,d\} + 2a]\,\frac{n}{2}. \qquad \text{.....(2.4)}$$

This is the same as the usual formula

$$S = \frac{n}{2}\,[2a + (n - 1)d].$$

Applying the above formula, we have, for every earth, the sum as :-

$$Se_1 = [\{(13 - e_1)\,8 + (e_1 - 1)\,8\} + 2 \times 293]\,\frac{13}{2} = 4433$$

$$Se_2 = [\{(11 - e_2)\,8 + (e_2 - 1)\,8\} + 2 \times 205]\,\frac{11}{2} = 2695$$

$$Se_3 = [\{(9 - e_3)\,8 + (e_3 - 1)\,8\} + 2 \times 133]\,\frac{9}{2} = 1\cdot\cdot 5$$

$$Se_4 = [\{(7 - e_4)\,8 + (e_4 - 1)\,8\} + 2 \times 77]\,\frac{7}{2} = 707$$

$$Se_5 = [\{(5 - e_5)\,8 + (e_5 - 1)\,8\} + 2 \times 37]\,\frac{5}{2} = 265$$

$$Se_6 = [\{(3 - e_6)\,8 + (e_6 - 1)\,8\} + 2 \times 13]\,\frac{3}{2} = 63\,.$$

Alternative formula for the above is given in the next verse 2.65 as follows:

$$Se_r = [\{(\frac{n-1}{2})^2 + (\frac{n-1}{2})\}d + 5\,]\,n, \qquad \text{.....(2.5)}$$

where n is the number of indraka for different earths.

Thus,

$$Se_1 = \left[\left\{\left(\frac{13-1}{2}\right)^2 + \left(\frac{13-1}{2}\right)\right\}8 + 5\right]13 = 4433$$

$$Se_2 = \left[\left\{\left(\frac{11-1}{2}\right)^2 + \left(\frac{11-1}{2}\right)\right\}8 + 5\right]11 = 2615$$

$$Se_3 = \left[\left\{\left(\frac{9-1}{2}\right)^2 + \left(\frac{9-1}{2}\right)\right\}8 + 5\right]9 = 1485$$

$$Se_4 = \left[\left\{\left(\frac{7-1}{2}\right)^2 + \left(\frac{7-1}{2}\right)\right\}8 + 5\right]7 = 707$$

$$Se_5 = \left[\left\{\left(\frac{5-1}{2}\right)^2 + \left(\frac{5-1}{2}\right)\right\}8 + 5\right]5 = 265$$

$$Se_6 = \left[\left\{\left(\frac{3-1}{2}\right)^2 + \left(\frac{3-1}{2}\right)\right\}8 + 5\right]3 = 63\,.$$

The last term 5 is significant, which may be related with the holes of the Mahātamaḥprabhā, which can be seen to be the last term. The total number of indraka holes is 49, hence if the last term, l = 5, is taken, a = 389 and d = 8, then, l = a – (49 – 1)d

$$= 389 - (48)8 = 389 - 384 = 5,$$

and hence, 5 could be replaced by l in the formula to give a general form as

$$Se_r = \left[\left\{\left(\frac{n-1}{2}\right)^2 + \left(\frac{n-1}{2}\right)\right\} d + l\right] n . \qquad \text{.....(2.6)}$$

For $n = 1$, $Se_r = 5$.

(vv.2.69-70) In the verse 2.69-70, for finding out the sum of sequence-ordered holes alongwith the indrakas, for all 7 earths, e_r being the desired earth, the first term or viceversa the last term is 5 or A, common-difference is 8 or D, the number of terms is 49 or N, hence the formula appears as

$$S_{total} = \frac{N}{2}\left[(n + \sum_{1}^{7} e_r) D - (\sum_{1}^{7} e_r + 1) D + 2A\right] \qquad \text{....(2.7)}$$

$$= \frac{N}{2}\left[2A + (N-1)D\right]$$

$$= \frac{49}{2}\left[2 \times 5 + (49-1)\,8\right]$$

= 9653 for all the 7 earths. ..... **(v. 2.69-70)**

(v.2.71) ~~Alternative~~ formula :

$$S_{total} = \left[\frac{N-1}{2} \times D + A\right] N$$

$$= \frac{N}{2}\left[2A + (N-1)\,D\right],$$

where , $N = 49$, $A = 5$, $D = 8$, giving

$$S_{total} = \left[\frac{49-1}{2} \times 8 + 5\right] 49$$

= 9653 for all the seven earths.

(vv. 2.74-75)

In order to find out the sum of the sequence-ordered holes alone, one has to remove the number of indrakas from the initial terms, getting them as 292, 204, 132, 76, 36 and 12. Similarly, the number of terms for each becomes 13, 11, 9, 7, 5 and 3. The common difference is 8 everywhere.

The formula for this is given as follows:

$$S'e_r = \frac{n^2 - d] + [2na] - nd}{2} \qquad \text{.....(2.8)}$$

which again reduces to $\frac{n}{2}[(n-1)d + 2a]$ again,

where n is the number of terms, d is common difference and a is the initial term corresponding to different earths.

Hence, $S'e_1 = \frac{(13^2 \times 8) + (13 \times 2 \times 292) - (8 \times 13)}{2} = 4420$

$S'e_2 = \frac{(11^2 \times 8) + (11 \times 2 \times 204) - (8 \times 11)}{2} = 2684$

$S'e_3 = \frac{(9^2 \times 8) + (9 \times 2 \times 132) - (8 \times 9)}{2} = 1476$

$S'e_4 = \frac{(7^2 \times 8) + (7 \times 2 \times 76) - (8 \times 7)}{2} = 700$

$S'e_5 = \frac{(5^2 \times 8) + (5 \times 2 \times 36) - (8 \times 5)}{2} = 260$

$S'e_6 = \frac{(3^2 \times 8) + (3 \times 2 \times 12) - (8 \times 3)}{2} = 60$

and $S'e_7 = 4$.

(vv. 2.81–82)

For finding out the grand total of sequence-ordered holes in all the earths the following formula is given in verses 2.81–82.

$$S''_{e_r} = \frac{(N^2 - N)D + (N.A)}{2} + \frac{A}{2} \cdot N \qquad \text{.....(2.9)}$$

This also reduces to $S = \frac{N}{2}[2A + (N-1)D]$

This gives

$$S''_{total} = \frac{(49^2 - 49)8 + (49 \times 4)}{2} + \frac{4}{2} \times 49 = 9604$$

(v. 2.83)

In the verse 2.83, the formula for finding out the initial or first term is given as

$$A = \frac{[Se_r''' \div \frac{N}{2}] + [D \cdot e_r] - [e_r - 1 + N]D}{2} \quad \text{.....(2.10)}$$

Here, number of terms $= N = 49$, total sum $= S'''_{e_r} = 9604$,

the requisite earth is $= e_r = e_7$, common difference $= D = 8$.

This gives

$$A = \frac{[9604 \div \frac{49}{2}] + (8 \times e_7) - (e_7 - 1 + 49) \times 8}{2}$$

$$= 4.$$

The Formula reduces to the standard one.

(v.2. 84)

The next verse 2. 84 gives the formula for finding out the common difference:

$$D = S'''_{e_r} \div [(N-1)\frac{N}{2}] - [A \div \frac{N-1}{2}] \quad \text{.....(2.11)}$$

This also reduces to the general formula.

Here, the number of terms = N = 49 , the total sum S''_{e_r} = 9604, the first term = A = 4 , giving

$$D = 9604 \div [(49-1)\times \frac{49}{2}] \div [4 \div \frac{49-1}{2}] = 8 .$$

(vv.2.85 86)

Now, the formula for finding out the number of terms when the total sum of the requisite earth is given for the sequence ordered holes as follows

$$n = \left\{ \sqrt{\left(S''_{e_r} \times \frac{d}{2}\right) + \left(\frac{a - \frac{d}{2}}{2}\right)^2} - \left(\frac{a - \frac{d}{2}}{2}\right) \right\} \div \frac{d}{2}, \qquad \ldots.(2.12)$$

which reduces again to the common usual formula.

Here, common difference = d = 8 , total sum = S''_{e_r} = 4420, first term (mukha) = a = 292,

$$\text{or } n = \left\{ \left(4420 \times \frac{8}{2}\right) + \left(\frac{\frac{292 - 8}{2}}{2}\right)^2 - \left(\frac{292 - \frac{8}{2}}{2}\right) \right\} \div \frac{8}{2}$$

= 13, for the first earth e_1 .

An alternative formula for finding out the same number of terms for a requisite earth's total sequence ordered holes is as follows:

$$n = \left\{ \sqrt{(2.d.S''_{e_r}) + \left(a - \frac{d}{2}\right)^2} - \left(a - \frac{d}{2}\right) \right\} \div d, \qquad \ldots\ldots(2.13)$$

which reduces to the same general form, and the same data gives

$$n = \left\{ \sqrt{(2 \times 8 \times 4420) + \left(292 - \frac{8}{2}\right)^2} - \left(292 - \frac{8}{2}\right) \right\} \div 8$$

= 13. .....(v. 2. 86)

(v.2.94) The number of scatterd holes in all the earths could be found out by subtracting the indraka and sequence-orderd holes from the total of all holes :

TABLE 2.1

EARTHS	TOTAL NUMBER OF HOLES (1)	NUMBER OF INDRAKA HOLES (2)	NUMBER OF SEQUENCE - ORDERD HOLES (3)	NUMBER OF SCATTERED HOLES (1) - {(2) + (3)}
FIRST	3000000	13	4420	2995567
SECOND	2500000	11	2684	2497305
THIRD	1500000	9	1476	1498515
FOURTH	1000000	7	700	999293
FIFTH	300000	5	260	299735
SIXTH	99995	3	60	99932
SEVENTH	5	1	4	0

Total number of scattered holes 8390347

(vv. 2.105 et seq)

The width of the indrakas is in arithmetical progression or regression, for example, the width of the first indraka is 4500000 yojanas and that of the last indraka is 100000 yojanas. The total number of indraka holes is 49. This is the number of terms (gaccha) which is symbolized as n.The first term (ādi) is a or 4500000 and the last term " l " is 1,00,000 and the common difference is d. Then, the formula given by the author is

$$d = \frac{a-l}{(n-1)}, \quad \text{where } n \text{ is for the last term .} \qquad \ldots.(2.14)$$

If one wishes to get the width of the nth hole from the first hole then the following formula is used

$$a_n = a - (n-1)\,d. \qquad \ldots\ldots(2.15)$$

If the width is to be obtained for the nth hole from the last hole, then

$$b_n = b + (n-1)\,d, \qquad \ldots\ldots(2.16)$$

where a_n and b_n are the symbols for widths of those nth holes.

For example, the measure of increase is given by

$$\frac{4500000-100000}{49-1} = 91666\frac{2}{3} \text{ yojanas .}$$

Then the width of the second etc. indrakas, say, the 25th indraka is given as follows :

$$91666 \times (25 - 1) = 2200000 ;$$

and 4500000 – 2200000 = 2300000 yojanas relative to the Sīmanta hole,

and 2200000 + 100000 = 2300000 yojanas relative to clairvoyance station. **(v.2.105)**

(v. 2.107)

The depth (bāhalya) of these holes is in arithmetical progression. Total number of earth is 7.

If the depth of the indraka of the nth earth is to be found, the rule is as follows:

$$\text{depth of indraka of nth earth} = \frac{(n+1) \times 3}{(7-1)} .$$

$$\text{Similarly, the depth of the scattered holes of nth earth} = \frac{(n+1) \times 7}{(7-1)} .$$

On application of this formula the following table is obtained regarding the depth of the indraka sequence-ordered, and scattered holes :

Depth of indraka holes in earth En	Depth of sequence-orderd holes in En	Depth of scatterd holes in En
E_1: 1 + 1 = 2, 2 × 3 = 6, 6 ÷ 6 =1 kośa	$2 \times 4 = 8, 8 \div 6 = 1\frac{1}{3}$ kośa	$2 \times 7 = 14, 14 \div 6 = 2\frac{1}{3}$ kośas
E_2: 2 + 1 = 3, 3 × 3 = 9, $9 \div 6 = 1\frac{1}{2}$ kośas	$3 \times 4 = 12, 12 \div 6 = 2$ kośas	$3 \times 7 = 21, 21 \div 6 = 3\frac{1}{3}$ kośas
E_3: 3 + 1 = 4, 4 × 3 = 12, 12 ÷ 6 = 2 kośas	$4 \times 4 = 16, 16 \div 6 = 2\frac{2}{3}$ kośas	$4 \times 7 = 28, 28 \div 6 = 4\frac{2}{3}$ kośas
E_4: 4 + 1 = 5, 5 × 3 = 15, $15 \div 6 = 2\frac{1}{2}$ kośas	$5 \times 4 = 20, 20 \div 6 = 3\frac{1}{3}$ kośas	$5 \times 7 = 35, 35 \div 6 = 5\frac{5}{6}$ kośas
E_5: 5 + 1 = 6, 6 × 3 = 18, 18 ÷ 6 = 3 kośas	$6 \times 4 = 24, 24 \div 6 = 4$ kośas	6 × 7 = 42, 42 ÷ 6 = 7 kośas
E_6: 6 + 1 = 7, 7 × 3 = 21, $21 \div 6 = 3\frac{1}{2}$ kośas	$7 \times 4 = 28, 28 \div 6 = 4\frac{2}{3}$ kośas	$7 \times 7 = 49, 49 \div 6 = 8\frac{1}{6}$ kośas
E_7: 7 + 1 = 8, 8 × 3 = 24, 24 ÷ 6 = 4 kośas	$8 \times 4 = 32, 32 \div 6 = 5\frac{1}{3}$ kośas	No scatterd hole

(v. 2. 158)

Alternative method of finding out the depth of holes: For this the first term is given, respectively, as 6, 8 and 14. The number of earths is 7. If the depth of the nth earth is to be found out, then the formula is:

$$\text{depth of the indraka at the nth earth} = \left(\frac{6+n.\frac{6}{2}}{7-1}\right)$$

$$\text{or, writing 6 as the first term 'a' the RHS} = \left(\frac{a+n.\frac{a}{2}}{7-1}\right).$$

$$\text{Similarly, the depth of the sequence-ordered holes of the nth earth} = \frac{(8+n.\frac{8}{2})}{7-1}$$

$$\text{or} = \frac{(a+n.\frac{a}{2})}{7-1}.$$

The same rule is for the scattered holes also.

For example, for E_4, $6 + 3 = 9$, $8 + 4 = 12$, $14 + 7 = 21$.

On dividing these by 6, respectively, one gets $1\frac{1}{2}$ kośa, 2 kośas, $3\frac{1}{2}$ kośas as the depths of the indrakahole, sequence-ordered hole and scattered hole, respectively.

(vv.160-162)

These verses give the formula for finding out the vertical interspace (antarāla) between the indraka holes of various earths.

The thickness of the earths have already been related, and in these earths, there is no hole for one yojana above and below. Hence after subtracting 2000 yojanas from the thickness of the earths, the remainder is multiplied by 4 for converting the yojana into kośa, and from the product the thickness of the indraka hole for each earth is subtracted, and then the result is divided by four multiplied by thirteen as reduced by unity.

For example, the vertical interspace between indraka holes of the first earth

$$= \frac{(8000-2000)\times 4-(1\times 13)}{(13-1)\times 4} = 6499\frac{35}{48} \text{ yojanas.}$$

(v.2.163)

The thickness of lower and upper earths of the indraka and sequence-ordered holes in the seventh earth is given as follows: From the thickness of the seventh earth the thickness of the indraka and sequence-ordered holes is subtracted. On halving the remaining set, the thickness of the earths over and below of the indraka and sequence-ordered hole is obtained.

For example,

$$\frac{8000-1}{2} = 3999\ \frac{1}{2} \text{ yojanas gives the former}$$

and $$\frac{8000-\frac{4}{3}}{2} = 3999\ \frac{1}{3} \text{ yojanas gives the latter.}$$

(v. 2.164)

This verse gives the other stationed (interspace) between the last indraka of the first earth and the first indraka of the second earth.

The thickness of the first is 180000 yojanas, and that of the second is 32000 yojanas. Excluding these thicknesses, there is still an interspace between both the earths as one rāju. Although the thickness of the Citrā earth 1000 yojanas is included in the first earth's thickness, its reckoning has been done in the thickness of the upper universe, hence out of these one thousand yojanas more is to be subtracted.

Besides, below the first earth and above the second earth, there being no hellish hole for a thousand yojanas, these two thousand yojanas should also be subtracted.

Thus (180000 + 32000 – 3000) = 209000 yojanas are to be excluded from one rāju for getting the desired result.

Similarly, the interspace for other stationed topic, regarding remaining earths are found out.

(vv. 2.180- 186)

The interspaces of the sequence-ordered holes of the seven earths are to be separately calculated through the rules given in vv. 2.159-162.

For example, the interspace of the sequence-ordered holes of the first Gharmā earth is given by

$$\left(8000 - 2000 - \frac{52}{12}\right) \div \left(\frac{13-1}{1}\right) = \left(78000 - \frac{52}{12}\right) \times \frac{1}{12}$$

$$= 6499\ \frac{23}{36} \text{ yojana,} \quad \text{or} \quad 6499 \text{ yojanas } 2\frac{5}{9} \text{ kośas.}$$

Similarly, for the other earths.

(v. 2.195)

For finding out the number of the hellish bios, there has been again the use of universe-line and cubic finger. Symbolically, 6 has been written for cubic finger (ghanāṅgula) and its cube-root 2 has been written. Here, universe-line gives the number of space-points and similarly, the cubic finger represents the number of space-points lying in that stretch, where space-point (pradeśa) is the space occupied by an ultimate particle at rest. Here again, 2 denotes the linear finger representing the cardinality.

Thus, the number of heliish bios of Gharmā earth is

$$= (\text{universe-line}) \times (\text{slightly less}) \sqrt{\sqrt{6}}$$

$$= (\text{universe-line}) \times (\text{slightly less } (6)^{1/4})$$

$$= (\text{universe-line}) \times [\text{slightly less } (2)^{3/4}]$$

$$= (\text{universe-line}) \times [\text{slightly less } \sqrt[4]{(2)^3}]$$

In the orignial text, the symbol for the above is in LHS.

The horizontal line represents the universe-line 2 stands for the linear finger or else scond root. Is it possible that the author might have written $2^{3/4}$ as $2^{9/12}$ as there seems to be use of 12 ?

$$\left|\begin{array}{ll} -2 & + \\ & 1 \\ & 12 \end{array}\right|$$

TPT (V), p.214

and $\left|\begin{array}{l} -12 \\ 12 \end{array}\right|$

TPT, p.83

(v.2.196)

Similarly, the number of hellish bios of the Vaṁśā earth is

$$= (\text{universe-line}) \div (\text{universe-line})^{\left(\frac{1}{2^{12}}\right)}$$

$$= (\text{universe-line}) \div (\text{universe-line})^{\left(\frac{1}{4096}\right)}$$

This has been written by the author as $\overline{12}|$.

It is evident that the first term is not the universe-line which is to be divided by (universe-line)$^{\left(\frac{1}{(2)^{12}}\right)}$. However, the twelfth root of universe-line appears to be denoted by 12 alone. Similarly, other earths have been quoted for their hellish beings through similar symbols.

(v.2.205)

In this verse the measure of innumerate pūrva crore (asaṁkhyāta pūrva koṭi) has been expressed as

puvva | 2 | (TPT)

or puvva (रि) (TPT (V))

Here, the value of puvva is $(84 \text{ lakh})^2$ or $(84 \times 10^5)^2$, koṭi is $(10)^7$, and रि represents innumerate.

(v. 2.206)

In the remaining 9 discs of first earth, the maximal age is in arithmetical progression, whose common difference $= \frac{1 - \frac{1}{10}}{9} = \frac{1}{10}$.

In the fourth disc, first term is $\frac{1}{10}$; in the fifth disc, the first term is $\frac{2}{10}$; in the sixth disc, the first term is $\frac{3}{10}$ sāgaropama , etc.

(v. 2.216)

In this verse, the heights of the hellish bios in the last indrak of Gharmā earth is given in a geometric series with common ratio 2, for the remaining earths, when the first term is 7 daṇḍa, 3 hasta, 6 aṅgula.

(vv. 2.217-218)

In these verses there is use of arithmetical progression. There is the first term and the last term as well as the number of terms, hence $l = a + (n-1)\,d$ giving $\frac{l-a}{(n-1)} = d$ gives the value of the common-difference (hāni-vṛddhi).

Here $t_1 = a$, $t_2 = a + d$, $t_3 = a + 2d$ and so on .

For example last term = 7 dhanuṣa, 3 hasta, 6 aṅgula

$$= 31\frac{1}{4} \text{ hasta}$$

first term = 3 hasta, number of term = 13

$$\therefore \text{ common difference } = \frac{31\frac{1}{4} - 3}{13-1} = 2 \text{ hasta } 8\frac{1}{2} \text{ aṅgulas}$$

Similar progression occurs in v.2.230.

✪✪✪

IMPORTANT TERMS

v.2.6	loya	loka	universe
	bahu majjha desa	bahu madhya deśa	very central portion
v.2.6	rajjupadar	rajjupratar	square of rājū
	trasanālī	trasanālī	channel of the mobile bios
v.2.7	ūṇa	ūna	less
	koḍi	koṭi	crore
	lakkha	lakṣha	lac
	bāsaṭṭhi	bāsaṭha	sixty-two
	sahassa	sahasra	thousand
v.2.8	loyapūraṇa	lokapūraṇa	universe-filling
	kevalī	kevalī	omniscient
	(samudghāda) pariṇada	(samudghāta) pariṇata	expansion of the points of soul in three types of samudghāt change
v.2.15	bahalatta	bāhalya	thickness
v.2.15	joyaṇa	yojana	yojana
	(heṭṭha) kamma	(adhaḥ) karma	(lower) order
v.2.16	vettasaṇa	vetrāsana	trapezoid
v.2.24	dasa disa	daśa diśā	ten directions
	ghaṇovahi	ghanodadhi	dense water
	(vādavalaya)	vātavalaya	(air envelop)
v.2.25	saṁṭhā	saṁsthāna	shape
	aṇādiṇihaṇa	anādinidhana	ab-aeterno ad-infinitum
v.2.36	indaya	indraka	central, chief
	seḍhībaddha	śreṇībaddha	sequence-ordered
	paiṇṇayā	prakīrṇaka	scattered

v.2.37	āṇupuvvie	ānupūrvī	sequential order
v.2.57	jahākama	yathākrama	proper order
v.2.58	pamāṇa	pramāṇa	measure
	tāḍiya	tāḍita	multiplied
	avaṇiya	apanīta	subtracted
	sesa	śeṣa	remainder
v.2.59	icchā	icchā	desired, requisite
	jutta	yukta	added
	vihīṇā	vihīna	on subtracting
v.2.60	uddiṭṭha	uddiṣṭa	desired
	bhajidaṁ	bhājitaṁ	divided
	sodhae	śodhita	subtracted
	laddhaṁ	labdha	resulta
v.2.61	āḍī	ādi	first term
	uttara	uttara	comman difference
	gaccha	gaccha	number of terms
v.2.64 (i)	guṇida	guṇita	multiplied
	dala	dala	half
	saṁkalida	saṁkalita	sum
v.2.64(ii)	pada	pada	number of terms
	vaḍaṇa	vadana	first term
v.2.65	vaggijja	vargita	squared
	mūla	mūla	square root
	dhaṇa	dhana	sum
v.2.67	turima	caturtha	fourth

v.2.71	savvadhaṇa	sarvadhana	total term
	muha	mukha	first term
v.2.76	vaḍḍhihada	vṛddhihata	multiplied by common difference
v.2.84(i)	veka	vyeka	less one
v.2.84(ii)	apavaṭṭida	apavartita	reducing
v.2.85	kodi	kṛti	square
	purimūla	pūrvamūla	former square root
	pacaya	pracaya	common difference
v.2.86	antarassa	antara	difference
v.2.87	bila	bila	hole
	ṭhavejja	sthāpita	established
	parisaṁkha	parisaṁkhyā	corresponding number
v.2.93	aṭṭāsaṭṭhi	aḍasaṭha	sixty eight
v.2.95	saṁkhejja	saṁkhyeya	numerable
	asaṁkhejja	asaṁkhyeya	innumerable
v.2.96	vitthāra	vistāra	width (diameter)
	runda	runda	width
v.2.100	jahaṇṇa	jaghanya	minimal
	vicchalaṁ	antarāla	interspace
	kosa	kosa	kosa
	tericche	triyaka	oblique
	ukkasse	utkṛṣṭa	maximal
v.2.101	avara	avara	minimal
v.2.102	vāsa	vyāsa	width
v.2.103	rāsi	rāśi	set, amount
	ubhaya	ubhaya	both

v.2.105	hāṇi	hāni	decrease
v.2.109	ekka kalā tivihittā	trivibhakta eka kalā	one out of three parts
v.2.110	dutibhāga	dvitribhāga	two out of three parts
v.2.167	ekkārasakalābārasa-hidā	bāraha bhājita-gyāraha bhāga	eleven parts out of twelve parts
v.2.175	guṇagāra	guṇakāra	multiplier
	bindaṁgula	ghanāṅgula	cubic finger
	bidiya mūla	dvitiya mūla	square root of square root
v.2.196	seḍhī	śreṇī	universe-line
	bārasa-mūla	dvādaśa-mūla	square root extracted twelve-times
v.2.214	samaya	samaya	indivisible instant
v.2.217	udao	udeya	height
v.2.218	uccheha	utsedha	height
v.2.218	suddhe	śodhita	subtraction
	ante	anta	last term
v.2.221	divaḍḍha	dyardha	one and half
	daha	daśa	ten
	daṇḍa	daṇḍa	daṇḍa
	aṅgula	aṅgula	finger
	hattha	hasta	hand
v.2.242	dhanu	dhanuṣa	dhanuṣa (bow)
	muhūrta	muhūrta	muhūrta (48 minutes)
	pakkha	pakṣa	fortnight
	māsa	māsa	month

THIRD CHAPTER

TIDIO MAHĀDHIYĀRO

INTRODUCTION

This chapter is parallel to the previous one for the details of the residential deities (Bhavanavāsī deva), through measures. The description is about the residence, their types, their characteristics, number of houses, number of indras and deities, proportion between age and periods of food-intake and respiration, their height, number of births and deaths every instant .

The numbers given are in decimal place value notation. Geometrical figures are small. Formula for summation of geometric regression is given.

Symbolism

For writing numbers, decimal place value has been adopted as earlier. As for example, seventy-two (bāhattari) lac and crore seven has been written as

77200000. Bāhattari means two and seventy. (TPT v.3.12)

or (७७२००००००)

However, in v.3.11 of TPT(V), lac is not given in expression of zeros but through the symbol la, ल . For example, 9600000 is given as

96 la or ९६ ल.

In verses 3.31-32, there is given a figure of caitya tree, standing on seats, with a base of 6 yojanas, top 2 yojanas, and height 4 yojanas. The place of the trees is 50 yojanas wide, with a height of 4 yojanas in the middle, and $\frac{1}{2}$ kośa at the end.

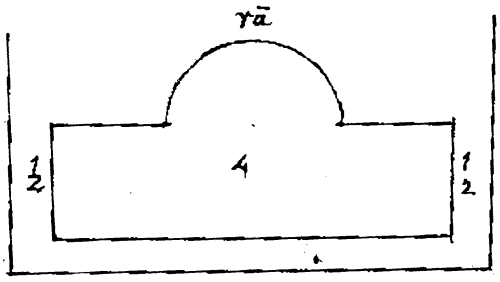


Figure-3.1

The symbol

rā or रा

is not clear in the figure

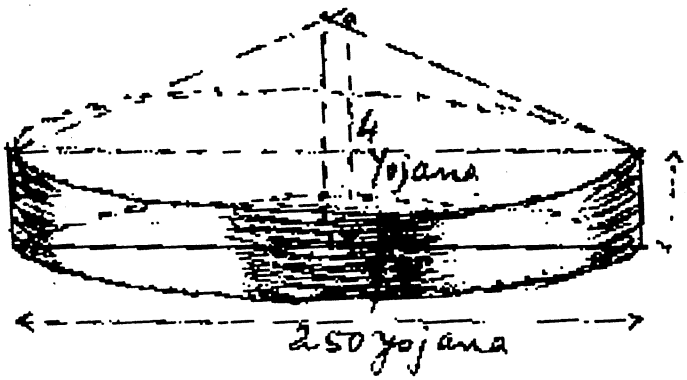


Figure-3.2

In (TPT(V) verse 3.32 , jo or जो appears for yojana or joyaṇa.

(.) verse 34 gives Ko or को and jo or जो, respectively, for kośa and joyaṇa

(.) verse 3.70 mentions sese or सेसे for the remainder

(.) verse 3.112 mentions va for varṣa, written as व

(.) versa ˆ 145 gives two symbols

sā or सा for sāgara
pa or प for palya

(.) verse 3.147 gives additional symbol

pu ko or पु को for puvva koḍi

(.) v.3.154 gives the symbol

va ko or व को for varṣa koḍi

(.) verse 3.163 mentions the symbol

dam or दं for daṁḍa

Commentary

TABLE-3.1

(vv. 3.11-12)

The description of the number of residencies of various residing deities (Bhavanavāsī deva) is as follows :

Asurakumāra deities	-	6400000
Nāgakumāra deities	-	8400000
Suparṇa kumāra deities	-	7200000
Dvīpakumāra deities	-	7600000
Udadhikumāra deities	-	7600000
Stanitakumāra deities	-	7600000
Vidyut kumāra deities	-	7600000
Dikkumāra deities	-	7600000
Agnikumāra deities	-	7600000
Vāyukumāra deities	-	9600000
Total houses of deities:	-	**77200000**

No doubt, the deva means a superhuman, who have been considered to have a fixed place of residence, expressing that they have their residential quarters, as those of human beings, and expressed through decimal place value notation: bāhattari lakkhāṇiṁ koḍīo satta-mettāo.

(v. 3.12)

It is evident that la and ko have been abbreviated for lac and koṭi or crore. These could serve the purpose of writing these numbers, but other abbreviations could not be convenient unless 0, 1, 2, --- etc. were not taken as fresh symbols, along with their place-value, cutting short the applied time for writting big numbers. Thus, these big numbers signify the fact that their creators needed a method or technique for writing their authentic exact numbers, conveniently, as such invention of the technique in this school had a greater probability to their credit.

(vv.3.25-26)

The houses are of cuboid shape (sama catuṣkoṇa), with dimensions:

height : 300 yojanas,

length-breadth: numerate, innumerate yojanas, the proportionate numbers of the deities correspond to their number of houses. It is a projection and abstraction through mathematics of some existential totality as well as through set-theoretic technique of mapping and expressing relations.

(vv.3.32-33)

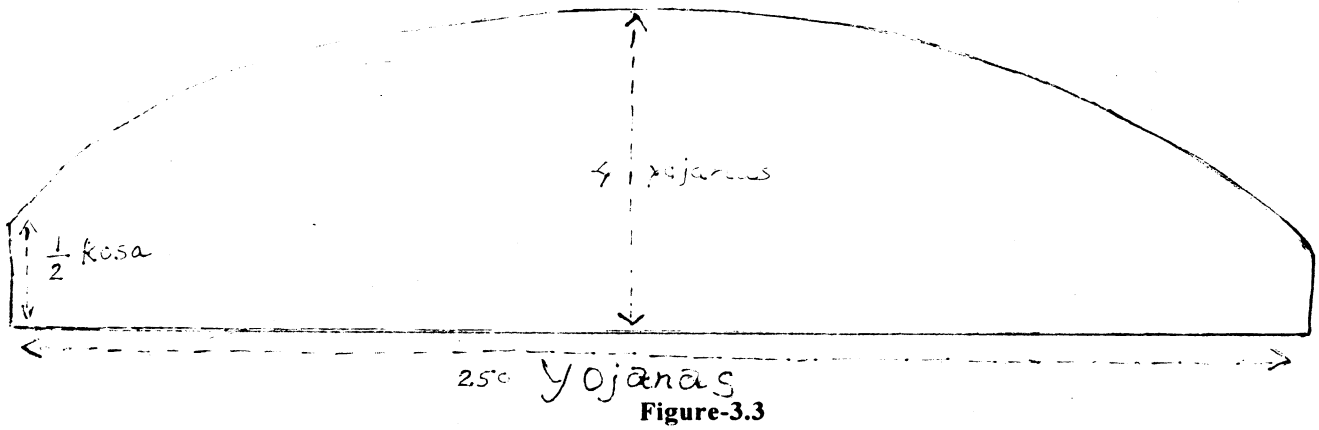


Figure-3.3

The width of the caitya trees is 250 yojanas, height 4 yojanas in the middle, and $\frac{1}{2}$ kośa at the end .

The diagram is definitely three-dimensional. It is like a right circular cylinder at the base as shown in figure 3.2. Above it there is a cone with a height of 4 yojana. Figure 3.3 gives a clear and natural picture of the tree.

(v. 3.76)

In giving the number of pārişadas (courtiers), as initial, medium, external, the medium have all been average of the two as follows:

Table-3.1A

indra	initial pārisada	medium pārisada	external pārisada
1) Camara	28000	30000	32000
2) Vairocana	16000	28000	30000
3) Bhūtānanda	6000	8000	10000
4) Dharaṇāananda	4000	6000	8000

and so on.

(vv.3.79-80)

In the family deities of the indra, there are seven types of armies (anīka). All the ten types of house-dweller deities, have each of them, seven typs of armies. Every army has seven classes, out of which the measure of first class is equal to the their own Sāmānika deities. After this, upto the last class, the measure goes on doubling, successively.

The Asurakumāra has seven armies. In the first army of Nāgakumāra, there are nine types. In the remaining second army etc. they are equal to the armies of Asurakumāra.

If the army of buffaloes of Camarendra be reckoned, then the total sum is the sum of a geometrical progression.

Here, number of terms (gaccha) = 7

first term (mukha) = 4000

common ratio (guṇakāra) = 2

For finding out the total reckoned sum, a formula has been used. Let Sn denote the sum of n terms, a the first term, r the common ratio , then

$$S_n = \{ (r.r.r.\ldots\ldots \text{upto n terms}) - 1 \} \div (r - 1) \times a$$

or, $$S_n = \frac{(r^n - 1)a}{r - 1}.$$

In this way the total sums of 7 armies are found out separately. For example, first term = 64000, common ratio = 2, number of terms = 7. Then taking 2 and multiplying it seven times by itself : $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 128$. Then subtracting it by one gives 128-1=127 and subtracting one from two gives one. Hence, dividing 127 by 1 gives 127. On multiplying this by first term 64000, we have $64000 \times 127 = 8128000$. This is the sum of a geometrical progression.

(v.3.82)

Here, the use of decimal notation place value has been given for writing of number 56896000, right to left, which has been expressed as 'zeros in three places, six, nine, eight, six and five.

Similarly ; vide vv.3.85, 3.86, 3.88.

(vv.3.111 et.seq.)

In these verses, the interval between the periods of food-in take is given alongwith the interval between their respiration, with decreasing capacity, having capacity of flights, and so on.

We relate in the following table important proportions, (although some of the important data is not available), so that one could derive the complete conclusive basis on which such measures have been given mathematically, rather quantitatively.

TABLE - 3.2

Table for intervals of food and respiration of Bhavanavāsī deities .

FAMILY OF DEITIES	OTHER INFORMATION	INTERVAL BETWEEN FOOD	INTERVAL BETWEEN RESPIRATION
Asurakumāra	$\frac{1}{24000}$ th	1000 years	15 days
Nāgakumāra	$\frac{1}{30}$ th	$12\frac{1}{2}$ days	$12\frac{1}{2}$ muhūrtas
Suparṇakumāra	$\frac{1}{30}$ th	$12\frac{1}{2}$ days	$12\frac{1}{2}$ muhūrtas
Dvīpakumāra	$\frac{1}{30}$ th	$12\frac{1}{2}$ days	$12\frac{1}{2}$ muhūrtas
Udadhikumāra	$\frac{1}{30}$ th	12 days	12 muhūrtas
Stanitakumāra	$\frac{1}{30}$ th	12 days	12 muhūrtas
Vīdyutkumāra	$\frac{1}{30}$ th	12 days	12 muhūrtas
Dikkumāra	$\frac{1}{30}$ th	$7\frac{1}{2}$ days	$7\frac{1}{2}$ muhūrtas
Agnikumāra	$\frac{1}{30}$ th	$7\frac{1}{2}$ days	$7\frac{1}{2}$ muhūrtas

Vāyukumāra	$\frac{1}{30}$th	$7\frac{1}{2}$ days	$7\frac{1}{2}$ muhūrtas
sāmā., tray., pārisada pratindra		like own indra	like own indra
deity having 1000 years of longevity	$\frac{1}{32340}$th	2 days	7 respirations
deity having longevity of 1 palya	$\frac{1}{30}$th	5 days	5 muhūrtas

A man has 18 respirations to the minute or $18 \times 60 \times 24 = 25920$ respirations in 24 hours, and the proportion is thus roughly $\frac{1}{25920}$th.

(vv.3.163-170)

In these verses, proportion between age and powers are given :

TABLE : 3.3

Age (longevity) of deity	Power
10000 years	can kill 100 men or nourish them can destroy or construct a cube with 150 dhanuṣas as side
one palyopama	can destroy six divisions of earth, and can kill or nourish the residents, human or subhuman therein
one sāgropama	can destroy the land (like) Jambū island and can kill or nourish the residents therein
numerate years	can move for numerate yojanas in an instant (samaya)
innumerate years	can move for innumerate yojanas in an indivisible instant (samaya)

That is how the proportions predominate in the description of the superhuman or deities.

FOURTH CHAPTER

CAUTTHO MAHĀDHIYĀRO

INTRODUCTION

This chapter is concerned with the description of the human universe, containing 16 sections. The details of the extension, areas and volume relevant to the human universe is given. The geography of the Jambū island and its various divisions are worthy of attantion. The descriptions about its mountains, rivers in areas, etc. are through mathematical details.

(vv. 4.1-268)

The nature of time and the changes on its lands and regions are periodic some where and nonperiodic else where. This is described through happy and miserable periods when increase and decrease in various states of existence are predicted as revelation. **(vv.4.277- 403)**

There are the various types of chief personalities born during the fourth aeon, called the log-personalities (śalākā puruṣas). There are twenty-four ford-founders (tīrthaṅkara) during this period alone. Much mathematical information has been given about them. Various types of prodigies appear and karmic conditions are given for their attainment. **(vv.4.510-1088)**

The paurāṇika history of the fifth period also appears upto Gupta dynasty and other period. The mensuration detail of the Meru is also available. **(vv.4.934-1511), (vv.4.1802-1810)**

After the mathematical description of the mountains and rivers of the Jambū island (vv.4.1624-2394), the similar description of the adjoining Lavaṇa sea is given. (vv.4.2408-2519) Here, the description about the under-regions (pātālas) is curious.

Symmetrical details are about those of the Dhātakīkhaṇḍa island with measures of the areas, heights etc. of the mountains, regions, and so on. The Puṣkaravara island is also having similar divided regions, the former and this one being the ring shaped as the Lavaṇa sea, where as the Kāloda sea, in between, is compared with the pieces as big as the Jambū island. (vv.4.2528-2924).

The comparability appears in vv.4.2925-2934, alongwith the types and numbers of human beings in the Puṣkaravara island.

This chapter covers about 2961 verses, and a detailed geometry of the circle and a straight line. It also contains the construction of number measure (saṁkhyā pramāṇa), the numerable (saṁkhejja), the innumerable (asaṁkhejja) and the infinite (ananta). Perhaps, it was then might have been followed by Georg cantor, in the light of the mathematics of the nineteenth century, for measuring the existential sets through the construction sets. **(vv.4.277-312)**

Symbolism

45 lac yojanas has been expressed as

joyaṇalakkha 4500000 or जोयण लक्ख ४५००००० . **(v.4.6)**

Place-value has been used for writing the number

14230249 or १४२३०२४९

through numerals placed as nine, four, two zero, three, two, four and one from right to left. **(v. 4.7)**

The area of the human-universe is given in place-value through the numerals zero, zero, zero, five, two, one, zero, three, zero, nine, zero, zero, six and one, written from right to left

16009030125000 or १६००९०३०१२५००० **(v. 4.8)**

Similarly, the volume of the human universe is given in place-value notation as

1600903012500000000 or १६००९०३०१२५०००००००

written as zero in eight places, five, two, one, zero, three, zero, nine, zero, zero, six and one, from right to left. **(v. 4.11)**

In verse (4.15), yojana appears as jo or जो |

In verse (4.19), ko appears for kośa or को experesse kośa.

In verse (4.23), daṁ or दं appears for daṁda.

In verse (4.51), fraction three fourth appears as $\frac{3}{4}$.

In verse (4.52), the following symbols appear

aṅgula	aṁ	or	अं
javā	ja	or	ज
jūṁ	jū	or	जू
likkha	l	or	लि
kammakkhi	ka	or	क
dina chavvālaṁ			

In verse (4.56) the fraction

23213	or	२३२१३
105409		१०५४०६

appears as twenty-three thousand two hundred thirteen as numerator (aṁsā) and one lac five thousand four hundred nine as denominator (hāro). Again, the area of Jambūdvīpa appears as

7905694150 or ७६०५६६४१५० (square yojanas)

and experessed as ambara (zero), five, one, four, nine, six, five, sunna (zero), nine and seven, from right to left. **(v. 4.58)**

In verse (4.67), the dhanuṣa or dhaṇū has been abbreviated as dha or ध .

Similarly, in verse (4.111), the southern range and northern range have been abbreviated as ḍa and u or द | उ |

In (v.4.212), the integral and fraction part given by five hundred tiventy-three yojana as divided by nineteen multiplied by eight, has been written as

$$523 \left| \begin{array}{c|c} 29 & \\ 19 & 8 \end{array} \right| \quad \text{or} \quad ५२३ \left| \begin{array}{c|c} २६ & \\ १६ & ८ \end{array} \right|$$

In verse 4.308 the product of 84 with 84 thirty-one times { or $(84)^{31}$, ie. eighty-four raised to exponent 31} as multiplied by 10^{90} , ie. ninety zeros placed after the product of 84 multiplied by 84 thirty-one times :

84 | 31 | 90 or ८४ | ३१ | ६०

This is actually $(84)^{31} \times (10)^{90}$

In verse (4.422), the expression for one tenth part of palya alongwith height one thousand eight hundred daṁḍa is written as, .

1800 | pa 1 |	or	१८०० | प १ |
10 |		१० |

Similarly, v. 454 expresses,

daṁḍa 725 | pa 1 |		दंड ७२५ । प १ |	
100000 |	or	१००००० |

and in v.476

1		१	
daṁ 600 | 100000000000 |	or	दं ६०० । १००००००००००० ।	

In verse 4.553, the following abbreviations appear-

puvva	-	puvva	पुव्व
causīdilakkha	-	8400000	८४०००००
vāsa	-	va	व
māsa	-	mā	मा
pakkha	-	di 15	दि १५

In verse 4.555, dhaṇa appears for plus, धण, and sāgara appears assā or सा .

In verse 4.564, minus appears as riṇa or रिण.

In verse 4.572, the year (vassa) appears as vā or वा |

In v.4.584, the names of the fourd founders have been abbreviated by their initial alphabet, for example usaha as u or उ and so on for mentioning respective heights in dhanuṣa.

In v.4.587, the hattha has been abbreviated as ha or ह .

In v.4.591, puvva is denoted by puvva and puvvāṅga is denoted by aṁ (अं) as in

puvva 4400000 aṁ 4 | or पुव्व ४४००००० अं ४ |

In v.4.723, the abbreviations for the constructions are given :

sālā	sā	सा
vedī	ve	वे
bhūmī	bhū	भू
pīḍha	pī	पी

Series: In verse 4.724, series of natural numbers from 4 to 24 is given. This is arithmetical regression.

In verse 4.726, arithmetical regression with 552 as first term, 69 as last term and common difference 23 as is given.

In verse 4.729, arithmetical regression with 6000 as first term, 750 as last term and common difference 250 as is given.

In verse 4.732, arithmetical regression with 2000 as first term, 400 as the last term, with common difference of 200 is given. From 360 to 200 common difference is 40 and from 200 to 40 common difference is 20.

In verse 4.753, arithmetical regression from 6000 to 1200 has a common difference of 600; from 1080 to 600 there is common difference of 120; from 600 to 120 there is a common difference of 60.

In verse 4.754, from 264 to 33 is an arithmetic regression with common difference of 11.

In verse 4.773, from 3000 to 375 there is an arithmetical regression with common difference of 125.

In verse 4.776, there is an arithmetical regression with first term as 23952, with last but one term as 2994 with a common difference of 998.

In verse 4.824, there is an arithmetical regression with 600 as first term, 75 as last term, and 25 as common difference.

In verse 4.854, there is an arithmetical regression with 120 as first term, 15 as last term, and with 5 as common difference.

In verse 4.871, there is an arithmetical regression with 6000 as first term, 750 as last term and with 250 as common difference.

In v.4.891, there is an arithmatical regression with 1725 as first term, 225 as last term and 75 as common difference.

Abbreviations :

From the vv.4.1100 et seq., the following abbreviations have appeared :

ohi	o	ओ
kevalī	ke	के
vekuvvī	ve(be)	वे (बे)
viulamadī	vi	वि
bārasa	vā (bā)	वा (वा)
puvvadharā	pu	पु
sikkha	si	सि
vādī	vā	वा

Place value

The use of place value occurs in vv. 4.1162, 4.1163, 4.1164 as follows :

36940	as sky (ṇabha), four, nine, six, three
2000555	as five, five, five, sky (ṇabha), sky, sky, two
127600	as sky (gayaṇa), sky (ambara), six, seven, two, one
185800	as sky (gayaṇa), sky (ambara), eight, five, eight, one
225900	as sky (āyāsa), sky (ṇabha), nine, five, two, two
154905	as five, sky (ambara), nine, four, five, one
116300	as sky (ṇabha), sky, three, six, one, one
2848000	as sky (ambara), sky (rayaṇa), eight, four, eight, two

Similarly, other numbers onwards have been expressed in terms of lac, thousand, hundred etc., in vv.4.1161, 4.1166 et seq .

Again, place-value occurs in v.4.1177 where 5056250 is written as sky (ṇabha), five, two, six, five, sky (ambara), five.

In verse 4.1189, 1000 appears as dasa saya or ten hundred.

vv.4.1214 et seq. mention notational values, hundred, thousand, lac as saya, sahassa, lakkha, koḍi, koḍisahassa and koḍi lakkha.

Symbolism

The following expression

sā 3 riṇa pa	3	kuṁ	pa	1	or	सा	३	रिण	प	३	कुं	प	१		
	4			2						४			२		

has sā for sāgara, pa for palya, riṇa for minus. So far riṇa was used for minus, some times as ri or रि. judā meant plus.

Place value

Big numbers were written as follows :

v.4.1240 sā 50000000000000 sāyara koḍiṇa paṇṇa lakkhesuṁ
(or fifty lac crore sāgaras).

v.4.1242 900000000000 ṇausu sahassesu koḍi pahadesuṁ
(or after ninety thousand crore)

vv.1258-1259 (sā) 89999999 pa 999999999999999 pa 3/4 riṇa aṁga 28 |

or (सा) ८९९९९९९९ प ९९९९९९९९९९९९९९९ प ३/४ रिण अंग २८ ।

This stands for 28 pūrvāṅga over the nine crore sāgaropama as reduced by one fourth part of a palya. The measure of the excess being one lac pūrva.

This amount is defective as seen above. In sequence it may be written as

$$\text{sā } 89999999,\ \text{pa } 999\ 999\ 999\ 999999\ \frac{3}{4} - \text{pūrvāṅga } 28 + \text{pūrva } 100000\ |$$

v.1260: The expression for half palyopama and one hundred sagara as subtracted from one crore sāgaropama in excess is given by

	sa 9999899 pa .999 999 999 999 999	1 2
or	सा ९९९९८९९ प ९९९ ९९९ ९९९ ९९९ ९९९	१ २

The words used for minus are hīna, ṇūṇa, virahida and parihīṇa.

For example, in verse 4.1265, the symbolism

	sa 4 va 750000 riṇa pa	1 2
or	सा ४ व ७५०००० रिण प	१ २

is expressed as paṇṇasa' sahassādhiya sagalakkeṇūṇa palla dala mette, virahida cauro sāyara uvamāni - or seven lac fifty thousand years as subtracted by half palya and four sāgaropamas (in excess) as reduced.

Symbolism

v.4.1291 gives the following symbolism :

In boxes which are 34 in horizontal direction and two in vertical direction, the following numbers have been filled with the denotation

tīrthaṇkara	1	or	१
nothing	0	or	०
and emperor (cakravarti)	2	or	२
nothing	0	or	०

Place value

In verse 4.1387 there is the expression koḍi koḍi (crore squared) symbolised as the number of ploughs or halas

ha 100000000000000 or ह १०००००००००००००

Symbolism

v.4.1417 gives boxes again with thirty-four horizontal boxes and vertically three boxes. In them, zero for nothing and 3 for narayaṇa appears in addition to the symbols in v. 4.1291.

v.4.1443: This verse is illustrated through boxes of a horizontal row containing 34 boxes and a vertical column containing four boxes. The fourth line contains one more symbol for rudras which is filled up by 4, and zero showing nothing, 4 showing the rudra.

v.4.1557 : After this verse the big periods of time have been denoted through symbols as well as place value : The expressions are

atidussamā kāla	21000	years
du	21000	years
dusamāsusamā	sā 100000000000000 riṇa vāsa 42000 |	
	sā 200000000000000	
	sā 300000000000000	
su	sā 400000000000000	

In detail, atiduṣṣamā 21000 years | duṣṣamā 21000 years | duṣṣamā-suṣamā sāgara 10000000000000 – 42000 years | suṣamā-duṣṣamā sāgara 200000000000000 | suṣamā sāgara, 300000000000000 | suṣamā-suṣamā sāgara. 400000000000000 |

v. 4.1701 : Integral and fraction are represented as under

yo. 6371	ka	15	or	यो. ६३७१	क	१५
		38				३८

Here yo means yojana and ka means kāla or fraction. v.4.1727. The following abbreviations appear:

vāsa (diameter)	vā	वा
āyāma (length)	ā	आ
gaḷiira (depth)	gā	गा

v.4.1856 : The similar symbols are here for kaāa and avagāha as ko and gā.

v.4.1902 : Zero or o has been used for the material (measure) as destroyed. Here the

height (udaya) is also to have been now not known due to destruction of the lecture.

v.4.2519 : The boundary of the Lavaṇa sea is described to have the dimensions as

bhū 12 | ma 8 | mu 4 | u 8 |

or भू १२ | म ८ | मु ४ | उ ८ |

where bhū is bhūmi (bottom), ma is madhya (middle), mu is mukha (top), u is udaya (height).

Place Value

In verse 4.2523, the following number appears 189736659610 written as zero, one, six, nine, five, six, three, seven, nine, eight and one, or gayaṇa, ekka, cha, ṇava, pañca, cha, cha, tiya, satta, ṇava, aṭṭha, ekka.

Similarly, verse 4.2524 expresses the number for area as 197642353760 | written as zero (ambara), six (cha), seven (satta), three (tiya), five (paṇa), three (ti), two (du), four (cau), six (cha), seven (satta), nine (ṇava), one (ekka).

Abbreviation appear through initial letter

vijaya - vi, vakṣāra - va , vibhaṅga, vibhaṁ, devāraṅya - de.

In v.4.2565 approximately rough value (kiñcūṇā) as slightly less is given as 4110961 and expressed as one, six, nine, zero (ṇabha), one, one, four, from right to left as usual

Similarly in verse 4.2599, the place-value has been used, to write the number

$$\begin{array}{|c|} 92 \\ 212 \end{array}$$ 397897 where 92 has been said to be aṁsa (numerator). The digital order (aṅkakame) is usual .

Place value has also been used in vv.4.2627 et seq. as usual. Similarly, from v.4.2665 on wards. The zero has been written as ṇabha (4.2679), ambara (4.2678), khaṁ (4.2671), gayaṇa (4.2708), sunna (4.2711), kha (4.2760), khaṁ ṇabha for zero zero (4.2859), et seq. The words ṇabha and kha have been used often. Ṇabha-gayaṇa for zero-zero, (4.2899), ṇaha (4.2928).

Symbolism

In v.4.2960, the symbol for the infinite number of instants in whole of the ab-aeterno past time is given as a or अ, for atītakāla .

In TPT(V), we find the following speciality in this text-topic. Lac has been abbreviated after as la or ल (4.7). For example :

pu 83 la or पु ८३ ल | (v.4.1458)

Commentary :

(vv. 4.6-11)

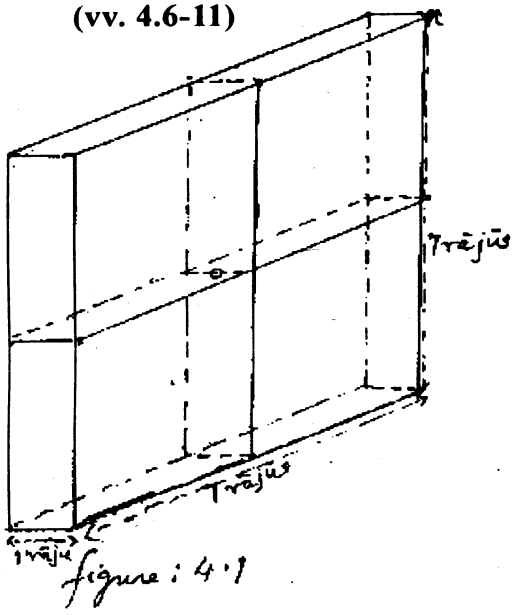


figure : 4.1

In the very central portion of the mobile bios channel, on the Citrā earth, there is an extremely-spherical (atigola) human universe with a diameter of 4500000 yojanas.

The meaning of extremely spherical may be cylindrical. It seems to be a right circular cylinder with base of radius 2250000 yojanas, and height of 100000 yojanas.

For finding out the circumference, the value of π has been taken to be $\sqrt{10}$ and the formula is given as :

$$\text{circumference} = \sqrt{(\text{diameter})^2 \times 10}$$

or $\quad \text{circumference} = \pi D$ where $\quad \pi = \sqrt{10}$.

As $D = 2r$, $\quad C = \sqrt{10} \quad = 2r\sqrt{10}$

Similarly, the area is given by the formula

$$\text{area of a circle} = \text{circumference} \times \frac{\text{diameter}}{4} = \pi . \frac{D.D}{4} = \pi . r. r = \pi r^2.$$

Thus the area of the circular base = circumference $\times \frac{\text{diameter}}{4}$.

As circumference $= \sqrt{(4500000)^2 \times 10}$

$= 14230249$ approximately in yojanas

the area is therefore $= 14230249 \times \frac{4500000}{4}$

$=$ 16009030125000 square yojanas approximately.

Now, the volume of the cylinder is given by

volume (vimdaphala) = area $\times$ height

$= 16009030125000 \times 100000$

$= 1600903012500000000$ cubic yojanas.

Then, in the very central portion of the human-universe (manuṣya loka), there is the Jambū island, circular with diameter of one lac yojanas.

(vv.4.50-56)

The diameter of Jambūdvīpa is given to be 100000 yojanas. For finding out the value of circumference the value of π has been taken to be $\sqrt{10}$. How far the value of $\sqrt{10}$ has been taken as a square-root has been calculated and shown in details by R.C. Gupta. The main problem is to obtain the fraction $\frac{23213}{105409}$ after 3 uvasannāsanna is abtained as a molecule (skandha).

From the Dṛṣṭivāda aṅga, it has been stated to be $\frac{23213}{105409}$ kha kha (padassaṁ sassa puḍhaṁ). This depends on the value of $\sqrt{10}$, on which again research has been carried out by R.C.Gupta[1] and the team of Takao Hayashi.[2] As already pointed out by Jain's[3], that after extracting the value of $\sqrt{10}$ upto five place of decimals, the 3 kośas cannot be attained from the sixth digit. This problem was solved by R.C.Gupta as follows:

In order to find the square-root of a non-square positive integral number N, the following binomial approximation was frequently used during the ancient and medieval periods :

$$\sqrt{N} = \sqrt{(a^2 + x)} = a + \left(\frac{x}{2a}\right), \qquad \text{....(4.1)}$$

where a and $x \in I^+$, $x < 2a$.

Similarly, $$\sqrt{N} = \sqrt{(b^2 - y)} = b - \left(\frac{y}{2b}\right), \qquad \text{.....(4.2)}$$

Here, D = 100000 yojanas

1.cf. BR, Gupta, R.C., the papers on the value of π and its applications. 2. cf. BR, Takao Hayashi, the papers on the value of π . 3.cf. BR, Jain, L.C., the Mathematics of TPT.

and $C = \sqrt{10\,D^2}$, where C is circumference,

D is the diameter for a circle, the Jambū island.

Thus, $\sqrt{10} = \sqrt{(3^2 + 1)} = 3 + \left(\frac{1}{6}\right)$. .....(4.3)

Hence from the relations between C and D as above, we have

$$C = \sqrt{(100,000,000,000)} = \sqrt{(316227)^2 + 484471}$$

$$= 316\,227 + \frac{484471}{2\times 316227} \quad \text{yojanas} \qquad .....(4.4)$$

as per application of the formula (4.1)

From(4.4) we find that the divisor = 632454

and remainder = 484471.

The fractional yojana remainder, $\frac{484471}{632454}$ on convertion into krośas gives

$$\frac{484471\times 4}{632454} \text{ krośa} = 3 + \left(\frac{40522}{632454}\right) \text{ krośas} \qquad .....(4.5)$$

The fractional krośa remainder, viz. $\frac{40522}{632454}$, can, further, be converted into the next lower unit (daṇḍa). The process could be continued, similarly.

It is seen easily that 128 daṇḍa, 1 vitasti (=12 aṅgula), and 1 aṅgula with the fractional aṅgula remainder as $\frac{407346}{632454}$ are obtained, which is equal to $\frac{67891}{105409}$. .....(4.6).

The above fractional remainder (4.6) is slightly more than half. In this way, we get the circumference of the Jambūdvīpa in the form

$C = 316227$ yojanas, 3 krośas, 128 daṇḍas and $13\frac{1}{2}$ aṅgula. .....(4.7)

However, if further evaluation to still lower units and subunits is to be carried out, one can easily find, on putting 105409 equal to H) :

(i) aṅgula-fraction $\frac{67891}{105409} = 5 \left(\frac{16083}{H}\right)$ yavas

(ii) yava-fraction, $\frac{16083}{H} = 1 + \left(\frac{23255}{H}\right)$ yūkas

(iii) yūka-fraction, $\frac{23255}{H} = 1 + \left(\frac{80631}{H}\right)$ likṣas

(iv) likṣā-fraction, $\frac{80631}{H} = 6 + \left(\frac{12594}{H}\right)$ karma bhūmi bālāgras

(v) ka.bhū bāl. fraction, $\frac{12594}{H} = 0 + \left(\frac{100752}{H}\right)$ ja. bhoga bhūmi bālāgras

(vi) ja. bho. bhū. bāl. fraction, $\frac{100752}{H} = 7 + \left(\frac{68153}{H}\right)$ ma. bho.bhū bālāgras

(vii) ma. bho.bhū. bāl. fraction, $\frac{68153}{H} = 5 + \left(\frac{18179}{H}\right)$ ut. bho.bhū bālāgras

(viii) ut. bho. bhū. bāl. fraction, $\frac{18179}{H} = 1 + \left(\frac{40023}{H}\right)$ ratha reṇus

(ix) ratha reṇu fraction, $\frac{40023}{H} = 3 + \left(\frac{3957}{H}\right)$ trasa reṇus

(x) trasa reṇu fraction, $\frac{3957}{H} = 0 + \left(\frac{31656}{H}\right)$ truta reṇus

(xi) truta reṇu fraction, $\frac{31656}{H} = 2 + \left(\frac{42430}{H}\right)$ sannāsanna units

(xii) sannāsanna fraction, $\frac{42430}{H} = 3 + \left(\frac{23213}{H}\right)$ avasannāsanna units.

Hence we have finally, the avasannāsanna fractional remainder as $\frac{23213}{105400}$ ....(4.8)

This value is in complete agreement with the TPT value right from the whole number of a yojana down to the lowest subunits as defined in the text. Moreover, it has been possible to find out the meaning of this fraction (4.8), designated as kha-kha (or ananta-ananta, endlessly endless or infinitely infinite) term, which can yield measure in still smaller and smaller units of length (to be defined) with the half of the infinitely small particles or paramāṇus) if desired.

It is evident, therefore, that the above method is the actual one which was used by the author, as confirmed above, as well as made evident by the value given by Mādhavacandra Traividya in his Sanskrit commentary of the Trilokasāra,[1] as $\frac{407346}{632454}$, calculeted upto the fractional aṅgula remainder.

(vv.4.59-64)

Similarly, the author has related the corresponding magnitude for the area, and represented the last calculated value as uvasannāsanna fraction remainder $\frac{48455}{105403}$, which is a molecular dimension, and constituted of endlessly-endless number of ultimate particles (paramāṇus).

On having obtained the circumference of the Jambūdvīpa, its area can be calculated by using the rule in TPT, v.4.9, as area is given by

$$\text{area} = \frac{C.D}{4}. \qquad \text{.....(4.9)}$$

Hence, on taking the result for C given in the expression (4.8), and putting its value and the value of the diameter D of the Jambūdvīpa, one gets

$$\text{area} = \frac{23213}{105409} \times \frac{100000}{4} \text{ square avasannāsanna units}$$

$$= 5505 + \left(\frac{48455}{105409}\right). \qquad \text{.....(4.10)}$$

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4 Cf. TLS, V. 311, pp. 125-126.

(v.4.70)

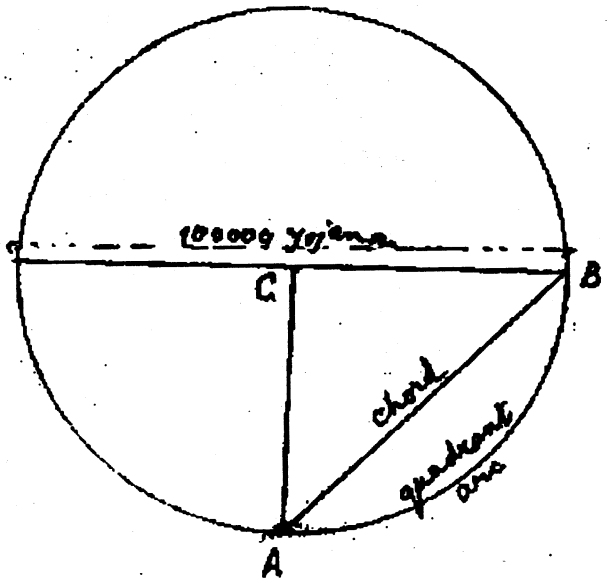


figure 4.2

If the diameter is taken as D and the circumference as C, the radius as r, then

$$(\text{chord of a quadrant arc})^2$$

$$= \left(\frac{D}{2}\right)^2 \times 2 = 2r^2. \qquad \text{.....(4.11)}$$

This could also be obtained as

$$(\text{chord AB})^2$$

$$= AC^2 + CB^2 = 2r^2$$

Then, the relation between the figure 4.2 quadrant arc and the chord has been shown by the author as

$$(\text{quadrant circumference})^2 = (\text{chord of the quadrant arc})^2 \times \frac{5}{4}$$

$$= \left[2 \times \frac{D^2}{4}\right] \times \frac{5}{4} = \frac{5D^2}{8} = \frac{10r^2}{4}, \qquad \text{....(4.12)}$$

on substituting the value of the chord from equation (4.11).

Or, on taking the square root both sides of equation (4.12),

$$\text{quadrant circumference} = \sqrt{10} \cdot \frac{r}{2}$$

(vv.4.65-66-71-72)

These verses define the interval between the doors in the internal parts of the boundary.

The following table details the actual values of different measurements, based on the value of π as approximation of $\sqrt{10}$ to be $\frac{19}{6}$ through bionomial approximation as found by R.C.Gupta.

TABLE - 4.1 (TPT(V)),VV.4.51 et seq.

Circumference, Area and interval between Doors of Jambūdvīpa								
S. no.	Measure	Five C of Jambū. vv.51-56	Five area of Jambū. vv.59-64	Interval of doors outer part vv.68-69	C of Jambū. in internal part of boundaries vv.70	Interval of door in inter. part v.71	Chord of direct inter. of doors vv.72-73	Arc of inter. of doors vv. 72-74
1	yojana	316227	7905694950	79052	316151	79033	70710	79056
2	kosa	3	1	3	3	3	2	3
3	dhanuṣa	128	1553	1532	970	1742	1421	1532
4	nikkū	0	0	0	1	1	1	0
5	hātha	0	0	0	1	0	1	0
6	vitasti	1	1	0	0	1	1	0
7	pāda	0	0	0	1	0	1	1
8	aṅgula	1	1	3	2	5	3	1
9	jau	5	6	3	0	0	4	4
10	jūṁ	1	3	2	1	0	7	2
11	līkha	1	3	2	3	2	7	3
12	k. bh. bāl.	6	2	3	6	7	4	5
13	j. bh. bāl.	0	7	4	4	5	2	7
14	m. bh. bāl.	7	3	1	4	1	3	2
15	u. bh. bāl.	5	7	7	7	1	5	7
16	ratharēṇu	1	4	2	5	7	2	4
17	trasarēṇu	3	2	2	6	3	1	5
18	truṭrēṇu	0	3	6	4	5	2	4
19	sannāsanna	2	7	0	0	0	6	4
20	avasannāsanna	3	1	$4\frac{3}{4}$	2	0	3	7
21	remainder fraction	$\frac{23213}{105409}$	$\frac{48455}{105409}$	X	$\frac{139026}{316151}$	$\frac{192832}{316151}$	$\frac{1521}{2357}$	$\frac{23}{1647}$

v.4.95 to v.4.269

(Digaram without scale as it is not possible)

BHARATA REGION

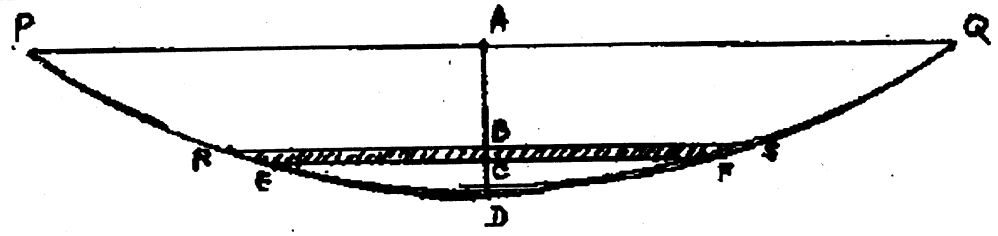


Figure 4.3

This is the map of the Bharata region where the width AD = $526\frac{6}{19}$ yojanas, a part of the Jambū island which is surrounded all around by Lavaṇa (salty) sea.

The Vijayārdha mountain RSFE is shown by line shade. CD is = $238\frac{3}{19}$ yojanas.

The southern Vijayārdha has the chord EF = $9748\frac{12}{19}$ yojanas, and the chord CD of Vijayārdha = $10720\frac{11}{19}$ yojanas. The arc REDFS = $10743\frac{15}{19}$ yojanas.

The side difference (triangles forming) is the exterme peak (cūlikā) given by

$$\frac{RS - EF}{2} = 485\frac{37}{38} \text{ yojanas.}$$

The lateral side = RE = SF = $488\frac{33}{38}$ yojanas.

The northern side of the Bharata region has the chord = PQ = $14471\frac{5}{9}$ yojanas, and the arc PREDFSQ = $14528\frac{11}{19}$ yojanas.

The difference side peak (cūlikā) = $\frac{PQ - RS}{2} = 1875\frac{13}{18}$ yojanas.

The lateral side PR = QS = $1892\frac{15}{38}$ yojanas .

(v.4.180) Formulae

The formula for finding out the chord of a circle when the height of the segment (bāṇa) and diameter (viṣkambha) of the circle are given .

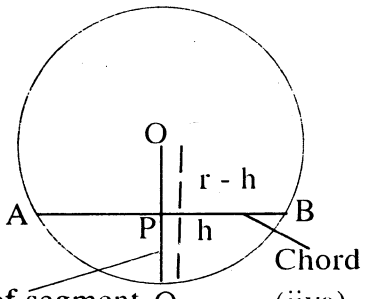


figure - 4.4

Let D be the diametor h be the height of the segment r be the radius = $\frac{D}{2}$

According to this verse,

the chord = $\sqrt{4\left[\left(\frac{D}{2}\right)^2 - \left(\frac{D}{2} - h\right)^2\right]}$ .....(4.13)

This may also be written as chord = $\sqrt{4\left[(r)^2 - (r - h)^2\right]}$

Here, the theorem of Pythagoras has been used as follows

$$OB^2 = OP^2 + PB^2$$

$$\therefore \quad PB^2 = OB^2 - OP^2 \quad \text{or} \quad PB = \sqrt{OB^2 - OP^2}$$

$$\text{or} \quad 2\,PB = AB = \sqrt{4\,[OB^2 - OP^2]}$$

$$= \sqrt{D^2 - (D - 2h)^2} \quad .$$

Note : In JPS, the chard = $\sqrt{4.h\,(D - h)}$, **(v.2.23)** , ...(4.14)

6.9, etc., which is the same as in (v.4.13), on solving.

(v.4.181)

This verse gives the formula for finding out the arc intercepted by the chord of a circle (Jambū island), when again the height of the segment (bāṇa) and diameter of the circle is given.

The formula for finding out the incepted arc (dhanuṣa) is

$$\text{arc} = \sqrt{2\left[(D + h)^2 - (D)^2\right]} = \sqrt{2h^2 + 4Dh}\ . \quad \text{.....(4.15)}$$

If we take the h = r, finding out the arc when the chord is a diameter, we get

$$\text{arc} = \sqrt{2\left[(D + r)^2 - (D)^2\right]} = \sqrt{[9r^2 - 4r^2]}$$

$$= \sqrt{10r^2} = \sqrt{10}\ r = \pi r$$

In JPS, however, vv. 2.24 , 2.29 , 6.10 , the formula is given as follows:

$$\text{arc} = \sqrt{6(h)^2 + (\text{chord})^2} = \sqrt{6h^2 + D^2 - (D - 2h)^2}$$

$$= \sqrt{6h^2 + D^2 - (D^2 - 4Dh + 4h^2)}$$

$$= \sqrt{2h^2 + 4Dh}\ . \quad \text{.....(4.16)}$$

Thus, the formulae given in the TPT and JPS are necessarily the same.

(v.4.182)

When the chord (jīvā) and the diameter (vistāra) is given the verse gives the formula for finding out the height of segment (bāṇa)

$$h = \frac{D}{2} - \left[\frac{D^2}{4} - \frac{(\text{chord})^2}{4}\right]^{1/2} \quad \text{.....(4.17)}$$

or $$h = r - \left[r^2 - \left(\frac{\text{chord}}{2}\right)^2\right]^{1/2}$$

Note:

1. The above formulae have been applied to find out the dimensions etc.of the different regions and mounts etc.
2. The various regions and mounts have been defined in the verses 4.95 et seq. which may be tabulated as in the following table 4.2 .
3. The divisions are perfectly symmetrical with symmetrical structures inside them so far as lands and mounts are concerned in the upper and lower parts of the Jambū island. The rivers also, have some type of symmetry while flowing on into lands through mountains, lakes and so on, with tributaries, entering into the Lavaṇa sea. For other islands, there is also symmetry in such structures, but it is of different nature.

TABLE 4.2 [(TPT)V] p.33 [vv. 4.104-108] Regions and Mountains-Dimensions

1	2	3	4	5	6	7	8
S. no.	Name	Region/ mount	190 reckning logs	colour	Mountain height in yojanas	Width in yojanas as per proportionate division	Remarks
1	Bharat	region	1	x	x	$526\frac{6}{19}$	sym with 13
2	Himvān	mount	2	goldan	100	$1052\frac{12}{19}$	sym with 12
3	Haimavata	region	4	x	x	$2105\frac{5}{19}$	sym with11
4	mahahimvān	mount	8	silvern	200	$4210\frac{10}{19}$	sym with10
5	Hari	region	16	x	x	$8421\frac{1}{19}$	sym with 9
6	Niṣadh	mount	32	heated	400	$16842\frac{2}{19}$	svm with 8
7	Videha	region	64	x	x	$33684\frac{4}{19}$	central
8	Nīla	mount	32	vaiḍūrya	400	$16842\frac{2}{19}$	sym with 6
9	Ramyaka	region	16	x	x	$8481\frac{1}{19}$	sym with 5
10	Rukmī	mount	8	silvern	200	$4210\frac{10}{19}$	sym with 4
11	Hairaṇyavata	region	4	x	x	$2105\frac{5}{19}$	sym with 3
12	Śikharī	mount	2	goldan	100	$1052\frac{12}{19}$	svm with 2
13	Airāvata	region	1	x	x	$526\frac{6}{19}$	sym with 1

(v.4.108) THE VIJAYĀRDHA MOUNTAIN IN THREE RANGES (ŚREṆĪ)

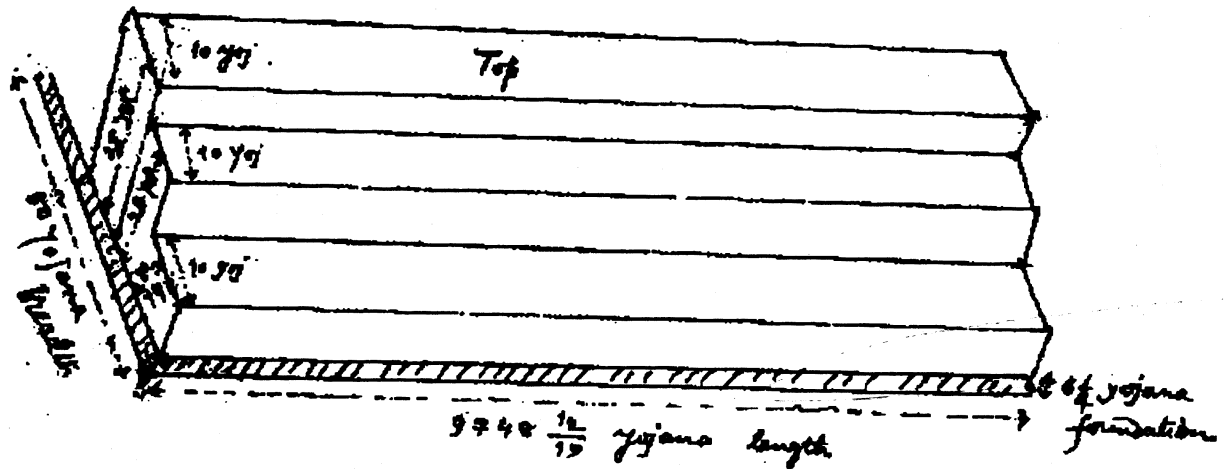


figure 4.5

(v.4.150)

This verse gives the formula for finding out the average width of a peak which has its base and top, and its width in the middle is half of the sum of the base and top:

width in the middle $= \frac{6\frac{1}{4}+3\frac{1}{8}}{2}$, where 3 yojanas, $\frac{1}{2}$ kośa is the width at the top and twice of it at the base.

(v.4.182)

Finding out the arrow (bāṇa). The diameter of the Jambū island is one lac yojanas and the southern chord of the Vijayārdha is $9748\ \frac{12}{19}$ or $\frac{185224}{19}$ yojanas.

The arrow of the southern is

$$= \frac{10000}{2} - \sqrt{\left(\frac{100000}{2}\right)^2 - \left\{\left(\frac{185224}{19}\right)2 \times \frac{1}{4}\right\}}$$

$$= 238\frac{3}{19} \text{ yojanas.}$$

(v.4.183)

The southern chord of the Vijayārdha is, under the same data: diameter of Jambū island: 100000 yojanas, arrow of Bharata region : $238\frac{3}{19}$.

Hence, chord of southern side of Vijayārdha is

$$= \sqrt{4\left[\left(\frac{100000}{2}\right)^2 - \left(\frac{100000}{2} - \frac{4525}{19}\right)^2\right]}$$

$$= \sqrt{4\left(\frac{2500000000}{1} - \frac{893922975625}{361}\right)} = 9748\frac{12}{19}$$

(v.4.184)

Under the same measures the arc of the southern chord

$$= \left[\left\{\left(100000 + 238\frac{3}{19}\right)^2 - (100000)^2\right\} \times 2\right]^{1/2}$$

$$= 9766\frac{1}{19} \text{ yojanas.}$$

(v.4.185)

For finding the north chord of the Vijayārdha, the arrow

$$= 288\frac{3}{19} = \frac{5475}{19} \text{ yojanas,} \quad \left(\text{by } 238\frac{3}{19} + 50\right).$$

Hence, the northern chord

$$= \sqrt{\left\{\left(100000 - \frac{5475}{19}\right) \times \frac{5475}{19} \times 4\right\}}$$

$$= 10720\frac{11}{19} \text{ yojanas.}$$

(v.4.185)

Diameter = 1 lac yojanas, Arrow = $288\frac{3}{19}$ yojanas.

Hence, the arc corresponding to this chord

$$= \left[2\left\{100000 + 288\frac{3}{19}\right\}^2 - (100000)^2 \times 2\right]^{1/2}$$

$$= \left[2\left(100288\frac{3}{19}\right)^2 - (10000000000)\right]^{1/2}$$

$$= \sqrt{\frac{41669951250}{361}} = 10743\frac{15}{19} \text{ yojanas.}$$

(v.4.188)

According to verse 4.187, the verse gives the measure of south minimal chord by the following formula:

the northerm chord of Vijyārdha = $\frac{203691}{19}$ yojanas

and that of the southern chord = $\frac{185224}{19}$ yojanas.

Hence, the peak of the Vijayārdha = $\left[\left(\frac{203691}{19} - \frac{185224}{19}\right) \times \frac{1}{2}\right] = 485\frac{37}{38}$ yojanas.

(v. 4.190)

The side-arm of the Vijayārdha (east-west) can be found by the formula given in v.4.189. It is the half of the difference between the maximal arc and lesser arc. The northern arc of the Vijayārdha is $\frac{204132}{19}$ yojanas and that of the southern is $\frac{185555}{19}$ yojanas.

Hence, the lateral side = $\frac{1}{2}\left(\frac{204132}{19} - \frac{185555}{19}\right) = 488\frac{33}{38}$ yojanas.

(v.4.191)

For the northern chord

The diameter of Jambū island = 100000 yojanas

The arrow = $526\frac{6}{19}$ yojanas .

Hence the corresponding chord at north side

$$= \left[4\left(\frac{100000}{2}\right)^2 - \left(\frac{100000}{2} - \frac{10000}{19}\right)^2\right]^{1/2}$$

$$= \sqrt{\frac{76200000000}{361}} = \frac{274954}{19} = 14471\frac{5}{19} \text{ yojanas.}$$

(v.4.192)

The arc of the Bharata rigion is calculated from the same data :

$$\text{The arc} = \left[2\left\{\left(\frac{100000}{1} + 526\frac{6}{19}\right)^2 - (100000)^2\right\}\right]^{1/2}$$

$$= \sqrt{\frac{76200000000}{361}} = 14528\frac{11}{19} \text{ yojanas.}$$

(v.4.193)

The peak of the Bharata region

$$= \frac{1}{2} \text{ [longer chord of Bharata region - smoller chord]}$$

$$= \frac{1}{2}\left(\frac{274954}{19} - \frac{203691}{19}\right) = 1875\frac{13}{38} \text{ yojanas.}$$

(v.4.194)

The lateral side of the Bharata region

$$= \frac{1}{2} \text{ [The greater arc of the Bharata region - The smaller arc]}$$

$$= \frac{1}{2}\left(\frac{276043}{19} - \frac{204132}{19}\right) = 1892\frac{15}{19} \text{ yojanas.}$$

(v.4.211) For finding out the length of the Ganges river in the upper south part of the himavān monutain, the process is as follows.

The width of the Himavān mountain = $1052\frac{12}{19}$ yojana.

The width of the river $= 6\frac{1}{4}$ yojana

Hence $\frac{20000}{19} - \frac{25}{4} = \frac{79525}{76}$ yojana .

$\frac{1}{2}\left(\frac{79525}{76}\right) = 523\frac{29}{152}$ yojana is the requisite length.

TABLE 4.3

Measure of diameter chord, arc, peak and lateral side of Bharata region and Vijayārdha								
S. No.	Name	Diameter	North chord	South chord	North arc	South arc	Peak	lateral side
1.	Bharata Region	$526\frac{6}{19}$ yojana	$14471\frac{5}{19}$ yojana v. 4.191	$10720\frac{11}{19}$ yojana	$14528\frac{11}{19}$ yojana v. 4.192	$10743\frac{15}{19}$ yojana	$1875\frac{13}{19}$ yojana v.4.193	$1892\frac{15}{38}$ yojana v.4.194
2.	Vijayārdha	50 yojana v. 4.178	$10720\frac{11}{19}$ yojana v. 4.185	$9784\frac{12}{19}$ yojana v.4.186	$10743\frac{15}{19}$ yojana v.4.189	$1766\frac{1}{19}$ yojana v.4.184	$485\frac{37}{38}$ yojana v.4.188	$488\frac{33}{38}$ yojana v.4.190

vv.4.214-226

In the next table, the system concerned with the rivers the Gaṅga and the Sindhu are described giving a look into the arrangements of the measures in Jambū island, while the rivers cross the lakes and islands, mountains and the cities, palaces, doors etc. of the forts.

Table - 4.4

The System related with the Ganges and the Indus, Diameter of the pits, islands etc. vv. 4.214-226																	Remarks
of system			of wells at base of mountains		of islands at the centre of wells			of mountains situated at the centre of islands			of palaces situated over the mountain				of doors of palaces		
width	length	thickness	width	height	height in the centre of water	width	depth in the water	height	Diameter at bottom	Diameter at centre	above	height	Diameter at base	Diameter at centre	Diameter over	Diameter increased	height	width	
$6\frac{1}{4}$ yojana	$\frac{1}{2}$ yojana	$\frac{1}{2}$ yojana	60 yojana	10 yojana	10 yojana	$8\frac{1}{2}$ yojana	$\frac{1}{2}$ yojana	$\frac{1}{10}$ yojana	4 yojana	2 yojana	1 yojana	2000 dhanuṣa	3000 dhanuṣa	2000 dhanuṣa	1000 dhanuṣa	750 dhanuṣa	80 dhanuṣa	40 dhanuṣa	

(vv.4.277-283)

Time is of two types (1) pros or deterministic (mukhya)

(2) cons or behavioral or practical (vyavahāra)

The first type is a fluent (as a time-particle (kālāṇu)), deterministic(niścaya) which has the following characteristics:

(1) It is without touch, taste, odour and colour.

(2) It is with the non-gravity-levity control (agurulaghu guṇa).

(3) It is characterized as associated with change (vartanā).

(4) The behavioral time (vyavahāra kāla) depends upon the deterministic time for practical purposes.

(5) The change of various types in the bios and matter occur due to dependence upon the deterministic time.

(6) In all the fluents and their events, effects, activities, and relativity tend to happen ownig to the external and internal (intrinsic) fields (nimittas).

(7) For all the above happenings in all the fluents, their controls and events (padārthas), the external field is the deterministic time fluent, and the internal field is existent in every one of the fluents of its own.

(8) Each time fluent is separate from the other, and they fill up the whole universe, without mutually entering into each other. [As the number of space-points (pradeśas) is innumerate or $\equiv$ or L^3, where L is the universe-line, so also the cardinal of the set of these time-particles is $\equiv$.

The unit of the second type is an indivisible instant (samaya), the time taken by an ultimate particle to move to its next-point.

Table - 4.5

Definitions of classes of time-units in vague (vyavahāra) **(vv. 4. 286 et seq)**

1.	innumerate samayas (instants)	= 1	āvalī
2.	numerate āvalīs $\left(\frac{2880}{3773}\text{ seconds}\right)$	= 1	ucchavāsa (prāṇa)
3.	7 ucchavāsas $\left(5\frac{185}{539}\text{ seconds}\right)$	= 1	stoka
4.	7 stokas $\left(37\frac{31}{77}\text{ seconds}\right)$	= 1	lava
5.	$38\frac{1}{2}$ lavas (24 minutes)	= 1	nālī
6.	2 nālīs (48 minutes)	= 1	muhūrta
7.	[1 muhūrta – 1 instant (samaya)	= 1	bhiṇṇa muhūrta]

8.	30 muhūrtas (24 hours)	=	1 dina (day-night)
9.	15 dinas	=	1 pakṣa (fortnight)
10.	2 pakṣas	=	1 māsa (month)
11.	2 māsas	=	1 ṛtu (season)
12.	3 ṛtus	=	1 ayana (6 months or solstice)
13.	2 ayanas	=	1 varṣa (year)
14.	5 varṣas	=	1 yuga
15.	2 yugas	=	10 varṣas
16.	10×10 varṣas	=	100 or śata varṣas
17.	śata $\times$ 10 varṣas	=	1000 or sahasra varṣas
18.	sahasra $\times$ 10 varṣas	=	10 sahasra varṣas
19.	10 sahasra $\times$ 10 varṣas	=	lakṣa varṣas (lac years)
20.	84 lakṣa varṣas (8400000 years)	=	1 pūrvāṅga 84 lac $\times$ 84 lac
21.	1 $(\text{pūrvāṅga})^2$	=	1 pūrva (70560000000000 years)
22.	84 pūrvas	=	1 parvāṅga or $(592704)\,(10)^{10}$ years
23.	84 lakṣa parvāṅgas	=	1 parva or $(49787136)\,(10)^{15}$ years
24.	84 parvas	=	1 nayutāṅga or $(4182119424)\,(10)^{15}$ years
25.	84 lakṣa nayutāṅgas	=	1 nayuta or $(351298031616)\,(10)^{20}$ years
26.	84 nayutas	=	1 kumudāṅga or $(29509034655744)\,(10)^{25}$ years
27.	84 lakṣa kumudāṅgas	=	1 kumuda or $(2478758911082496)\,(10)^{25}$ years
28.	84 kumudas	=	1 padmāṅga or $(208215748530929664)\,(10)^{25}$ years
29.	84 lakṣa padmāṅgas	=	1 padma or $(17490122876598091776)\,(10)^{30}$ years
30.	84 padmas	=	1 nalināṅga or $(146917032163423970918 4)\,(10)^{30}$ years

31.	84 lakṣa nalināṅgas	=	1 nalina or (12341030701727613557145 6)$(10)^{35}$ years
32.	84 nalinas	=	1 kamalāṅga or (10366465789451195388002304) $(10)^{35}$ years
33.	84 lakṣa kamalāṅga	=	1 kamala or $(84)^{14}$ $(10)^{40}$ years
34.	84 kamalas	=	1 truṭitāṅga or $(84)^{15}$ $(10)^{40}$ years
35.	84 truṭitāṅgas	=	1truṭita or $(84)^{16}$ $(10)^{45}$ years
36.	84 truṭitas	=	1 aṭaṭāṅga or $(84)^{17}$ $(10)^{45}$ years
37.	84 lakṣa aṭaṭāṅgas	=	1 aṭaṭa or $(84)^{18}$ $(10)^{50}$ years
38.	84 aṭaṭas	=	1 amamāṅga or $(84)^{19}$ $(10)^{50}$ years
39.	84 lakṣa amamāṅgas	=	1 amama or $(84)^{20}$ $(10)^{55}$ years
40.	84 amamas	=	1 hāhāṅga or $(84)^{21}$ $(10)^{55}$ years
41.	84 lakṣa hāhāṅgas	=	1 hāhā or $(84)^{22}$ $(10)^{60}$ years .
42.	84 hāhās	=	1 huhāṅga or $(84)^{23}$ $(10)^{60}$ years
43.	84 lakṣa hūhāṅgas	=	1 hūhū or $(84)^{24}$ $(10)^{65}$ years
44.	84 hūhūs	=	1 latāṅga or $(84)^{25}$ $(10)^{65}$ years
45.	84 lakṣa latāṅgas	=	1 latā or $(84)^{26}$ $(10)^{70}$ years
46.	84 latās	=	1 mahālatāṅga or $(84)^{27}$ $(10)^{70}$ years
47.	84 lakṣa mahālatāṅgas	=	1 mahālatā or $(84)^{28}$ $(10)^{75}$ years
48.	84 lakṣa mahālatās	=	1 śrīkalpa or $(84)^{29}$ $(10)^{80}$ years
49.	84 lakṣa srīkalpas	=	1 hasta prahelita or $(84)^{30}$ $(10)^{85}$ years
50.	84 lakṣa hasta prahelitas	=	1 acalātma or $(84)^{31}$ $(10)^{90}$ years .

In symbols, this has been expressed as 84 | 31 | 90 (v.4.308)

Note : This process of calculation has been asked to be continued till the maximal numerate is obtained.

(vv.4.309 et seq.)

There are two types of sets, the existential and the constructional in this text and other texts on Karma theory. The task was to evaluate the measure of the existential sets, and for this purpose, sets were constructed to work as equivalent to existential sets.

As in the treatment of the fourteen sequences, in TLS, ch. 1, so also here the numbers have been constructed from the lowest to the greatest ordinals and cardinals, as well as mixed, for the purpose of denoting the measure of ordinality or cardinality of the existential sets as postulated in this philosophy.

The text deals with natural numbers alone and the sets contain members to be counted through the construction sets. The maximal numerate binds the limit to be a subject of the Omniscript or the Omniotology (śruta kevalī). The maximal innumerate binds the limit to be a subject of the clairvoyant (avadhi jñānī). The maximal infinity binds the limit be a subject of the Omniscient (kevalī). Only these persons could have the perception or knowledge of the qualities and attributes of these limits.

The infinities are the proper or actual infinities which resemble to some extent with those once evolved by Georg Cantor (1845-1918 A.D.) about whom E.T. Bell[1] remarks, "Resolving Simplicius' doubt about the conceit of 'assigning an Infinite bigger than an Infinite' Cantor proceeded to describe any desired number of such bigger infinities. First, there is said to be no difficulty in imagining an ordered infinite class; the natural numbers 1, 2, 3, ... themselves suffice. Beyond all these, in ordinal numeration, lies ω; beyond ω lies $\omega + 1$; then $\omega + 2$, and so on, until $\omega 2$ is reached, when $\omega 2 + 1$, $\omega 2 + 2$, ... are attained; beyond all these lies ω^2 , and beyond this $\omega^2 + 1$, and so on, it is said, indefinitely and for ever. If the first step- after which all the rest seems to follow of itself - offers any difficulty, we have to grasp the scheme 1, 3, 5, ...; $2n + 1$, ... I 2, in which, after all the odd natural numbers have been counted off, 2, which is not one of them, is imagined as the next in order. One purpose of Cantor in constructing these transfinite ordinals, ω, $\omega + 1$ ..... was to provide a means for the counting of well ordered classes, a class being well-ordered if its members are ordered and each has a unique 'successor'." "For cardinal numbers also cantor described 'an infinite bigger than an Infinite' to confound the Simpliciuses .... . He proved (1874) that the class of all algebraic numbers is denumerable, and gave (1878) a rule for constructing an infinite non-denumerable class of real numbers. Where we to make a list of spectacularly unexpected discoveries in mathematies, there two might head our list".

For comparabilities of sets, various results occur in the Dhavalā texts (vide BS).

For details of application of mathematical logic in the presentation of this material of TPT, the DVL may be referred (vol. 3,1942 or 1980 edition), specifically for defining the numerate (saṁkhyāta), innumerate (asaṁkhyaāta) and infinite (ananta). The author of DVL, Vīrasenācārya starts with the various classification of the infinities as follows, through the quotation of the ancient Prakrit verse :

1 Bell, E.T., Developmentof Mathematics, loc. cit., p.275.

nāmaṁ ṭhavaṇṇā daviyaṁ sassada gaṇaṇāpadesiyamaṇaṁtaṁ ego ubhayādeso vitthāro savva bhāvo ya //8// (DVL , vol.3, p.11)

Translation

That infinity is of various types :

1. nāmānanta (denomination of infinity) .
2. sthāpanānanta (establishment of infinity) or (attributed infinity)
3. dravyānanta (fluent-infinity)
4. śāśvatānanta (eternal-infinity)
5. gaṇanānanta (computation-infinity)
6. apradeśikānanta (non-pointed-infinity)
7. ekānanta (mono-dimensional-infinity)
8. ubhayānanta (two-dimensional-infinity)
9. vistārānanta (extension-infinity)
10. sarvānanta (omni-infinity)
11. bhāvānanta (phase-infinity)

What are these types, will now be defined in brief, for clarity of the various conceptual infinities here.

1. **nāmānanta :** Simply denominating a fluent: bios, non-bios, mixed without any reason, as infinite, is called nāmānanta.
2. **sthāpanānanta :** Establishment or attribution, "as this is infinite", in wood work, painting-drawing work, book work, script work, taking out work, rock work, wall work, domestic work, instrumental (bheṇḍa ?) work, an axis or a courie (varāṭika) or any other object, is called sthāpanānanta.
3. **dravyānanta :** This is of two types, āgama and noāgama. The authentic work enlightening all syllable-norms, and without contradiction, etc., is called āgama. That which is different from āgama is noāgama.

   The bios, knower of the science of infinity, but without its utilization at present, is called āgamadravyānanta.

The noāgama dravyānanta is of three types: knower-body, the accomplishable (bhavya) and others (tadvyatirikta).

4. **śāśvatānanta :** This type is said to exist in dharma etc. fluents, because the dharma etc. fluents, being eternal never get destroys.

5. **gaṇanānanta :** This is of various types and simple .

6. An ultimate particle is called **apradeśikānanta**.

7. **ekānanta :** There is no end, while looking at the line (śreṇī) of the space-points from the centre of the universe, hence it is called ekānanta.

8. **ubhayānanta :** On looking at the space-point line in two directions from the centre of the universe, there seems no end to it , hence it is called ubhayānanta.

9. **vistarānanta:** The space, which looked at in from of a surface, has no end, hence it is called vistārnanta .

10. **sarvānanta :** The space on being looked at in the form of a volume (ghana) has no end, hence it is called sarvānanta .

11. The **bhāvānanta** is of two types : āgama and noāgama. The attentive bios, having attention at present towards the knowing of the science of infinity is called āgama bhāvānanta. The bios etc. fluents, transforming into infinite events in all the three times (present, past and fiture), are called noāgamabhāvānanta.

Further details may be available in DVL, 3, pp. 11, et seq, with specific description of computation-infinity.

Simnilarly, eleven types of innumerate (asaṁkhyāta) have been described with more or less similar details in DVL, vol. 3, pp.123 et seq. For example, the single point (pradeśa) of a bios is apradeśāsaṁkhyāata (non-pointed innumerate) relative to the indivisible corresponding-section of volition (yoga). Computation-innumerate has been similarly detailed here.

The mathematical methods of analysing the type of an infinity may be seen in the appendix, A-4.

In the TPT, the detailed description has been given for finding out the maximal numerate (utkṛṣṭa saṁkhyāta), the maximal innumerate (utkṛṣṭa asaṁkhyāta) and the maximal infinite (utkṛṣṭa ananta). There are minimal (jaghanya) and non-minimal-maximal types of these three types: the saṁkhyāta; *S*, the asaṁkhyāta; *A*, and the ananta *I*. The *S* has been divided to three types: the minimal saṁkhyāta, *Sj*, the intermediate saṁkhyāta *Sm*, and the maximal saṁkhyāta, *Su*.

The asaṁkhyāta has been first divided into the peripheral innumerate (parīta asaṁkhyāta), *Ap*, which has been further classified into *Apj*, *Apm*, *Apu* as the numerate (saṁkhyāta) above. Then the asaṁkhyāta has been divided into the yoked (yukta), *Ay*, and then into the innumerate (asaṁkhyāta) categories, *Aa*. Thus *Ay* and *Aa* are further classified into *Ayj*, *Aym*, *Ayu* as well as *Aaj*, *Aam* and *Aau*.

Similarly, the ananta, *I*, is divided first into *Ip*, *Iy*, *Ii* and further into *Ipj*, *Ipm*, *Ipu*, *Iyj*, *Iym*, *Iyu*, and *Iij*, *Iim*, *Iiu* .

First, to start with for finding out the measure of the maximal saṁkhyāta *Su*, a right circular cylinder as a pit with a diameter of 1 lac yojana and of height 1 thousand yojana alongwith three more similar pits are established . They are respectively called

1. reckoning log pit (śalākā kuṇḍa)
2. counter reckoning-log pit (pratiśalākā kuṇḍa)
3. greater-reckoning-log pit (maha śalākā kuṇḍa)
4. unstable pit (anavasthā kuṇḍa)

If the last unstable pit is filled up with two mustard seeds, this set measures minimal numerate ($Sj = 2$). It may be mentioned that the reckoning of 1 is not a numerate. This is first choice. All those numbers above *I* , and not reaching upto maximal numerate, are the choices of intermediate numerate [$Sm > 2$ but $Sm < Su$] . This unstable pit is filled up completely and to the successive islands and seas, one by one, one seed is given successively to each.

In TLS (v.28), the pit has been stated to be so fill up fully that the top level may contain only one seed, so that over the right-circular cylindrical pit a cone of the seeds is also formed. In this way the total number of seeds contained in the pit as well as the upper cone is obtained as

$$(1997\ 112\ 938\ 451\ 316\ 36\ 36\ 36\ 36\ 36\ 36\ 36\ 36\ 36\ 36\ 36\ 36\ 36\ 36\ 36\ 36\ \frac{4}{11}),$$
{in all 31 digits}.

Neither the volume of a seed has been prescribed, except that the number of seeds is given, nor the height of the cone is given, except that the number of seeds contained in the pit is given as $(19791209299968) \times (10)^{31}$. As the number of the seeds is an even number, hence the last seed of the unstable pit (anvasthā kuṇḍa) will be dropped in the sea after transgresing the above number of islands as well as seas. In whatever sea it is dropped, that width of the sea is noted and a pit of that diameter of right-circular cylinder shape with a depth of 1000 yojanas is taken next, and filled up completely with similar mustard seeds, and simultaneously after finishing the filling up, a seed may be dropped in the reckoning-log pit. The process of exhausting this

unstable pit be started and continued as above, till the last seed is dropped in an island sea and the process of exhausion and similar filling up be reckoned by dropping the second seed in the reckoning-log (śalākā) pit (kuṇḍa). It will give the diameter of rest of the island-ocean for the third new unstable pit, which is filled up, exhausted similarly and the fourth unstable pit with new diameter is filled up and a third seed is dropped in the reckoning-log pit (śalākā kuṇḍa).

This process be continued till the reckoning log pit śalākā kuṇḍa is completely filled up and then the filling of the counter-reckoning-log-pit (prati-śalākā kuṇḍa) be started filling up through one seed each time the process of exhaustion is completed with the filling up of the next unstable pit. And when this counter-reckoning-log pit is filled up to the full, the process of filling the great-reckoning log pit (mahāśalākā kuṇḍa) be started through dropping of a seed in it at the end of exhaustion of each unstable-pit while the next is being filled up. When the process comes to a stop with the last seed, the diameter of that island-sea when the last seed has been dropped is taken up and a new unstable pit is dug with that diameter, in the right-circular cylinder shape, of 1000 yojanas of depth.

The pit so dug is completely filled up with the seeds and that number of seeds will denote the minimal peripheral innumerate (jaghanya parīta asaṁkhyāta), from which if 1 is subtracted the maximal numerate (utkṛṣṭa saṁkhyāta) is obtained. Thus ,

$$Su = Apj - 1 , \qquad \text{.....(4.18)}$$

In this way ,

$$Su > Sm > Sj > 1, \qquad \text{.....(4.19)}$$

and according to

$$Apj > Su \text{ and definition,} \qquad \text{.....(4.20)}$$

we have

$$Apu > Apm > Apj . \qquad \text{.....(4.21)}$$

Here, *Apu* or maximal perepheral innumerate is obtained by spreading the number-logs and after giving one *Apu* to each log, they are multually multiplied (vide (4.27)), giving the minimal yoked innumerate or *Ayj*, which is one in excess of the maximal peripheral innumerate *Apu* :

$$[Apj]^{Apj} = Ayj = Apu + 1 . \qquad \text{.....(4.22)}$$

After this, according to definition,

$$Ayu > Aym > Ayj > Apu \qquad \text{.....(4.23)}$$

For obtaining the maximal yoked innumerate, or *Ayu*, the minimal yoked innumerate, *Ayj*, is squared getting minimal innumerat-innumerate, *Aaj*, from which one is to be subtracted :

$$[Ayj]^2 = Aaj = Ayu + 1 , \qquad \text{.....(4.24)}$$

and one gets

$$Aau > Aam > Aaj > Ayu . \qquad \text{.....(4.25)}$$

The value of Aau is less than Ipj by 1 .

$$Aau = Ipj - 1 \qquad \text{..... (4.26)}$$

For finding out or constructing *Ipj*, the following process is adopted.

In the beginning, two counter sets (prati-rāśi) are taken, each equal to *Aaj*. Out of these, the one set *Aaj* is established or presumed as the reckoning-log-set (salākā rāśi). The other *Aaj* set is spread, and the very amount of set *Aaj* is given to each spread unity log. This row is then mutually multiplied, as before like this

$$\underset{1}{Aaj} \times \underset{1}{Aaj} \times \underset{1}{Aaj} \times \underset{1}{Aaj} \quad \text{.....upto Aaj} \quad \text{.....(4.27)}$$

and suppose this product gives rise to the set b, and the end of this operation be denoted or reckoned by subtracting unity from the reckoning-log-set *Aaj*, the counter one.

Now the set b is spread into units as a row and to each unit a set b is given, and all the elements b's of the row are mutually multiplied, as before in (4.27), to give rise to the set c. Then, at the end of this, one more unity is reduced from Aaj, the counter set. This process is continued till at the end the counter-set Aaj is completely exhausted. Symbolically, we may express this operational process as

$$[Aaj]^{Aaj} = \overline{Aaj|}^{1} = b \ , \ [b]^{b} = \overline{b|}^{1} = c = \overline{Aaj|}^{2}$$

$$[c]^{c} = \overline{c|}^{1} = \overline{b|}^{2} = \overline{Aaj|}^{3} = d ,$$

$$[d]^{d} = \overline{d|}^{1} = \overline{c|}^{2} = \overline{b|}^{3} = \overline{Aaj|}^{4} = e \text{ and } c . \qquad \text{.....(4.28)}$$

In this way the process is continued till Aaj is completely exhausted , and let j be produced :

$$\overline{Aaj|}^{Aaj} = \overline{Aaj|}_{1} = j \qquad \text{.....(4.29)}$$

Here is a new notation we have introduced for the operation

$\overline{Aaj}\rceil^{Aaj} = \overline{Aaj}\rceil_1$ which is first time vargitasamvargita according to TPT .

Now the set j or $\overline{Aaj}\rceil_1$ is established as two sets counter (and primary), one is established as reckoning-log (śalākā) set and other is spread into unit logs, to each unit of which the set *j* is given and mutually multiplied. In this way let *k* set be produced. At this instant 1 is subtracted from the set reckoning log set (śalākā rāśi) established as mentioned for counting. This set *k* is taken, spread, given to each unit the set *k* and mutually multiplied to produce *L* . At this instant 1 more is subtracted from the counter set *j* to devote the second operation. The process is thus continued till the whole counter set *j* is completely exhausted . Symbolically we have

$$[j]^j = \overline{j}\rceil^1 = \overline{\overline{Aaj}\rceil^1}\rceil^1 = K \qquad \text{.....(4.30)}$$

$$[k]^k = \overline{k}\rceil^1 = \overline{\overline{Aaj}\rceil_1}\rceil^2 = l \qquad \text{.....(4.31)}$$

$$[l]^l = \overline{l}\rceil^1 = \overline{\overline{Aaj}\rceil_1}\rceil^3 = m \qquad \text{..... (4.32)}$$

This is continud till *j* is completely exhausted and at the end let *p* be produced :

$$\overline{j}\rceil^j = \overline{\overline{Aaj}\rceil_1}\rceil^{\overline{Aaj}\rceil_1} = \overline{Aaj}\rceil_2 = p \qquad \text{.....(4.33)}$$

The new notation may be noted here as $\overline{Aaj}\rceil_2$ carefully.

Again set *p* is established as two sets-one as the counter set, and other as meant for further operational counting. The first set *p* is kept as a counter set, and other is spread into units and to each unit this *p* is given and then mutually multiplied to give a set *q*, and to denote the end of one operation, one is subtracted from the counter set *p*. Then *q* is taken, spread into unities and to each unity the whole set *q* is given, and the whole row of *q's* is mutually multiplied to give, say *r* set, and again to denote the end of second operation, one more is subtracted from the counter set *p*. This process is continued till *p* is completely exhausted, symbolically,

$$[p]^p = \overline{p}\rceil^1 = \overline{\overline{Aaj}\rceil_2}\rceil^1 = q \qquad \text{.....(4.34)}$$

$$[q]^q = \overline{q}\rceil^1 = \overline{p}\rceil^2 = \overline{\overline{Aaj}\rceil_2}\rceil^2 = r \qquad \text{.....(4.35)}$$

$$[r]^r = \overline{r}\rceil^1 = \overline{p}\rceil^3 = \overline{\overline{Aaj}\rceil_2}\rceil^3 = s \qquad \text{.....(4.36)}$$

This process is continued till set *p* is completely exhausted and in the end suppose t set is produced.

$$\overline{p}\,|^{p} = \overline{\overline{Aaj}|_2}\,|^{\overline{Aaj}|_2} = \overline{Aaj}\,|_3 = t \qquad \text{.....(4.37)}$$

In his DVL, Vīrasenācārya has denoted these operations upto $\overline{x}\,|^3$ alone and called it as third vargita-saṁvargita of x, whereas the TPT author, Yativṛṣabhācārya has carried the operations upto $\overline{x}\,|_3$ and called it the three times vargita saṁvargita of x. TPT is earlier than DVL by at least five hundred years. Thus, we have introduced two notations here, the $\overline{x}\,|^3$ and the $\overline{x}\,|_3$. The difference between these is enormous. The same is applied for the proper infinities as well.

Here, the author of TPT says that still after this process, the maximal-innumerate-innumerate (utkṛṣṭa asaṁkhyāta asaṁkhyāta) or *Aau* is not produced. Here begins the projection of actual or proper innumerate sets into $\overline{Aaj}\,|_3$ in order to produce *Aau*. For this purpose, six properly innumerate sets, as follows, are added or projected into $\overline{Aaj}\,|_3$. The four are the space-points contained in the aether fluent (dharma dravya), the anti-aether fluent (adharma dravya), the universe-space (lokākāśa) and a bios (jīva), all of which contain space-points equivalent to each other.

Then, two more sets are taken each having space-points as innumerate universes here, $\equiv$ a, and called non-established every-set (apratiṭhita pratyeka rāśi) and established every-set (pratiṣṭhita pratyeka rāśi). All these six sets are added in $\overline{Aaj}\,|_3$, getting say

$$\overline{Aaj}\,|_3 + \text{ six innumerate-sets.} \qquad \text{.....(4.38)}$$

This sum is then again subjected to the above operations of three times vargaṇa-saṁvargaṇa getting

$$\overline{\overline{Aaj}\,|_3 + \text{ six innumerate-sets}}\,|_3 \qquad \text{.....(4.39)}$$

Then still the *Aau* is not produced. Hence in (4.39), the following six more sets are projected or added which are innumerate also :

1. life-time bond advenience stations (sthiti bandhādhyavaṣāya sthānas)
2. every bond advenience stations (anubhāga bandhādhyavasāya sthānas)
3. indivisible-corresponding-sections of mind volition (yoga) (avibhāgī praticcheda-manoyoga)
4. indivisible-corresponding-sections of speech's volition (avibhāgī praticcheda-vacana yoga)

5. indivisible-corresponding-sections of body's volition (avibhāgī praticchadas kāya yoga)

6. indivisible instants of the hyperserpentine, hyposerpentine periods of time (utsarpiṇī and avasarpiṇī kāla samayas).

Hence, the new expression during this process becomes a set which is again subjected to vargaṇa saṁvargaṇa of TPT three times, producing *Ipj* or jaghanya parīta ananta. When 1 is subtracted from this *Ipj*, *Aau* is produced. Symbolically,

$$\overline{\overline{Aaj}\,|_3 + \text{former six innumerate sets}\,|_3 + \text{latter six innumerable sets}}\,|_3$$

$$= Ipj = Aau + 1. \qquad \text{.....(4.40)}$$

further

$$Ipu > Ipm > Ipj \qquad \text{.....(4.41)}$$

Afterwards, we obtain the minimal yoked-infinite as follows :

$$Iyj = [Ipj]^{Ipj} = \overline{Ipj}\,|^1 = \text{The non-accomplishable proved set (abhavya siddha rāśi)} \qquad \text{.....(4.42)}$$

and $Iyj = Ipu + 1.$

Then, $Iyu > Iym > Iyj, > Ipu \qquad$ .....(4.43)

and $Iij = [Iyj]^2 = Iyu + 1, \qquad$ .....(4.44)

In order to obtain maximal infinite-infinite (utkṛṣṭa anantānanta) from *Iij*, the *Iij* is subjected to the similar three times vargaṇa-saṁvargaṇa operation as before getting $\overline{Iij}\,|_3$, which is not capable of producing *Iiu*. Hence, the following six infinite sets of proper infinite cardinals are added to $\overline{Iij}\,|_3$

1. set of all accomplished souls (siddha jīva rāśi)

2. set of eternal and noneternal vegelable bios (nityānitya nigoda jīva rāsi)

3. set of vegetable bodied bios (vanaspati kāyika jīva rāśi)

4. set of instants in past, present and future time (kāla samaya rāśi)

5. set of all ultimate-particles of fusion-fission matter (pudgala paramāṇu rāśi)

6. set of all space-points in non-universe space (alokākāśa)

and the sum is again subject to three operations of varagaṇa saṁvargaṇa, giving

$$\overline{\text{Iij}\,|_3 + \text{six infinite sets as above}\,|_3} \qquad \text{.....(4.45)}$$

Still the *Iiu* is not produced. Hence in this set the following two proper infinite sets are introduced, and their description is as follows:

1. The set of infinite non-gravity-levity control in the aether fluent (dharma dravya sthita ananta agurulaghu guṇa)

2. The set of infinite non-gravity-levity control in the non-aether fluent (adharma dravya sthita ananta agurulaghu guṇa)

and the sum is again subjected to operation of three times vargaṇa saṁvargaṇa:

$$\overline{\text{Iij}\,|_3 + \text{six infinnite sets as above}\,|_3 + \text{two infinite sets}\,|_3} \qquad \text{.....(4.46)}$$

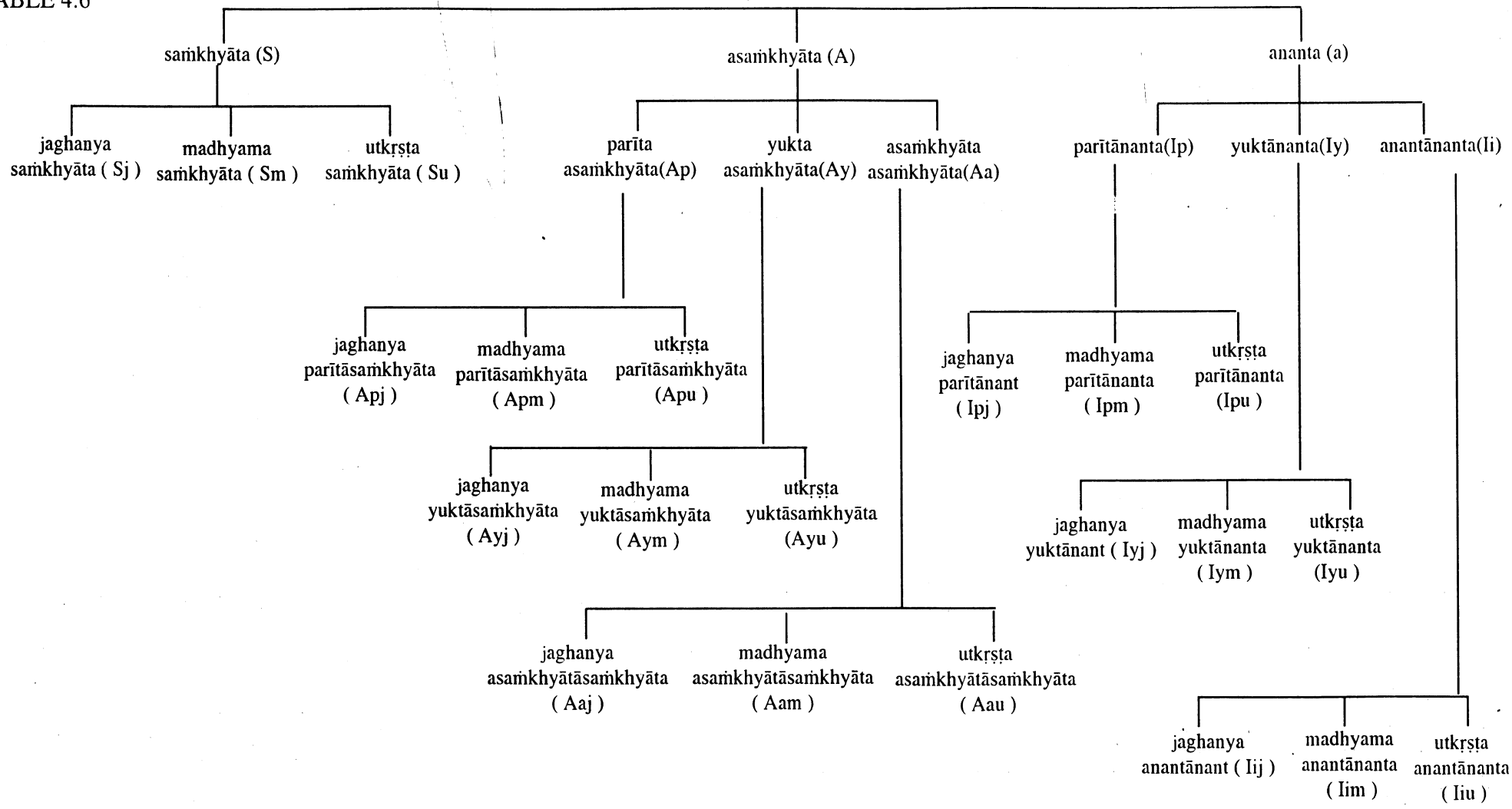
Still the *Iiu* is not produced. Then in the expression ,(4.46),

the infinite major part of Omniscience or Omnivision (Kevalajñāna athavā kevaladarśana ananta bahu bhāga) [obtained on subtracting expression (4.46) from Omniscience or Omnivision] is added, producing maximal infinite-infinite or *Iau*, (utkṛṣṭa anantānanta).

It has been stated that it is a fraction (bhājana) and not the fluent (dravya). The reason is that on vargaṇa of the whole set of squared sets, only the infinite part of Omniscience or Omnivision is obtained, hence it is a fraction and not a fluent. Wheresoever infinite-infinite (anantānanta) is to be taken, there non-minimal-maximal (ajaghanyānutkṛṣṭa) infinite-infinite is to be taken. Whose subject is this ? This is the subject of the Omniscient (kevalajñānī) .

TABLE 4.6

THE NUMBER MEASURE



Note: Although apratiṣṭhita pratyeka vanaspati kāyika set of bios has its cardinal number as innumerate times the number of space-points in the universe-space (lokākāśa) which are innumerate, the cardinal has been formally called innumerate only. Similarly, although the above mentioned measure when multiplied by innumerate universe-space-points cardinal produces the set of pratiṣṭhita pratyeka vanaspati-kāyika bios cardinal form, still formally, it has been stated to be innumerate universe-space-points set cardinal.

It may be noted that the word 'innumerate' (asaṁkhyāta) does not denote a single number, but the set of numbers which lie within the limits of the numerate and infinite (saṁkhyāta and ananta). In this way, innumerate times the innumerate also signify, innumerate product lying within the similar limits.

Formal innumerate for intermediate-innumerate innumerate numbers also forms a set, just produced from the numerate, countable or denumerable, but it has been called formally as innumerate. The real innumerate or proper innumerate quality appears only after the innumerate point-ses of dharma etc. fluents are added to the generated numbers from the numerate reaching the limits of innumerate, as *Apj*. Similarly, for *Ipj*. Before this, the maximal numerate (utkṛṣṭa saṁkhyāta) is denoted as the subject of the Omniscript (śrutakevalī), and the following numbers, successively, are called innumerate.

The import about the number of sthitibandhādhyavasāya stations as are innumerate universes in measure, denotes the number of effective phases of bios causal for such life-time bond (sthiti bandha). Similarly, the import about the number of anubhāgabandhādhyavasāya stations as are innumerate unriverses space-points in measure, denotes the number of effective phases of bios causal for such energy-bond (anubhāga bandh). The measure of the number of indivisible-corresponding-sections of the volitions (yoga) of mind, speech and body is innumerate universe-space-points times that of the causal effective phases responsible for evergy-bond.

Similarly, although there is a difference of 1 alone between minimal peripheral-infinite, (*Ipj*), and the maximal innumerate-innumerate, (*Aau*), still the denomination of infinity has been given formally only. The limiting subject for the clairvoyant (avadhijñānī) is upto the maximal innumerate, (*Aau*), and after this, the subject limit being that of the Omniscient, it is denominated as infinity. In fact, the set which can not be exhausted completely in spite of being exhausted for infinite time, has been called, as the infinite set. Hence, the denomination of 'infinite' is only significant (purposeful), when existent infinite sets are projected into the three times vargita-saṁvargita.

In DVL, vol. 4, pp. 338, 339, Vīrasenācārya mentions that the denomination of ardha pudgala parivartana kāla as infinite is simply formal. The accomplishable bios (bhavya jīva) set is also infinite.

Hence, doubt arises that of the ardha pudgala parivartana time[1] set comes to an end, then why not the set of accomplishable bios not be exhausted ? On this the preceptor explains that the infinite set is that which can not be exhausted in infinite time when continually exhausted or spent by numerate or innumerate set. The ardha pudgala parivartana kāla (half of the time of a cyclic change of matter), in spite of being denominated as infinite owing to its transgression of the

1. Cf. five cyclic change form of transmigration in JSK, vol. 4, pp. 148 et seq. for details, vide also SVS, 2/ 10/ 165/ 2.

subject-limit of the clairvoyance, still it lies in the limits or bounds of the innumerate. Similarly, there are other sets like the accomplishable bios set which remain always as non exhaustible, as counteraspected by all the exhaustible sets like the exhaustible set as the pudgala parivartana kāla.

Here the author mentions that wheresoever *S* is to be searched. there *Sm* be taken, and wheresoever innumerate-innumerate, *Aa* is to be searched, there *Aam* be taken. Similarly for searching infinite-infinite, the *Iim* be taken.

A mention be made about the recent article, " The first unenumerable Number in Jaina Mathematies" by R.C. Gupta.[1] Vide appendix 4.3 at the end for comments upon the said research paper, for its abstract and sophisticated approach.

(vv.324 et seq)

Some classification numbers related with bios (objects) born (generated) of pleasant land (bhogabhūmija bios), (vide TPT) (V).

Table : 4.7

v.324.	earth five coloured
v.326.	grass of five colours, with height of 4 aṅgulas
v.342.	power in a human being equal to that of nine thousand elephants
v.344.	body with 32 characteristics
v.346.	kalpavṛkṣa (wish fulfilling tree) of 10 types
v.347.	drinking substances of 32 types
v.351.	food of 16 types, (pastytasty) sauce of 17 types, pulse of 14 types
v.351.	edible substances of 108 types
v.352.	tasty substances of 363 types, juice of 63 types
v.353.	residential houses of 16 types
v.356.	garlands of 16 types
v.361.	enjoyment of quality infinite times that of emperor (cakravartī)
v.366.	jewellery of 16 types for men and 14 types for women
v.389.	art-quality of 64 types

Some of the above numbers are related with 16 or its multiple.

1. Gaṇita Bhārtī, vol. 14, Nos.1-4 (1992), 11-24.

Table No. 4.8 (vv.4.424 to 4.506)

height, age and interval about kulakara (family generator)

S.No.	name	height in dhanuṣa	age	alternative age	interval between births	name of deity	punishment (penal code)
1	Pratiśruti	1800	palya / 10	slightly less palya / 10	0	Svayaṁprabhā	hā
2	Sanmati	1300	palya / 100	amama	palya / 80	Yaśas ati	hā
3	Kṣemaṅkara	800	palya / 1000	aḍaḍa	palya / 800	Sunandā	hā
4	Kṣemandhara	775	palya / 10000	truṭita	palya / 8000	Vimalā	hā
5	Sīmaṅkara	750	palya / 100000	kamala	palya / 80000	Manoharī	hā
6	Sīmaṅdhara	725	palya / 10 lac	nalina	palya / 8 lac	Yaśodharā	hā mā
7	Vimalvāhana	700	palya / 1 kalpa	padama	palya / 80 lac	Sumati	hā mā
8	Cakṣuṣmān	675	palya / 10 kalpa	padmāṅga	palya / 8 kalpa	Dhariṇī	hā mā
9	Yaśasvī	650	palya / 100 kalpa	kumuda	palya / 80 kalpa	Kāntāmālā	hā mā
10	Abhicandra	625	palya / 1000 kalpa	kumudāṅga	palya / 800 kalpa	Śrīmati	hā mā
11	Candrābha	600	palya / 10000 kalpa	nayu..a	palya / 8000 kalpa	Pra..āvati	hā mā dhik
12	Marudeva	575	palya / 1 lac kalpa	nayutāṅga	palya / 80000 kalpa	Satyā	hā mā dhik
13	Prasenajita	550	palya / 10 lac kalpa	pūrva	palya / 8 lac kalpa	Amitamati	hā mā dhik
14	Nābhirāya	525	pūrva koṭi year	pūrva koṭi	palya / 80 lac kalpa	Marudevī	hā mā dhik

The proportions are notable. The names-amam etc. signify numbers as per definition of the...

(vv. 4.553 et seq.)

The following table of chronology about the interval between their births and their age gives the data for research in precession of equinoxes or the pole star after its discovery. A. Cunningham observes, [1]

"The oldest eras described by the astronomers are the *Saptarshi-kal*, or cycle of the seven Rishis; the *Bārhaspatya-Mānas*, or sixty and twelve year cycles of Jupiter; and the Kali-Yuga, or beginning of the Kali-Age. Not one of these mounts upto the exaggerated periods of thousands of millions of years like the monstrous systems invented by the astronomers. The oldest of them, the *Saptarshi-kal*, ascends only to B.C. 4077, or perhaps to 6777 B.C., while the *Barhaspatya-Mānas* and the Kali-Yuga reach only a little beyond 3000 B.C. In Alexander's time the Hindus did not claim a greater antiquity than B.C. 6777. I have therefore a very strong suspicion that the present extravagant system of Yugas and Mahāyugas, Manwantaras, and Kalpas, was an invention of the astronomers, which they based on their newly-acquired knowledge of the precession. The problem was a simple one: Given the precession of 49.8 seconds, as determined by Hipparchus, the period of one revolution through the whole circle of 360^0 would be $26{,}024\ \frac{16}{166}$ years.

To obtain a whole number of years the fraction was got rid of in the usual way by multiplying 26,024 by 166, and adding 16 to the product, a process which gives a period of exactly 4,320,000 years, or just one *Yuga* ."

He further finds that although precession fixed by Āryabhata as 46.2 seconds and that by Pārāśara is 46.5 seconds, but by the same process as followed above we get $28{,}051\ \frac{146}{154}$ years for Āryabhata and $27{,}870\frac{150}{155}$ years for Pārāśara, and both of these periods give the same whole number of 4,320,000 years. Exactly the same result can be obtained from European precession of 50.1 seconds, which gives a period of $25{,}868\ \frac{44}{157}$ years for one revolution and a whole number of 4,320,000 years. And if this is the true origin of the Indian Yugas, and Kalpas, it shall follow that some other mode of reckoning must have been in use before the Christian era.

The eras of Buddha and Mahāvīra are prior to that of Vikramāditya. In Mathura inscriptions of Indo-Sythian kings, found in statues of both, the dates seem to have been originated with Kaniṣka. Was it an Indian adoption of the Seleukidan era ?

The following data is subject to research.

1.Book of Indian Eras, Delhi, 1971.

Table : 4.9

The Interval and Age Concerning the Ford founders

S.no.	Name	Interval-period between births	Age
1	Ṛṣabhanātha	84 lac pūrva 3 years $8\frac{1}{2}$ months remaining in the 3rd hyposerpentine sub-period 50 lac crore sāgaras + 12 lac pūrva years	84 lac pūrva
2.	Ajitanātha	30 lac crore sāgara + 12 lac pūrva years	72 lac pūrva
3.	Sambhavanātha	10 lac crore sāgara + 10 lac pūrva years	60 lac pūrva
4.	Abhinandananātha	9 lac crore sāgara + 10 lac pūrva years	50 lac pūrva
5.	Sumatinātha	90 thousand crore sāgara +10 lac pūrva years	40 lac pūrva
6.	Padmaprabha	9000 crore sāgara +10 lac pūrva years	30 lac pūrva
7.	Supārśvanātha	900 crore sāgara +10 lac pūrva years	20 lac pūrva
8.	Candraprabha	90 crore sāgara +10 lac pūrva years	10 lac pūrva
9.	Puṣpadanta	9 crore sāgara +1 lac pūrva years	2 lac pūrva
10.	Śītalanātha	(1 ko.sā+1 la.pū) – (100 sa.15026000 years)	1 lac pūrva
11.	Śreyānsanātha	54 sāgara + 12 lac years	84 lac years
12.	Vāsupūjya	30 sāgara +12 lac years	72 lac years
13.	Vimalanātha	9 sāgara + 12 lac years	60 lac years
14.	Anantanātha	4 sāgara + 20 lac years	30 lac years
15.	Dharma nāth	3 sāgara 9 lac years – $\frac{3}{4}$ palya	10 lac years
16.	Śāntinātha	$\frac{1}{2}$ palya + 5000 years	1 lac years
17.	Kunthunātha	$\frac{1}{4}$ palya – 9999989000 years	95000 years
18.	Aranātha	10000029000 years	84000 years
19.	Mallinātha	5425000 years	55000 years
20.	Munisuvratanātha	620000 years	30000 years
21.	Naminātha	509000 years	10000 years
22.	Neminātha	84650 years	1000 years
23.	Pārśvanātha	278 years	100 years
24.	Mahāvīra	When there remained 75 years $8\frac{1}{2}$ month for completion of the fourth hyposerpentine subperiod	72 years

Table for the above is also related with the following table of the birth time and planetary or stellar positions, in Indian cities, from which the methodology of dealing with the chronology set may be made clear in the appendices.

Table : 4.10

City, month, fortnight, tithi, constellation as the birth of ford-founders

S. No.	Name of ford-founder	City of birth	Birth			
			Month	Fortnight	Tithi	Constellation
1.	Ṛṣabhanātha	Ayodhyā	caitra	dark	ninth	uttarāsāḍhā
2.	Ajitanātha	Sāketa	māgha	white	tenth	rohaṇī
3.	Sambhavanātha	Śrāvastī	magasira	white	fullmoon	jyeṣṭhā
4.	Abhinandananātha	Sāketa	māgha	white	twelfth	punarvasu
5.	Sumatinātha	Sāketa	śrāvaṇa	white	eleventh	maghā
6.	Padmaprabha	Kauśāmbī	āsauja	dark	thirteenth	citrā
7.	Supārśvanātha	Vārāṇasī	jyeṣṭhā	white	twelfth	viśākhā
8.	Candraprabha	Candrapurī	pauṣa	dark	eleventh	anurādhā
9.	Puṣpadanta	Kīkandī	magasira	white	first	mūla
10.	Śītalanātha	Bhaddalapura	māgha	dark	twelftʰ	purvāṣāḍhā
11.	Śreyānsanātha	Siṁhapurī	phālguna	white	eleventh	śravaṇa
12.	Vāsupūjya	Campāpurī	phālguna	white	fourteenth	viśākhā
13.	Vimalanātha	Kapilā	māgha	white	fourteenth	pūrvābhādrapada
14.	Anantanātha	Ayodhyā	jyeṣṭha	dark	twelfth	revatī
15.	Dharmanātha	Ratnapura	māgha	white	thirteenth	puṣya
16.	Śāntinātha	Hastināpura	jyeṣṭha	white	twelfth	bharaṇī
17.	Kunthunātha	Hastināpura	vaiśākha	white	first	kṛttikā
18.	Aranātha	Hastināpura	magasira	white	fourteenth	rohiṇī
19.	Mallinātha	Mithilā	magasira	white	eleventh	aśvinī
20.	Munisuvratanātha	Rājagṛha	āsauja	white	twelfth	śravaṇa
21.	Naminātha	Mithilā	āsāḍha	white	tenth	aśvanī
22.	Neminātha	Saurīpura	vaiśākha	white	thirteenth	citrā
23.	Pārśvanātha	Vārāṇasī	pauṣa	dark	eleventh	viśākhā
24.	Mahāvīra	Kuṇḍalapura	caitra	white	thirteenth	uttarāphālgunī

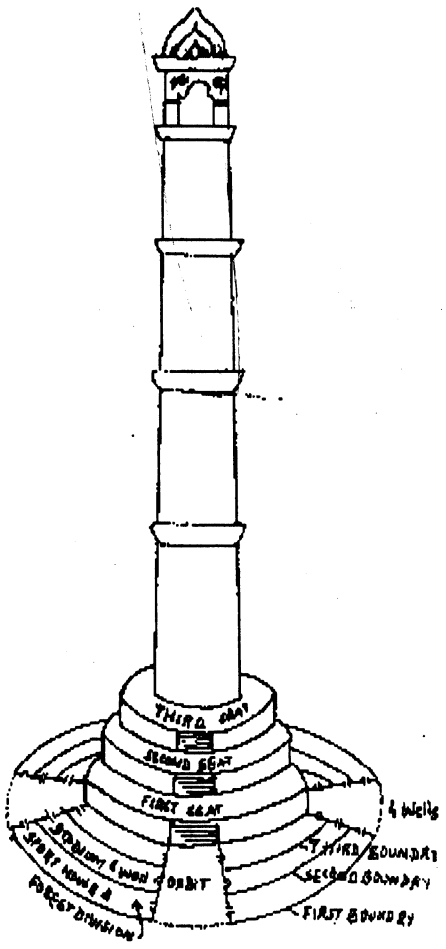
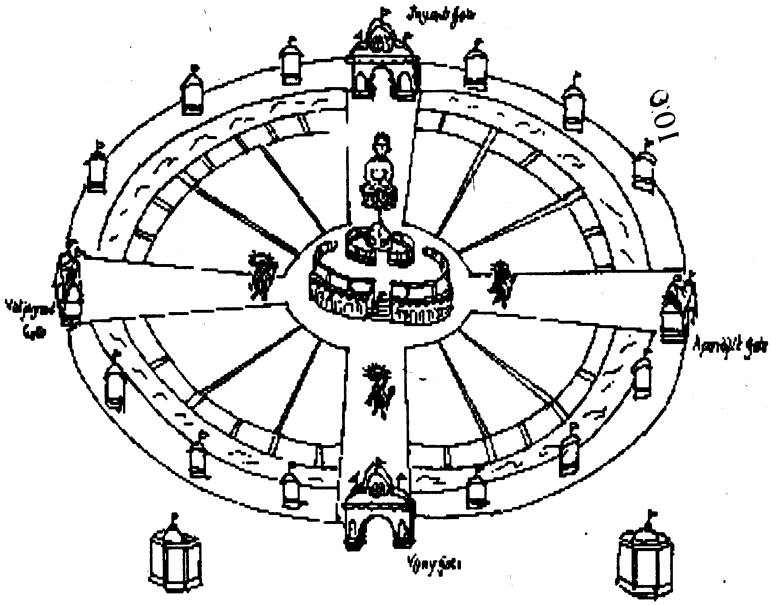


FIGURE No. 1 : PRIDE TOWER LAND.

4·5.1



SAMAVASARANA

(THERE ALL TWELVE HALLS ROUND ABOUT, OCCUPIED BY VARIOUS TYPES OF BIDS.)

Figure 4.5.2

VV. 4·711 et seq.

(vv.4.711 et seq.)

These verses describe the structure of audience site of each of the ford-founders (Tīrthaṅkaras). This was called the 'Samavasaraṇa' built up by Kubera subject to order of Saudharma Indra. The structure is a miracle, and shows the plan and project of the architecture. Some of the substructures have been given to be of certain dimensions, of the periods hyposerpentine and hyperserpentine, being just in the reverse order of dimensions.

The built up constructions are as follows -

1.	measure of common ground	2.	measure of ladders
3.	arrangement-distribution	4.	orbits
5.	dust-gallery (dhūliśālā)	6.	temple-palace-grounds
7.	dancing halls	8.	Victory tower (mānastambha) or pride-tower
9.	altar	10.	square well
11.	other altar	12.	creeper ground
13.	hall	14.	garden ground
15.	other dancing hall	16.	another altar
17.	flaghoister	18.	hall
19.	chosen-ground	20.	dancing hall (another)
21.	another altar	22.	building ground
23.	pyramid (stūpa)	24.	sāla (perhaps the śāla tree)
25.	auspicious dome (śrīmaṇḍapa)	26.	arrangement of seats for groups of ṛśis etc.
27.	another altar	28.	seat (pīṭha)
29.	second seat	30.	third seat
31.	perfume-cottage (gandha kuṭī)		

The above is the idea of architectural knowledge, deseribed in details, perhaps differing in measures from ford-founder to ford-founder. There should be some proportion set up for this difference in measures, however, this requires a statistical study along with chronology.

(v.4.901)

After the attainment of omniscience, the 11 the miracle is worthy of attention. There are eighteen great languages and 700 dialects (kṣudra bhāṣā), as well as all other alphabetical and non-alphabetical languages of rational beings in which the divine preaching is given without the activities of the palate, teeth, lips and vocal cords. This is naturally continuous and unparalleled, given out in the three joint (sandhi) periods (morning, noon and evening) for nine muhūrtas and spreads all around upto a distance of 1 yojana.

(v.4.929)

In every one of the samavasaraṇa (the place of preaching) the number of the various types of bios remaining in the ford-founder's obeissance is innumerate part of a palya.

(v.4.930)

Although the area of the space occupied by the bios is innumerate times that of the cells or rooms there, yet due to miracle of the Lord Jina, they remain untouched by each other. The bios are never illusive visioned, nonaccomplishable, irrational, without advenience, doubtful and full of several types of anti-activities. They do not suffer from any [illegible]or, disease, death, generation enemity, sex, thirst and hunger owing to miracle of the Lord Jina, and the children etc. bios take only an inter muhūrta in entering into or going out for numerate yojana.

COMMON LAND :-

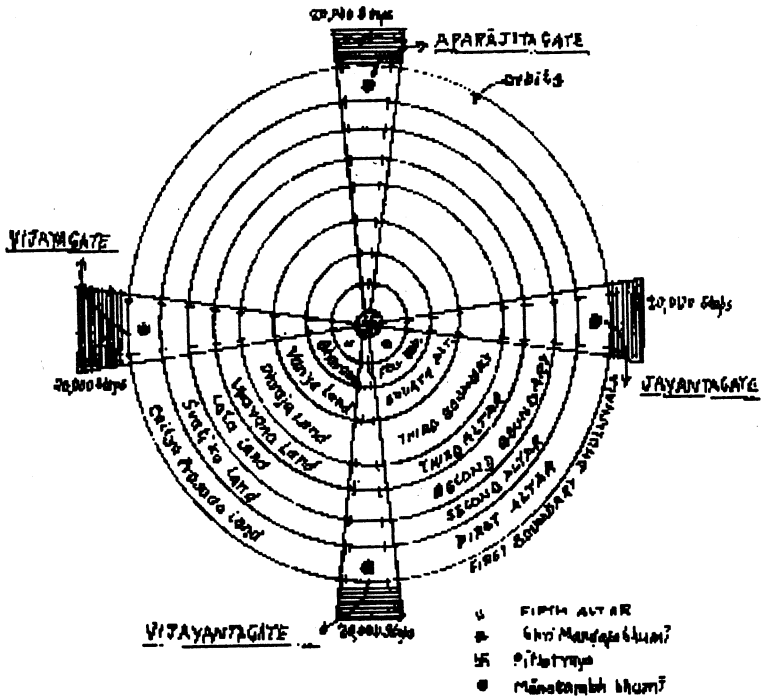


FIGURE No. ( ) SAMAVASARANA DIAGRAM

4.5.5

VV. 4.901 onwards.

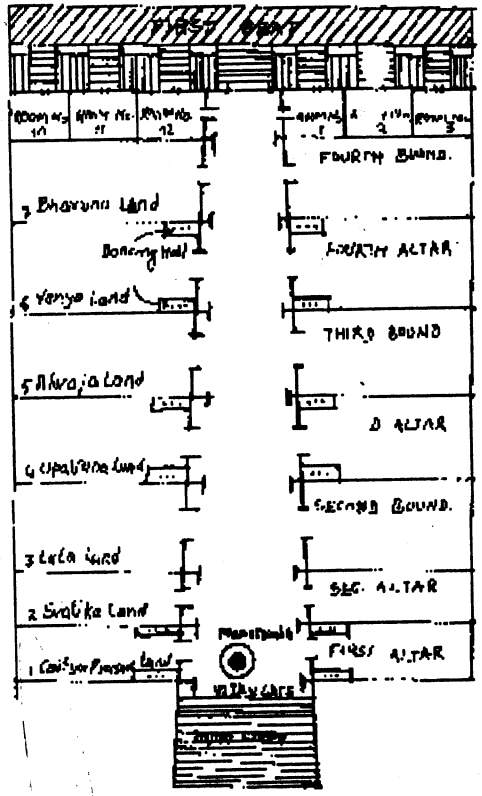


FIG. No. ( ) MONO DIRECTIONAL COMMON LAND.

4.5.6

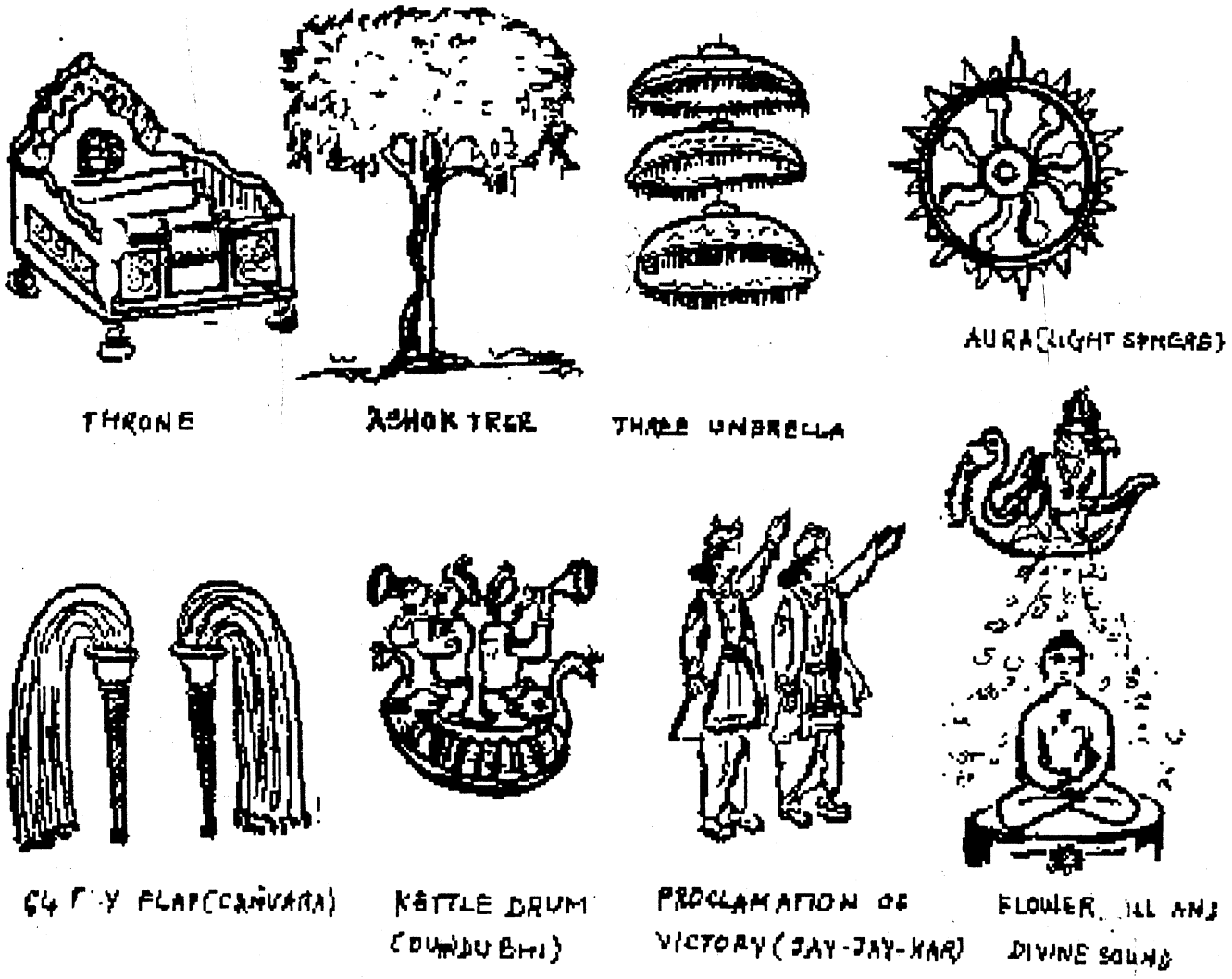


FIG. No. 1 EIGHT GREAT CONJURING SYMBOLS

4.5.8

(vv.968-1091)

The Ṛddhis of Gaṇadharas:

These verses give the names of the super-powers or miracles (ṛddhis) attained, which are sixty-four in all due to austerities, some of them being due to annihilation-cum-subsidence of karmic action of a specific type or types. There are eight original types of ṛddhis which are further subdivided into sixty-four subtypes.

1. intellect-super power [18]

(i) clairvoyance knowledge (avadhijñāna)

(ii) mental-events knowledge (manaḥ paryayajñāna)

(iii) omniscience (kevala jñāna)

(iv) seed-intellect (bīja buddhi)

(v) stored-sense (koṣṭha mati)

(vi) syllable-following intellect (pādānusāriṇī buddhi) [directly-following, indirectly-following, both-following]

(vii) differentiating-auditorial-intellect (saṁbhinna śrotṛtva-buddhi)

(viii) tele-taste superpower (dūra svāditva ṛddhi)

(ix) tele-touch superpower (dūra sparśatva ṛddhi)

(x) tele-odour superpower (dūra ghrāṇatva ṛddhi)

[xi] tele-audio superpower (dūra śravaṇatva ṛddhi)

[xii] tele-vision superpower (dūra darśitva ṛddhi)

[xiii] ten precedent-knowledge superpower (dasa-pūrvitva ṛddhi)

[xiv] fourteen precedent-knowledge super-power (caudaha-pūrvitva ṛddhi)

[xv] field-intellect (nimitta buddhi) [astral (nabha), earthly (bhauma), physiognomy (aṅga), tone (svara), moles (vyañjana), characteristic (lakṣaṇa), sign (cihna), dream (svapna)]

[xvi] wisdom-ascetic superpower (prajñā-śramaṇa ṛddhi) [generating (autpattikī), effecting (pāriṇāmikī), courtesy-generated (vainayikī), karma-generated (karmajā)

[xvii] self-intellect (pratyeka-buddhi)

[xviii] debate-super power (vāditva ṛddhi)

2. extra-activity-super power (vikriyā ṛddhi) [11]

[i] atomic-superpower (aṇimā ṛddhi)

[ii] cosmic-superpower (mahimā ṛddhi)

[iii] levitating -superpower (laghimā ṛddhi)

[iv] gravitating-superpower (garimā ṛddhi)

[v] approaching-superpower (prāpti ṛddhi)

[vi] walking over watersuperpower (prākāmya-ṛddhi)

[vii] commanding-superpower (īsitva ṛddhi)

[viii] subduing superpower (vaśitva ṛddhi)

[ix] penetrating-superpower (apratighāta ṛddhi)

[x] invisibility-superpower (adṛṣyatā ṛddhi)

[xi] wishful morphological-superpower (kāmarūpitva ṛddhi)

3. activity-superpower (kriyā ṛddhi) [2]

[i] moving in sky (nabhastala gāmitva) [ākāśa-gāminī]

[ii] motion-superpower (cāraṇa ṛddhi)

(a) motion over water (jala cāraṇa)

(b) motion above earth [without bending of knees] (janghā cāraṇa)

(c) motion over fruits (phala cāraṇa)

(d) motion over flowers (puṣpa cāraṇa)

(e) motion over leaves (patra cāraṇa)

(f) motion over fire flames (agni śikhā cāraṇa)

(g) motion over smoke (dhūma cāraṇa)

(h) motion over clouds (megha cāraṇa)

(i) motion over currents (dhārā cāraṇa)

(j) motion over string [spidernet] (tantu cāraṇa)

(k) motion across astral bodies (jyotiṣ cāraṇa)

(l) motion across winds (māruta-cāraṇa)

4. austerity-superpower [7]

[i] severe austerity (ugra tapa) [unstable and more intensive (ugrogra), stable (avasthita)]

[ii] glowing austerity (dīpta tapa)

[iii] intensive digesting austerity (tapta-tapa)

[iv] great -austerity (mahā tapa)

[v] intensive-austerity (ghora tapa)

[vi] intensive-adventure-austerity (ghora-parākrama tapa)

[vii] non-intensive-chastity-austerity (aghora-brahmacāritva tapa)

5. **force-super power (bala ṛddhi) [3]**

[1] mental force (manobala)

[2] force of speech (vacana bala)

[3] force of body (kāya bala)

6. **cure-treatment superpower (auṣadhi ṛddhi) [8]**

[i] cure-treatment by touch (āmarśauṣadhi)

[ii] cure-treatment by lymph material (kṣelauṣadhi)

[iii] cure-treatment by sweat (jallauṣadhi)

[iv] cure-treatment by excretion through tongue etc. (malauṣadhi)

[v] cure-treatment by urine etc. (viḍauṣadhi)

[vi] cure-treatment by any material in contact of the ascetic (sarvauṣadhi)

[vii] cure-treatment of toxicity by words (vacana nirviṣa)

[viii] cure treatment of toxicity by sight (dṛṣṭi-nirviṣa)

7. **flavour-[effect] superpower (rasa ṛddhi) [6]**

[i] deadly words working as poison (āṣīviṣa)

[ii] deadly gaze working as poison (dṛṣṭiviṣa)

[iii] anti-unctuous to unctuous effect (kṣīraśrāvī)

[iv] anti-untuous or non-nutritious to sweet effect (madhuśrāvī)

[v] non-nutritious to nectarlike effect (amṛtaśrāvī)

[vi] non-nutritious to ghrata like effect (sarpiśrāvī)

8. **landscape or quarters superpower [2]**

[i] inexhaustible kitchen (akṣīṇa mahānasika)

[ii] inexhaustible [endlessly] accommodating hall (akṣīṇa mahālaya)

Now the conditions for certain superpower attainments are described as follows:

1. seed-intellect superpower: this is due to maximal annihilation-cum-subsidence of three types of configirations (prakṛtis), the quasi-sense-screening (no-indriyāvaraṇa), scriptural knowledge-screening (śrutajñānāvaraṇa), power-obstructing (vīryāntarāya) karma.

2. differentiating-audio-intellect superpower: this is due to maximal annihilation-cum-subsidence of the audio-sense-screening, scriptural knowledge-screening, power-obstructing Karma and rise of limb-sub-limb genetic-coding Karma (nāma Karma). [limit all around for finite or numerate yojanas]

3. tele-taste superpower : this is due to maximal annihilation-cum-subsidence of the tongue-

sense-screening, scriptural knowledge-screening, and power-obstructing karma, and rise of limb-sub limb genetic-coding Karma, [same limit]

4. tele-touch superpower : this is due to maximal annihilation-cum-subsidence of touch-sense-screening, scriptural knowledge-screening and power-obstructing karma, and rise of limb-sub limb genetic-coding Karma, [same limit]

5. tele-odour-superpower : this is due to maximal annihilation-cum-subsidence of olfactory-sense-screening, scriptural knowledge-screening and power-obstructing karma and rise of limb-minor-limb genetie-coding Karma, [same limit]

6. tele-audio-superpower: this is also due to maximal annihilation-cum-subsidence of audio-sense-screening, scriptural-knowledge-screening, and power-obstructing karma, and rise of limb-minor-limb genetic-coding Karma, [limit same]

7. tele-vision-superpower: this is due to maximal annihilation-cum-subsidence of vision-sense-screening, scriptural-knowledge-screening, and power-obstructing karma and rise of limb-minor-limb genetic-coding Karma, [limit same]

8. wisdom-ascetic superpower: this is due to maximal annihilation-cum-subsidence of scriptural knowledge-screening and power-obstructing Karma.

9. mental force superpower : this is due to maximal annihilation-cum-subsidence of scriptural knowledge-screening and power-obstructing Karma.

10. force of speech superpower : this is due to maximal annihilation-cum-subsidence of tongue-sense-screening, quasi-sence-scriptural knowledge-screening, and power-obstructing Karma.

11. force of body superpower : this is due to maximal annihilation-cum-subsidence of power-obstructing configuration (prakṛti) Karma .

12. inexhaustible kitchen superpower : this is due to association of the annihilation-cum-subsidence of gain-obstructing Karma.

Note : The above information is preserved in copper plates, or otherwise, as matrices in different names, as Ṛṣi Maṇḍala or Gaṇadhara valaya with additional words, circles, segments, and other symbols, spirals and kept in temples at the altar alongwith the idols on thrones. Sometimes, they have been printed in books either on Vidyānuvāda or other works relevant to the matter. The matrices are called yantras and they are drawn through spirals, circles, straight lines, curved lines, points etc. It is believed that when these names are carried alongwith certain sounds, expressible through alphabets, form hymns, recited or muttered as spell or incantation for chanting then relevant desired effects or results are produced. Their combination requires, of course, a knowledge of their various effects whose science is still under research.

Table No. : 11 (vv.4.1239 et seq.)

CHRONOLOGY OF INTERVAL OF LIBERATION OF FORD-FOUNDERS AND PERIOD OF FORD ACTIVITY

S.NO.	INTERVAL OF LIBERATION OF FORD-FOUNDERS	PERIOD OF FORD-ACTIVITY
1.	50 lac koṭi sāgaras	50 lac koṭi sāgaras + 1 pūrvāṅga
2.	30 lac koṭi sāgaras	30 lac koṭi sāgaras + 3 pūrvāṅgas
3.	10 lac koṭi sāgaras	10 lac koṭi sāgaras + 4 pūrvāṅgas
4.	9 lac koṭi sāgaras	9 lac koṭi sāgaras + 4 pūrvāṅgas
5.	90.000 koṭi sāgaras	90.000 koṭi sāgaras + 4 pūrvāṅgas
6.	9000 koṭi sāgaras	9000 koti sāgaras + 4 pūrvaṅgas
7.	900 koṭi sāgaras	900 koṭi sāgaras + 4 pūrvāṅgas
8.	90 koti sāgaras	90 koṭi sāgaras + 4 pūrvāṅgas
9.	9 koṭi sāgaras	9 koṭi sāgaras – ($\frac{1}{4}$ palya +28 pūrvāṅgas) +1 lac pūrvas
10.	337390€ sāgaras	1 koṭi sāgaras – {(100 sāgaras + $\frac{1}{2}$ palya) + (25000 pūrvas - 6626000 years)}
11.	54 sāgaras	(54 sāgaras + 21 lac years) – $\frac{3}{4}$ palya
12.	30 sāgaras	(30 sāgaras + 54 lac years) – 1 palya
13.	9 sāgaras	(9 sāgaras + 15 lac years) – $\frac{3}{4}$ palya

14.	4 sāgaras	(4 sāgaras + 750000 years) $-\frac{1}{2}$ palya
15.	3 sagaras $-\frac{3}{4}$ palya	(3 sāgaras + 250000 years) – 1 palya
16.	$\frac{1}{2}$ palya	$\frac{1}{2}$ palya + 1250 years
17.	$\frac{1}{4}$ palya – 10000000000 years	$\frac{1}{4}$ palya – 99999?/2? J years
18.	10000000000 years	9999966100 years
19.	5400000 years	5447400 years
20.	600000 years	605000 years
21.	500000 years	501800 years
22.	83750 years	84380 years
23.	250 years	278 years
24.	x	21042 years

Note : The above data again brings to light the problem of the chronology, through great periods of time. The periodicity requires a study through statistical and probability.

(vv.4.1371 et seq.) TABLE No. 4.12

INTRODUCTION TO GLORY OF THE CAKRAVARTĪ

S. No.	Name of Glory	Speciality of Measure	S. No.	Name of Glory	Speciality of measure
1	body-constitution	adamantine nerv muscular osteo system	2.	body - colour	golden
3.	body-shape (form)	symmetrical	4.	queens	96000
5.	empress	1	6.	sons and daughters	numerate thousand
7.	body guard deity-group	32000	8.	physicians	360
9.	cook	360	10.	precious gems	14
11.	fanning yaṣkas	32	12.	family-brothers	35000000
13.	treasures	9	14.	conch	24
15.	ploughs	one lac crore	16.	earth-land	six divisions
17.	trumpets	12	18.	wardrums	12
19.	cows	3 crore	20.	discs	1 crore
21.	trained elephants	84 lac	22.	chariots	84 lac
23.	horses	18 crore	24.	warriors	84 crore
25.	technicians	several crore	26.	non-āryana kings	88000
27.	crowned kings	32 000	28.	theaters	32000
29.	concert-halls	32000	30.	foot-soldiers	48 crore
31.	countries	32000	32.	villages	96 crore
33.	cities	75000	34.	small towns	16000
35.	karbaṭas	24000	36.	maṭambas	4000
7.	paṭṭanas	48000	38.	droṇa mukhas	99000
39.	vehicles	14000	40.	inter-islands	56
41.	cavities-residencies	700	42.	forts and forests etc.	28000
43.	divine enjoyment	10 types			

The above was the standard of glory of an emperor (cakravartī).

(vv.4.1411 et seq.)

TABLE No. 4.13

THE BALBHADRAS

S.No.	Name	Height	Age	Gems
1.	Vijaya	80 dhanuṣas	87 lac years	thrashar, plough, club &
2.	Acala	70 dhanuṣas	77 lac years	garland of gems-trail
3.	Dharma	60 dhanuṣas	67 lac years	
4.	Suprabha	50 dhanuṣas	37 lac years	
5.	Sudarśana	45 dhanuṣas	17 lac years	
6.	Nandi	29 dhanuṣas	67000 years	
7.	Nandimitra	22 dhanuṣas	37000 years	
8.	Rāma	16 dhanuṣas	17000 years	
9.	Padma	10 dhanuṣas	1200 years	

THE NĀRĀYAṆAS

S.No.	Name	Height	Age	Gems
1.	Tripṛaṣṭha	80 dhanuṣas	84 lac years	power, bow, club,
2.	Dvipṛaṣṭha	70 dhanuṣas	72 lac years	wheel, sword, conch
3.	Svayambhū	60 dhanuṣas	60 lac years	and staff .
4.	Puruṣottama	50 dhanuṣas	30 lac years	
5.	Puruṣa siṁha	45 dhanuṣas	10 lac years	
6.	Puruṣa puṇḍarika	29 dhanuṣas	65000 years	
7.	Puruṣa datta	22 dhanuṣas	32000 years	
8.	Nārāyaṇa (Lakṣamaṇa)	16 dhanuṣas	12000 years	
9.	Kṛṣṇa	10 dhanuṣas	1000 years	

The above is related to the well-known heros of the epics the Rāmāyaṇa and the Mahābhārata.The proportion between the height age may be a topic for reseaech.

TABLE No. 4.14

CHRONOLOGY OF LIBERATION DATES OF FORD-FOUNDERS

S. No.	Name of ford-founder	Month	Fort-night	Tithi	Libration time	Constellation	place of Libration	
1.	Ṛṣabhanātha	māgha	dark	fourteenth	pūrvāhna (A.M.)	uttarāsāḍhā	Kailāśa mountain	
2.	Ajitanātha	caitra	white	fifth	pūrvāhna	bharaṇī	Sammeda Śikhara	
3.	Sambhavanāth	caitra	white	sixth	aparāhna (P.M.)	jyeṣṭhā	Sammeda Śikhara	
4.	Abhinandana	vaiśākha	white	seventh	pūrvāhna	punarvasu	Sammeda Śikhara	
5.	Sumatinātha	caitra	white	tenth	pūrvāhna	maghā	Sammeda Śikhara	
6.	Padmaprabha	phālguna	dark	fourteenth	aparāhna	citrā	Sammeda Śikhara	
7.	Supārśvanātha	phālguna	dark	sixth	pūrvāhna	anurādhā	Sammeda Śikhara	
8.	Candraprabha	bhādrapad	white	seventh	pūrvāhna	jyeṣṭhā	Sammeda Śikhara	
9.	Puṣpadanta	āśvina	while	eighth	aparāhna	mūla	Sammeda Śikhara	
10.	Śītalanātha	kārtik	white	fifth	pūrvāhna	pūrvāṣāḍhā	Sammeda Śikhara	
11.	Śreyānsanātha	śravaṇa	white	fifteenth	pūrvāhna	dhaniṣiṭhā	Sammeda Śikhara	
12.	Vāsupūjya	phālguna	dark	fifth	aparāhna	aśvinī	Campāpura	
13.	Vimalanātha	āṣāḍha	white	eighth	pradoṣa[1]	pūrvābhādrapad	Sammeda Śikhara	1. day-set and night- rise
14.	Anantanātha	caitra	dark	first	pradoṣa	revati	Sammeda Śikhara	
15.	Dharmanātha	jyeṣṭha	dark	fourteenth	pratyūṣa[2]	puṣya	Sammeda Śikhara	paścima din (amāvasyā)
16.	Śāntinātha	jyeṣṭha	dark	fourteenth	pradoṣa	bharaṇī	Sammeda Śikhara	
17.	Kunthunātha	vaiśākha	white	first	pradoṣa	kṛttikā	Sammeda Śikhara	2. last part of night or morning
18.	Aranātha	caitra	dark	first	pratyūṣa	rohaṇī	Sammeda Śikhara	
19.	Mallinātha	phālguna	dark	fifth	pradoṣa	bharaṇī	Sammeda Śikhara	
20.	Munisuvrata	phālguna	dark	twelfth	pradoṣa	śravaṇa	Sammeda Śikhara	
21.	Naminātha	vaiśākha	dark	fourteenth	pratyūṣa	aśvanī	Sammeda Śikhara	
22.	Neminātth	āṣāḍha	dark	eighth	pradoṣa	citrā	Ūrjayanta-giri	
23.	Pārśvanātha	śravaṇa	white	seventh	pradoṣa	viśākhā	Sammeda Śikhara	
24.	Mahāvīra	kārtik	dark	fourteenth	pratyūṣa	svātī	Pāvānagarī	

Note- A study of chronology may be attempted through the book or eras.

TPT (vv.4.1474 et seq.)

THE CHRONOLOGY OF VĪRA NIRVĀṆA YEAR

The Tiloyapaṇṇattī gives the following trace material for fixing the era of Vīra nirvāṇa

1. The duḥṣamā period begins after 3 years, 8 months and 15 days after nirvāṇa of Lord Mahāvīra.
2. Gautama-gaṇadhara gets omniscience the very day.
3. The period of Gautama etc. omniscients is, in all, 62 years.
4. The period of Nandi etc.(ending with the fifth Bhadrabāhu), five omniscripts (śruta kevalīs) or omniauditions is, in all, 100 years.

   [**Note:** Soon after his abdication, Candragupta becomes disciple of Bhadrabāhu.] They became famous as "caudaha pūrvī" and dasa pūrvī respectively.
5. The emperor Candragupta adopted Jina initiation, after whom there has been no such initiation of any other emperor, later on.
6. Viśākhā, Proṣṭhila, et al., have been 11 prceptors, well-known as "dasa-pūrvī ", whose traditional period goes upto 183 years. [Among these, Candragupta could be included, as after initiation, he is stated elsewhere to be 'dasa pūrvī' and who served as a disciple at least for 12 years at Śravaṇa belgola.]
7. Afterwards Nakṣatra., et al., five preceptors remained as possessor of knowledge of 11 aṅgas, ending in 220 years.
8. Then Subhadra et al., four preceptors remained as possessor of knowledge of ācārāṅga and in part of the 11 aṅga and 14 pūrva, ending in 118 years.
9. Beginning with Gautama ascetic, this total time ranges over 683 years.
10. After liberation of Vīra jina, at the lapse of 461 years the Śaka rājā was born.
11. *Or* after accomplishment of Vīra, the Śaka king was born at the lapse of 9785 years and 5 months.
12. *Or* 14793 years after Vīra's accomplishment, the Śaka king was born.
13. *Or* 605 years and five months after the liberation of Vīra, the Śaka king was born.
14. 461 years after Lord Vīra's liberation the Śaka king was born whose dynasty continued for 242 years.
15. The Gupta dynasty continued for 255 years and that of Caturmukha for 42 years. The total interval is (461 + 242 + 255 + 42 =) 1000 years.
16. *Or* pālaka 60 years, Vijaya dynasty 155 years, Muruṇḍa dynasty 40 years, Puṣyamitra 30

years, Vasumitra + Agnimitra 60 years, Gandharva 100 years, Naravāhana 40 years, Bhṛtya (Kuṣāṇa) dynasty 242 years, Gupta dynasty 231 years and Caturmukha 42 years, all totalling to 1000 years.

17. *Or* 683 years upto ācārāṅgadharas, 275 years later the king was enthroned to rule for 42 years, totalling to 683 + 275 + 42 = 1000 years.

18. In this way, the cycles of kalkī and sub-kalkī (upakalkī) goes on with tyranny every 1000 years and 500 years, respectively.

[**Note: 1** Here a formula has been given to find out the maximal longevity after lapse of a certain number of years from the fifth period of the avasarpiṇī. Let the maximal longevity at Lord Mahāvīra period be 120 years, and a lapse of ***n*** number of years after him, then the maximal longevity will be given by]

$$\text{Longevity} = 120 - \{(\mathbf{n} + 242) \div 210\}$$

Let $\mathbf{n} = 461, 605\frac{5}{12}, 9785\frac{5}{12}$ and 14793 years,

Then the longevity will be. $116\frac{137}{210}$ years, $115\frac{2431}{250}$ years,

$72\frac{631}{2520}$ years and $48\frac{17}{42}$ years at most respectively.

Note: 2. About the Nirvāṇa of Mahāvīra, the opinion of Alexander cunningham in his, "Book of Indian Eras" is as follows[1] : "The Jains make use of an era dating from the Nirvāṇa or death of their last teacher Mahāvīra." According to Swetāmbara sect this event took place 470 years before Vikrama, or in B.C. 527. The Digambaras, however, make it 605 years before Vikrama. As the difference between the two dates is exactly 135 years, it seems probable that the Digambara date of 605 years before Vikrama should be altered to 605 years before Śaka, which would agree with that of the other sect. I have made many enquiries on this subject from learned Jains in Northern India, and the answer has been uniformly the same "470 years before Vikramāditya." This also is the date given by the Jains of Gujarat.[2] The same date is used through out the Theravalī of Merutuṅga, who says, "Before the commencement of the reign of Vikrama, Śrī Vīra's Nirvāṇa took place 470 years." [3] Colonel Miles also, in his account of the Jainas of Gujrāt and Mārwār, uses the same date.[4] Colonel Tod makes the era 477 years before Vikrama. For details of the Vīra nirvāṇa era, cf. the Appendix - 4.

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1. Oriental Publishers, Delhi - 6 1971, p. 37. 2. Dr. Stevenson's Kalpa Sūtra, Preface p. viii, and note , p. 96. 3. Dr. Bhau Dâji, Bombay Aciatic Society's Journal, IX, 149. 4. Roral Asiatic Society's Transaction.

(v.4.1536 et seq.)

The sixth period, the extreme misery, will enter on this earth after a lapse of 21000 years after Vīra Nirvāṇa year and a lapse of three years, eight months and one fortnight, with cycles of kalkī kings and sub kalkī kings every 1000 years and 500 years. Just as in the fifth period, the maximum longevity will be 120 years, height 7 hands and 24 backbones (v.4.1474). Similarly, in the sixth period the maximum longevity will be 20 years alone, height will be three or three and a half hands, with 12 backbones.

This is important to note that at beginning of this sixth era, the fire is said to be destroyed, food is from roots, fruits and meat, as people are unable to see clothes, trees, houses etc., all being naked, wandering in forests without houses, they being of smoke colour, behaving like animals, cruel, deaf, blind, poor, dumb, angry, monkey like, hunchback, greedy, suffering with intensive diseases and pains, without relationships, and so on.

Thus, ultimately a great destruction occurs, after a lapse of 21000 years as reduced by 49 days. After utter destruction another cycle of hyperserpentine (utsarpiṇī) period begins, when human beings have an age of 15 years or 16 years, with a height of 1 hand. Gradually, an uplifting trend begins towards happiness. This cycle goes on in this Bharata kṣetra of seven dimensions.

(v.1582) Here, symbol for pūrva koṭi has been given as pu ko 1.

(v.1593) Here, one koḍākoḍi sāgaropama has been given as 100,000,000,000, in decimal notation.

(v.1614) The periodicity of the hyposerpentine (avasarpiṇī) and hyperserpentine (utsarpiṇī) periods happen to be alternately, like the logic of ramhaṭaghaṭikā (chronometer), going up and down, endlessly.

(vv.4.1624 et seq.)

Here, the Himavān small mountain has the following dimensions:

height is 100 yojanas, depth is 25 yojanas, width is $1052\frac{12}{19}$ yojanas.

North chord $= 24932\frac{1}{19}$, north arc $= 25230\frac{4}{19}$.

Formula for finding chord is

$$\text{chord} = \sqrt{4 \text{ arrow (diameter - arrow)}} \qquad \text{.....(4.47)}$$

Here, the chord for Himavān is to be found out as follows : $\frac{x}{x}$

$$\text{arrow} = \frac{30000}{19}, \qquad \text{the diameter of Jambū island} = \frac{1900000}{19}$$

$$\text{Thus, chord} = \sqrt{4 \times \frac{30000}{19}\left(\frac{1900000}{19} - \frac{30000}{19}\right)}$$

$$= \sqrt{\frac{120000}{19}\left(\frac{1870000}{19}\right)}$$

$$= \sqrt{\frac{224400000000}{361}} = \frac{473709}{19} = 24932\frac{1}{19} \text{ yojanas.}$$

The formula for finding out the arc (dhanuṣa) is $(\text{arc})^2 = 6h^2 + (\text{chord})^2$

$$\text{or} \quad (\text{arc}) = \sqrt{6\,(\text{arrow})^2 + (\text{chord})^2} \qquad \text{..... (4.48)}$$

$$\text{Hence here, arc} = \sqrt{6\left(\frac{9000000000}{361}\right) + \frac{224400000000}{361}}$$

$$= \sqrt{\frac{54000000000}{361} + \frac{224400000000}{361}}$$

$$= \sqrt{\frac{229800000000}{361}} = \frac{479374}{19} = 25230\frac{4}{19} \text{ yojanas.}$$

Note: For finding out the square root, the method adopted has been traced by Dr. R.C.Gupta as follows :[1]

For finding out the chord of Bharata region

$$= \sqrt{4 \text{ arrow (diameter - arrow)}}$$

$$= \sqrt{4 \times \frac{10000}{19} \times \left(100000 - \frac{10000}{19}\right)}$$

$$= \sqrt{756 \times \frac{100000000}{19}}$$

$$= \sqrt{(274954)^2 + \frac{297884}{19}}$$

$$= \frac{(274954.54)}{19}, \text{ approximately.}$$

If the decimal part is neglected, the value of the chord

$$= \frac{274954}{19} = 14471\ \frac{5}{19} \text{ yojanas.}$$

Similarly, other values may be found out as given in TPT (V). This is of great historical importance.

(vv.4.1629-1630)

Abbreviation : ko for koṡa, da for daṇḍa, va for vana, jo for joyaṇa.

(vv.4.1627-1628) These verses give the values of the cūlikā and lateral side of the Himavān mountain as $5230\frac{15}{38}$ yojanas and $5350\frac{31}{38}$ yojanas, respectively. The cūlikā has been defined as half the difference of the southern and northern chords. Similarly, the lateral side is defined to be half the difference of the preceding and succeeding arc (dhanuṣa). (Vide v. 778 of TLS).

1. Vide Tiloyapaṇṇttī (V), vol-3, op. cit. p.47. "Jambūdvīpa ke kṣetroṁ aura parvatoṁ kī Gaṇanā."

(vv. 4.1701-1702):

Here, by the same procedure the cūlikā of the Haimavata region is found to be $6371\frac{15}{38}$ yojanas and the lateral side is $6755\frac{3}{19}$ yojanas.

(vv.4.1721-1722)

Similarly, the cūlikā and lateral side of the Mahāhimavān mountain are $8128\frac{5}{19}$ and $9276\frac{19}{38}$ yojanas, respectively.

(v. 4.1727)

Abbreviations

vā for vāsa, ā for āyāma, gā for gāhira (depth).

(vv. 4.1742-1743)

Here, the same procedure is adoptad to find out the cūlikā and pārśva bhujā (lateral side) of the Harivarṣa region. They are, $9985\frac{11}{38}$ and $13361\frac{13}{38}$ yojanas, respectively.

(vv. 4.1754-1755)

Similarly, the cūlika and lateral side of the Niṣadha mountain are, $10127\frac{2}{19}$ and $20165\frac{5}{38}$ yojanas, respectively.

(vv. 4.1778-1779)

The cūlikā and lateral side of the Mahāvideha are, $2921\frac{18}{19}$ and $16883\frac{17}{38}$ yojanas, respectively.

(vv. 4. 1780 et seq.)

These verses give the various types of dimensional measurements of the great mountain called the Mandara.

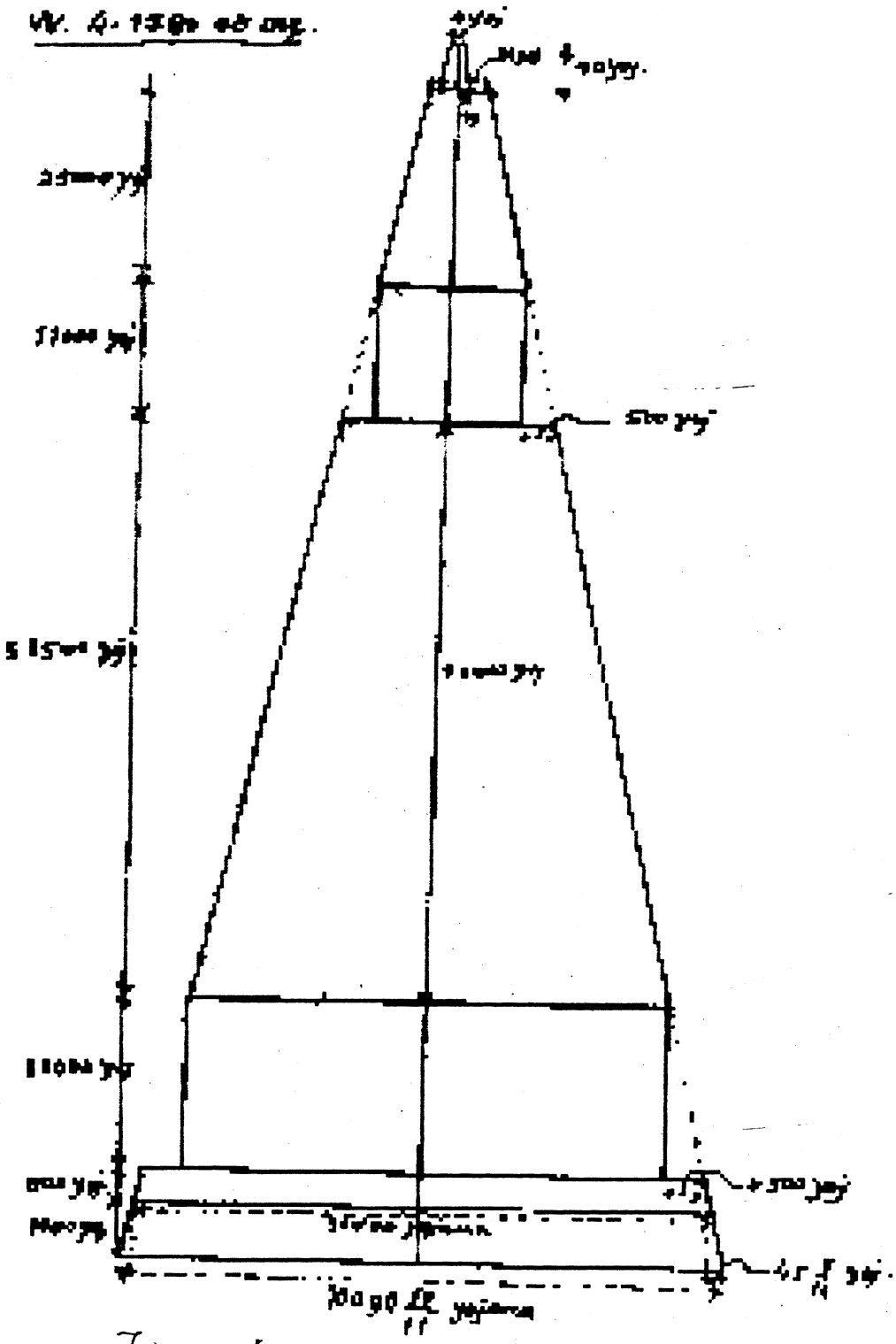


Figure-4.6

ELEVATION

PLAN

Fig. 4.7

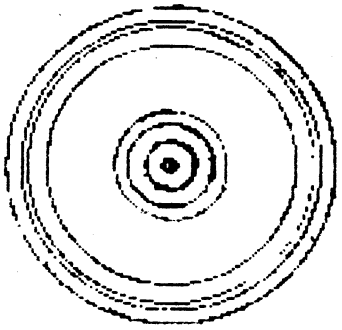
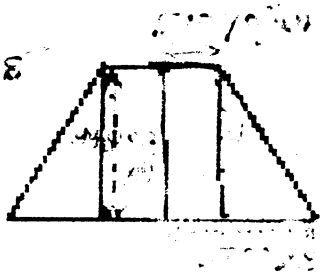


Figure 4.8



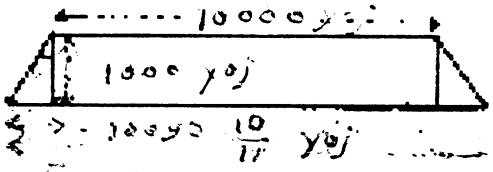
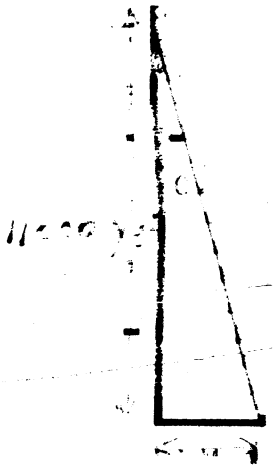


Figure 4.9



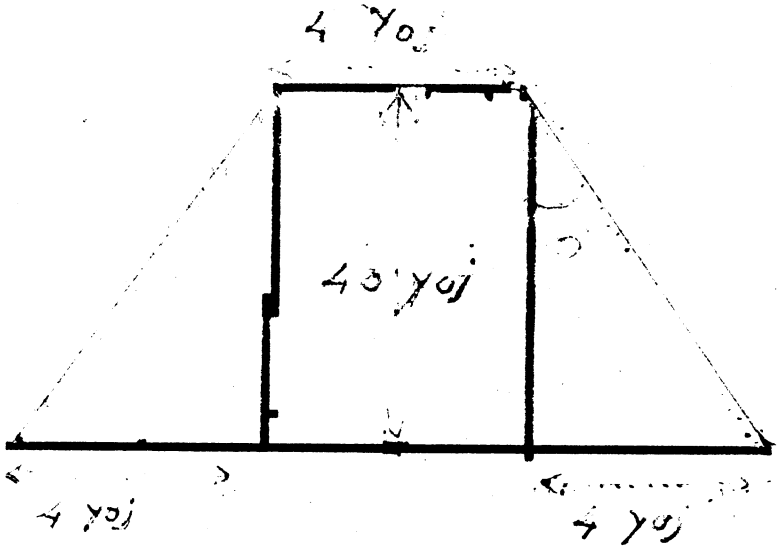


Figure 4.10

Figure 4.11

The above is the diagram of the Mandara (Sudarśana) mountain, situated at the very centre of the Mahāvidaha region, recognized as the bath, anointment, birth ceremonies of the ford-founders in the concerned island.

Dr. S.S.Lishk[1] has discussed the historicity of the this mountain concept and has tried to take it in scientific aspect as well. He has found that in this concept is hidden the notion of the obliquity of the ecliptic. Sixteen name various of the Meru appear as[2]

1. Mandara	2. Girirāja	3. Mēru	4. Priyadarśana
5. Ratnoccaya	6. Lokanābhi	7. Manorama	8. Sudarśana
9. Diśādi	10. Uttama	11. Asta (accha)	12. Sūryavarta
13. Svayamprabha	14. Vatanka	15. Lokamadhupa	16. Sūryavaraṇa

The names, in a few cases above, may signify certain scientific aspects, and the measures

The names, in a few cases above, may signify certain scientific aspects, and the measures given by the TPT, signify geographical, astronomical and cosmoslogical aspects, which have been intermingled. Tilak opined that Meru is the terrestrial north pole of the Hindu astronomers.[3] Alberuni, however, pointed out that the Meru was similar to that of Zoroastrians who placed at centre of the world the mountain of Girnagar, The Taera of Avesta.[4]

As shown in the diagram Fig. 4.6, the meru has a base of $10090\ \frac{90}{11}$ yojana, risinng in cylinders and right circular cones.The meru goes on thus redusing as a cone, reducing to 1000 yojana at a height of 10000 yojanas.The cone has the slant θ given by

$$\tan\theta = \frac{4500}{99000} = \frac{500}{11000},$$ vide fig 4.8, 4.9, and 4.11.

Originally, upto 1000 yojanas this mountain uniformly reduced.The diameter is the base is $10090\ \frac{90}{11}$ yojana, and at height of 1000 yojana it is 10000 yojana. hence the vertical line and the slant line makes o given by $\tan\theta = \frac{45\ \frac{5}{11}}{1000} = \frac{500}{11000}$.

At a hiight of 500 yojana, the diameter all around radious by 500 yojana and the cone on this diameter remain up to a height of 11000 yojana. Here the half vertical angle is given again by $\tan\theta = \frac{500}{11000}$. Again at a height of 51500 yojana, the diameter all around reduces

1. Lishk, s.s., Jaina Astronomy, approved thesis for Ph.D., Punjabi University. Patiala, op. cit., pp. 58, et. seq.
2. Kuppanna shastri, TS. (1969),IJHS, 4.1, 2, 107-125.
3. The arctic Home in the Vedas, 1971, 55-60
4. Kaye, G.R. (1924),op. cit, 38

by500 yojanas and on it the cylinder of height 11000 yojanas rests. At the end, at a height of 25000 yojanas from here, the radius of 500 yojanas reduces all around by 494 yojanas, hence only the peak having a diameter of 12 yojanas, height 40 yojanas and top 4 yojanas remain at the end. (figure.4.12).

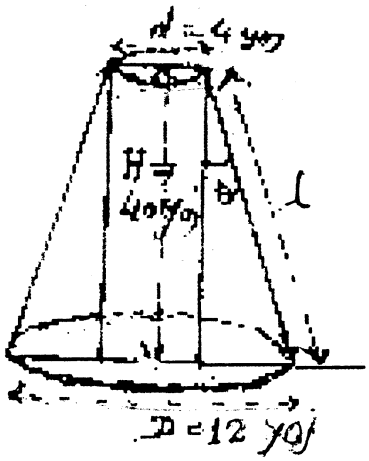


Figure 4.12

Here, the peak makes an angle between the slant and vertical line given by $\tan\theta = \frac{4}{40} = \frac{1}{10}$. The formula for finding the slant side (pārsva bhujā) is given by

$l = \sqrt{\left(\frac{D - d}{2}\right)^2 + (H)^2}$ just as the frustrums of right triangular prism are with faces as right trapeziums, similarly the frustrums of cone on being cut through a vertical plane along the vertical axis give trapiziums. Hence in this fomula, the former formula has been applied.

(v. 4. 1797)

If the width (viṣkambha) x is needed at a depth of h yojanas below the of the peak, then then the following formula can be used

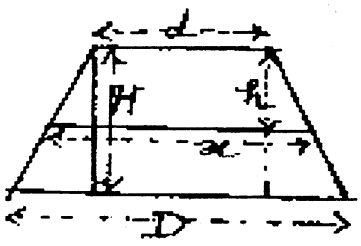


figure 4.13

$$x = h + \left[\frac{D - d}{H}\right] + d$$

or $$x = D - \left[(H - h) + \left(\frac{D - d}{H}\right)\right]$$

The use of the above formula has been in the

(vv. 4.1798- 4. 1800)

APPERHENSION
OF S.S. LISHK
(op.cit)

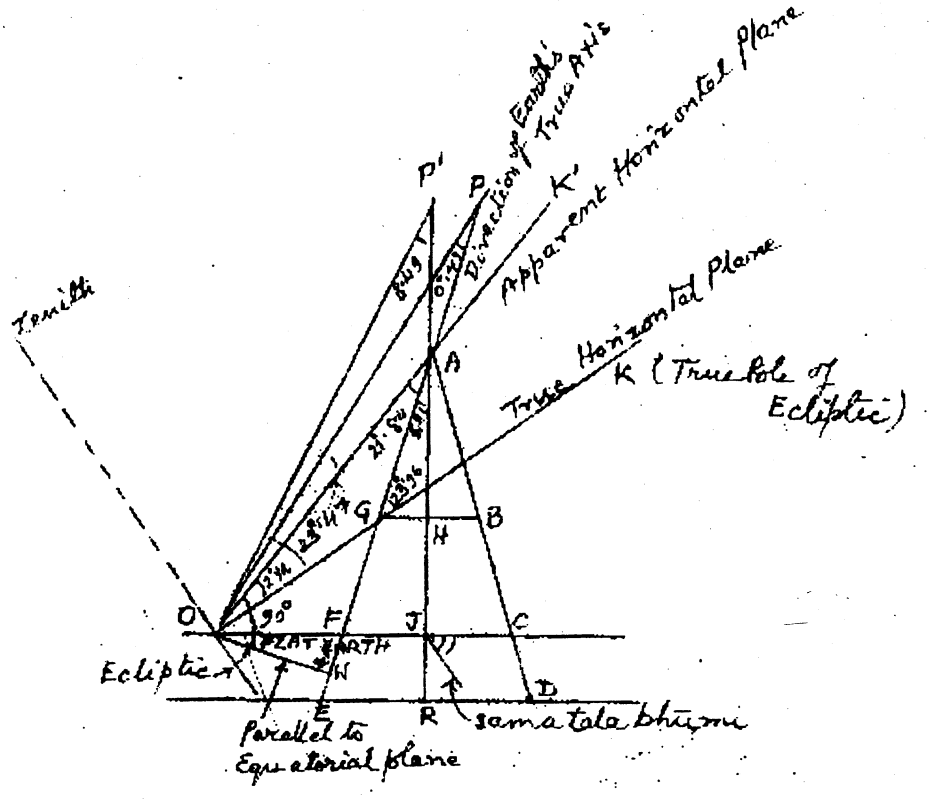


Figure 4.14 **THE APPROXIMATE FORM OF THE MOUNT MERU GEDB**

In the above diagram, y = yojana

HJ = 99000 y, GB = 1000 y, AH = 11000 y,

JR = 1000 y, FC = 10000 y, NH = 1000 y,

$$ED = 10090\frac{10}{11}\ y.$$

Lishk further describes the astronomical aspects as follows :

Let OFJC be the plane of earth (flat) and FC denote the diameter of meru on it. Let ED and GB denote the diameters of meru at its lowest base, depressed inside the flat earth and at its top, respectively. RJH represents the axis of meru. The various straight lines EFG, DCB be extended to meet at A. GB is diameter of meru at its top, FC is diameter of meru on flat earth, ED is diameter of meru at its lowest base depressed inside the flat earth. HJ is height of meru above flat earth. JR is depth of meru inside flat earth.

Now in Δ AFC, $\because$ GB $\|$ FC, $\frac{AJ}{AH} = \frac{FC}{GB}$ $\therefore$ AH = 11000 y.

Similarly, from Δ AED,GB $\|$ ED $\therefore \frac{AR}{AH} = \frac{ED}{GB}$, $\because$ AR = 111000 y

$\therefore$ ED = $10090\ \frac{10}{11}$ yojanas.

The data, ED = $10090\frac{10}{11}$ yojanas, suggests that this odd value as base should have been chosen through knowledge of geometrical proportional methods.

Further, Lishk assumes the following presumptions:

1. The observer is situated at O lying at circumference of Jambūdvīpa whose radius is 5000 y.
2. OGK represents the true horizontal plane of observer, meeting the direction of earth's axis at G such that P lies at the true celestial north pole and OW represents a plane parallel to the equatorial plane.
3. OAK' represents the apparent horizontal plane of observer.
4. P' is chosen such that its apparent attitude $\angle$P'OK' is equal to $\angle$PGK (the angle of inclination of axis of earth to the true horizontal plane OGK of observer.)

As angles FOW and FAJ are equal, the imaginary locus of revolution of P round P' is projected on flat earth as the locus of F revolving round J. This generates cone AFC. The cone is cut at G by plane GHB parallel to flat earth. The true horizontal plane OGK meets the axis to Meru at N.

The earth is regarded as made up of concentric rings of land masses, alternatively surrounded by ocean rings with the mount meru placed at centre of the central island Jambū, so OJ forms the radius of Jambūdvīpa.

Calculations give NH = 1000 y, JR = 1000 y (given)

$$\angle OAJ = \tan^{-1}\frac{OJ}{AJ} = \tan^{-1}\frac{50000}{110000} = 24^{\circ}.45$$

$$\angle FAJ = \tan^{-1}\frac{FJ}{AB} = \tan^{-1}\frac{5000}{11000} = 2^{\circ}.61$$

$$\angle AOJ = \tan^{-1}\frac{AJ}{OJ} = \tan^{-1}\frac{110000}{50000} = 65^{\circ}.55$$

$$\angle NOJ = \tan^{-1}\frac{NJ}{OJ} = \tan^{-1}\frac{100000}{50000} = 63^{\circ}.43$$

$$\angle ACG = \angle AOJ - \angle NOJ = 2^{\circ}.12\ ;$$

$$\angle OAF = \angle OAJ - \angle FAJ = 21^{\circ}.84$$

$$\therefore \quad \angle PGK = 23^{\circ}.96 \quad (= \angle P'OK \text{ assumed})$$

$\angle P'AK = \angle OAJ = 24^{\circ}.45 \ \therefore \ \angle P' = 0^{\circ}.49 = \angle P$ approximately.

Hence, $\angle POK = 23^{\circ}.47$ which is true latitude of celestial north pole $23^{\circ}.5$.

This is same as latitude of the observer at Ujjain ($23^{\circ}.5$) or Patna, approximately($25^{\circ}.37$ N).

Differences in terrestrial latitude may be due to actual shape of the earth etc. (including naked eye observation).

Further $90 - \delta_{max}$ = 720 yojanas. (colatitude of observer, OF) .....(4.49)

and $2\,\delta_{max}$ = 510 yojanas (due to solstices) .....(4.50)

Hence, on solving the above, $\delta_{max} = 23^{0}.54$ = latitute of observer at O.

From all the above, Lishk draws the following conclusions :

1. The flat earth OFJC is inclined to equatorial plane at $2^{0}.61$.

2. The circumference of Jambūdvīpa coincides with the parallel of maximum declination of the sun.

3. Meru represents an astronomical model implying a notion of latitude of the celestial north pole, which for an observer at $23^{0}.5$ north, is equal to obliquity of ecliptic.

The Kutubmīnāra at Delhi ($28^{0}.31'\ 28''$) north, is inclined at an angle of $5^{0}\ 1'\ 28''$ to the vertical, whose noon shadow length is zero on summer solstice day, implying also a notion of maximum declination of the sun. For similarity of Meru and Kutubamīnāra, vide Prabhakar, K.N., op.cit. (1974).

Further applications are as follows:

[1] On the basis of all above discussions, Lishk is able to find that 510 yojanas = $2\,\delta_{max}$ = 47^{0} = 47 × $69^{0}.09$ miles (1 = 6080 ft) Hence, 1 yojana = 6.37 miles .....(4.51)

[2] On cosmological measures, the linear measure of yojana gets projected over surface of the earth and defines modern degrees of arc.

[3] 800 TPT yojanas = 50000 ātma yojanas of Anuyoga dvāra sūtra, ie. OJ. Since the sun always remains at a distance of 800 yojanas from Samatala bhūmi, its movement along ecliptic defines J as describing an imaginary locus, round O. Hence OJ = 800 yojanas = $73^{0}.7$, denoting the celestial latitude of the point.

We shall apply these concepts in the heights of the planets, the sun and the moon above the Citrā, having a radius of 90^{0}-73^{0} .7' or $16^{0}.3$. For example, the moon is 80 yojanas above the sun, which is radius of meru's base on flat earth. Hence the moon is at maximum northern latitude,

its distance from the periphery of samatal bhūmi is 800 - 80 or 720 yojanas. Thus, this shows that at the sun's distance from earth's true axis on summer solstice day is equal to moon's distance at moon's maximum north latitude.

(v.4.1861)

This verse mentions about Śālabhañjikās, having wonderful forms, in the Lord Jina palace well known as "Tribhuvana Tilaka".

(v.4.2020)

The chord in between the two mountains is obtained as

$$= (\text{width of Bhadrśāla - width of Vakṣāra}) \times 2 + (\text{width of meru})$$

$$= (22000 - 500) \times 2 + 10000 = 53000 \text{ yojanas.}$$

(v. 4.2021)

The arrow of chord of two Vakṣāra mountain is obtained as

$$= \frac{1}{2} [\text{width of Videha}] - 5000$$

$$= \frac{1}{2}\left[\frac{640000}{19}\right] - 5000 = \frac{225000}{19} \text{ yojanas.}$$

(v.4.2023)

The bow or arc (dhanuṣa) of Vakṣāra mountains is given as $60418\frac{12}{19}$ yojanas.

(v.4.2024)

The length of the similar rectangular Vakṣāra mountains is $30209\frac{6}{19}$ yojanas.

(v.4.2025) In this verse, the formula for finding out the width or diameter of an inscribed circle area ACBD has been given, when the chord AB and arrow EC is given.

In the figure

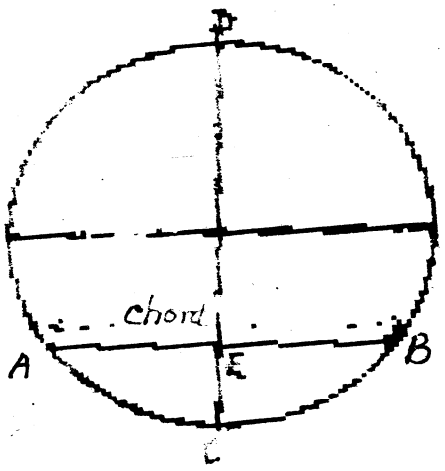


Figure 4.16

D = diameter of the circle

C = chord

h = arrow or height of segment ACD

Then $$D = \frac{(C)^2}{4h} + h = \frac{(\frac{C}{2})^2 + h^2}{h} \qquad \text{.....(4.91)}$$

$$\therefore \quad D = \frac{(\frac{D}{2})^2 - (\frac{D}{2} - h)^2 + h^2}{h} = \frac{Dh}{h} = D$$

which proves its validity. Here "antaravaṭṭa" is the inscribed circle. Vikkhambha is diameter. "Jīvā" is chord.

(v.4.2026) Here, the diameter of the circle is found to be, as per formula,

$$(53000)^2 \div \left(\frac{225000 \times 4}{19}\right) + \frac{225000}{19} = 71143\ \frac{37}{172} \text{ yojanas.}$$

(vv.4.2033-2034)

The measure of the decrease relative to base (bhūmi) is obtained on subtracting the top (mukha) from the base and dividing the remainder by height (udaya), and this is the increase with relation to top. Here the measure of the top is

top = 100 yojanas

base = 125 or $(5)^3$ yojana

height = 6 yojana:

$\therefore$ decrease or increase

$$= \frac{125-100}{6} = \frac{25}{6}.$$

(v.2.2035)

Alternative:

The height of the peak is obtained on subtracting from the base or adding to the top the product of the requisition (icchā) and the decrease-increasa. Both ways the peak is obtained as 125 yojanas.

(vv.2047-2050)

Here some of the data has been extinct. The measure of the increase-decrease has been calculated with the usual formula $\frac{\text{base} - \text{top}}{\text{height}}$ = decrease or increase. Similarly the height is obtained as base-requisition (decrease or increase) or top + requistion (decrease or increase).

(v.4.2055 et. seq.)

The above gives a picture and other descriptions of the Gajadanta mountains in the Mahāvideha region, where flow the two great rivers, the Sītā and the Sītodā. All such maps contain names which do not find their indentification with the ancient maps of the civilizations of China and Babylonia, etc. In China there is a Si river, equal in length to that in India, the Gangā. The chaper 22, on geography and cartography, in the text, "Science and Civilization in China", vol.3, may be consulted from p.497 on wards for any further identification of the T - O maps. Specially, the religious cosmographies in Europe appear to have been degenerated from the cartography of the T - O maps of Jaina-Indian origin, and Greek or Chinese origin.

(v.4. 2065 et. seq.)

Geography of rivers is given here

The sītodā is a great river, well known in the world flowing over the Niṣadha mountain from the northern door of Tigiñchadraha lake. Vide the map, on p.567, (TPT)(V). There are 84000 tributories. Vide 4.71, appendix, for map.

(v. 4. 2106)

The circumferences of these are (slightly) greater than three times their diameters. Here, the use of $\pi > 3$ value has been used.

(v.4.2116-2122)

The river Sītā has the same length, depth etc., and the descriptions are like those of the Sītodā. It comes out from the south door of the Nila mountain, at its lake divine, well known as Kesarī.

For geographical descriptions, see the appendix- 4.7, for maps vide 4.71 .

(vv.4.2372 et seq.)

This is the description of the Airāvata region which is situated in the south of the boundary of Jambū island, just symmetric to the Bharata region in its contents.This is in the north of the Śikharī mountain. In this region, the symmetric to the Gangā is the Raktā river which also falls into the Lavaṇa sea.There are seven rivers, the Gangā, the Rohit, the Harit, the Sītā, the Nārī, the Suvarṇa kūlā, and the Raktā, which move towards the east. Similarly, the Sindhu, the Rohitāsyā, the Harikāntā, the Sītodā, the Narakāntā, the Rūpyakulā, and the Raktodā move towards the west.What can be said about these? The exact symmetry leads one again to the concept of real and counter bodies as for two suns and two moons meant for some specific calculation purpose.

(vv.4.2374 et seq.)

After the appearance of new edition of TPT, in the form TPT(V), some new verses on the measurements of the chords and areas of the regions concerned with plane and mountainous regions could not be found as given. This problem was tried to be solved by L.C.Jain and it was due to the credit of R.C.Gupta who was kind enough to delve deep into it and could solve it as we shall find in the following.

The details given by R.C.Gupta are as follows.[1]

The circular Jambū island is divided into 13 divisions by drawing 12 horizontal lines, east to west. The plane regions are the Bharata, Haimavata, Hari, Videha, Ramyaka, Hairaṇyavata and Airāvata. The mountains dividing these regions as boundaries are the Himavān, Mahāhimavān, Niṣadha, Nīla, Rukmī and Śikharī, (Vide the Table- 4.2, p.76).

Starting with the southern point of the Jambū island, the 7 planes and 6 mountains situated in between them have widths given by proportional reckoning rods (logs), 1,2,4,8,16,32,64,32,16,8,4,2,1, respectively. Here each 1 reckoning rod means the width of $556\frac{6}{19}$ yojanas or $\frac{100000}{190}$ yojanas, as the total rods are 190, and diameter of the Jambū island is 100000 yojanas.

The diameter of the Jambū island divides the Videha region into two equal and symmetric parts, called the north Videha and the south Videha. It is also clear that the southern boundaries of Bharata, Himavān, Haimavata, Mahāhimavān, Hari, Niṣadha and south Videha form arcual segments, together with their southern chords, whose heights are, 1,3,7,15,31,63, and 95 rods (logs), respectively, out of which the last height is equal to half of the diameter. The height of the segment is called the arrow (bāṇa or iṣu) in ancient texts.

As per verse 183, vol. 2, TPT(V), p.51, the chord formula for an arcual region is as follows.

$$\text{Chord} = \sqrt{4\left[\left(\frac{\text{diameter}}{2}\right)^2 - \left(\frac{\text{diameter}}{2} - \text{arrow}\right)^2\right]} \quad , \ldots\ldots (4\text{-}92)$$

which on simplification gives

$$\text{Chord} = \sqrt{4 \text{ arrow (diameter - arrow)}} \qquad \ldots\ldots(4.93)$$

1. Vide the TPT(V), vol.3,op.cit., Jambūdvipa ke kṣetra aur parvatoṁ ki gaṇanā, pp. 46-49, (Hindi), [2401-2409, pp. 636-639].

Applying this for the chord of Jambū island's Bharata region, the measure will be given by chord of Bharata as

$$= \sqrt{4 \times \frac{10000}{19} \times \left(100000 - \frac{10000}{19}\right)}$$

$$= \sqrt{\frac{576 \times 100000000)}{19}}$$

$$= \sqrt{\frac{274954)^2 + 297884}{19}}$$

$$= \frac{274954.54}{19}, \quad \text{approximately.} \qquad \cdots\cdots(4.94)$$

If in the above calculation, the square root is taken only upto integers, the chord (on neglecting the decimal portion) is

$$= \frac{274954}{19} = 14471\ \frac{5}{19}\ \text{yojanas.} \qquad \ldots\ldots\ldots(4.95)$$

This measure of the northern chord of the Bharata resion, is given in the v.4.194, (TPT(V), vol.2, p.56. Similarly, we can apply the formula (4.21) to find the measure of the chords of the arcual regions also, made due to divisions situated in the southern half. And every time, through this approximation method of neglecting the decimal portion, and taking only integral numbers, we can get the following table :

1.19 is removed from the denominator and finding out the square root of the denominator up to integers alone.

TABLE No.4.18 [CHORDS]

SERIAL NO.	DIVISIONS	WIDTH (RECK.RODS)	HEIGHT OF SEGM. (RECK.RODS)	NORTHERN CHORDS (YOJANAS)
1	BHARATA REGION	1	1	$14471 + \frac{5}{19}$
2	HIMAVĀN MOUNTAIN	2	3	$24932 + \frac{0}{19}$
3	HAIMAVATA REGION	4	7	$37674 + \frac{15}{19}$
4	MAHĀ HIMVĀN MOUNTAIN	8	15	$53931 + \frac{6}{19}$
5	HARI REGION	16	31	$73901 + \frac{17}{19}$
6	NIṢADHA MOUNTAIN	32	63	$94156 + \frac{2}{19}$
7	SOUTHERN VIDEHA REGION	$\frac{64}{2}$	95	$100000 + 0$

In the verse 4.1647, (TPT(V)), the fractional value of northern chord of the Himavān is $\frac{1}{19}$ and in the verse 4.1722, (TPT(V)), the fractional value of northern chord of the Haimavata is given as slightly less than 16. All other values are in accordance with tho[illegible]en in the text (vide 4.1742, 4.1763, 4.1775, and 4.1798). But, in order to find out the chords as given in the above table, the same method of leaving the remaining part (whether it be more or less than half) while extracting the square root, has been adopted. This very method (policy), we shall adopt for finding out the value of their areas which are exactly similar to that given in the text.

For finding out the area of the arcual region (dhanuṣākāra region), [vide verse 4.2401 (TPT(V)),] the following formula has been given:

$$\text{(fine) area} = \sqrt{10\left(\frac{\text{chord} \times \text{arrow}}{4}\right)^2} \qquad \text{.....(4.96)}$$

On applying this formula , the area of the Bharata region

$$= \sqrt{\left(\frac{10}{16}\right) \times \left(\frac{274954}{19}\right)^2 \times \left(\frac{10000}{19}\right)^2}$$

$$= \sqrt{\left(\frac{472498138225 \times 10^7}{361}\right)}$$

$$= \frac{2173702229}{361}$$

Here, the square root has been taken out only upto the integers and the remaining part has been left. In this way the area of the Bharata region

$$= 6021335 + \frac{294}{361} \text{ (square yojanas),} \qquad \text{.....(4.97)}$$

which is the same value as given in v.4.2402, (TPT)(V)), vol.2, p.636

Similarly, on applying the formula (4.96), and adopting the same method, R.C.Gupta has been able to find the values of the areas of Bharata, etc., regions and mountains in form of the constructed arcual regions as given in the following table:

TABLE NO. 4.19 [AREAS]

SER.No.	DIVISION	AREA OF INCLUSIVE ARCUAL REGION [square yojanas]	AREA OF DIVISION [square yojanas]
1	BHARATA	$6021335 + \frac{294}{361}$	$6021335 + \frac{294}{361}$
2.	HIMAVĀN	$31121805 + \frac{88}{361}$	$5^{\cdot}{}^{\cdot}0469 + \frac{155}{361}$
3.	HAIMAVATA	$109732502 + \frac{25}{361}$	$78610696 + \frac{298}{361}$
4.	MAHĀHIMAVĀN	$336603542 + \frac{349}{361}$	$226871040 + \frac{324}{361}$
5.	HARI	$953243909 + \frac{260}{361}$	$616639566 + \frac{272}{361}$
6.	NIṢADHA	$2468172123 + \frac{211}{361}$	$1514929013 + \frac{312}{361}$
7.	SOUTHERN VIDEHA	3952847075	$1484674951 + \frac{150}{361}$

The total of the divisional areas is 3952847075 square yojanas.

Notes : (1) The areas of the divisions from the Airāvata region to northern Videha in the north half of the Jambū island, will be the similar to the above, respectively, from 1 to 7 due to exact symmetry.

(2) The above seven divisions, from Bharata to the southern Videha, form the south-half of the Jambū island as a semi-circle, and the area of the Jambū island is given as 7905694150 square yojanas. It has already been given ... the v.59 TPT(V), chap.4, p.17. This very measure has been given later on in verse 2409. Hence it will be twice that given as above sum in the table.

(3) Another point is that the arc of the Mahāhimavān mountain is not available in the printed text, because the connected verse in the manuscript has been eaten by moth (vide p.630, ibid.), and the remaining calculated areas in the verses 2402 to 2407 of chap. IV of TPT(V) are perfectly, the same as given in the original values. Hence, it is evident that the method investigated by R.C.Gupta is correct and probably this method might have been adopted in ancient times. Yet, it may be that the writing method or practical working system might have been different. One more thing is clear that the values of the chords in table no. 4.18 were possibly in the original text. The difference at one or two instances may have been due to later changes in view of improvement.[1]

The treatment given by Jain may be found in the TPT(V), vol.2, introduction, where these results could not be attained in spite of effort.[2]

The formula for finding out the fine area of the segment, ABCD

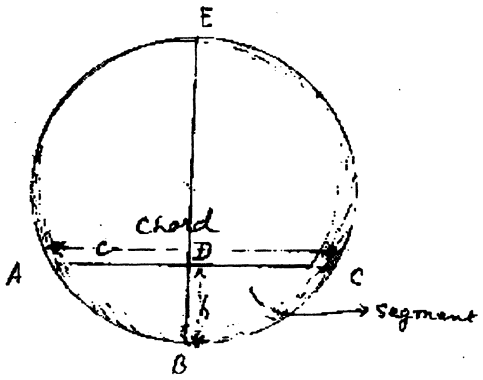


Figure 4.20

$$= \sqrt{\left(\frac{h}{4} C\right)^2 \times 10} \qquad = \frac{h\,C}{4} \sqrt{10}$$

This has been mentioned by Mahāvirācārya in 7.70 $\frac{1}{2}$.

1.The the same material with brevity has been produced by R.C. Gupta in gaṇita bhārati, vol. 9 (1987)

2.Jain, L.C., Tiloya-paṇṇatti aura usakā gaṇita, Lucknow.

The area of half the circle is given by this formula as

$$= \frac{r \cdot D}{4} \sqrt{10} = \sqrt{10} \frac{r^2}{2}.$$

The formula has been used for the results from the verses 4.2374-2379,(TPT).

In China, this area is given by the formula

$$\text{Area of the segment} = c + 2\frac{h^2}{d}$$

where c is the chord, h is the height segment and d is the diameter. This is contained in the Shen Kua's text. "Meng Chhi Pi Than" of the +1086 (11th century A.D.). Later on, the method of exhaustion was adopted in China, and it is just possible that it might have been due to some Jaina or Buddhist influence. As, the Jainas, the Buddhists preoccupation with innumerable worlds within a single drop of water, etc., could be well seen with the mental possible connection between the idea of close-packing. Cf. Jain, L.C., 'The Tao of Jaina Sciences, Delhi, 1992." Cf. also Needham, op. cit. In the same map, they insert geography, astronomy and cosmology with diffe ent units, in Jains maps.

(v. 4.2385)

This verse gives the total number of rivers in the Jambū island as 1792090.

The details are as follows:

In Videha,		
Sitā sitodā	2	
Kṣetra Nadi	64	Total 1400078
Vibhaṅgā	12	
Sita-Sitoda family	168000	
Kṣetra Nadi .mily	896000	
Vibhaṅgā family	336000	
Rivers in Bharata etc.regions	remaining - 392012	Total 392012
Grand Total Rivers :	**1792090 .**	

(v.4.2394)

In the Jambū island, the total number of mountains is six, number of Vijayārdha is thirty-four, number of Vakṣāragiri is sixteen, and number of Gajadanta is four. Similarly, others.

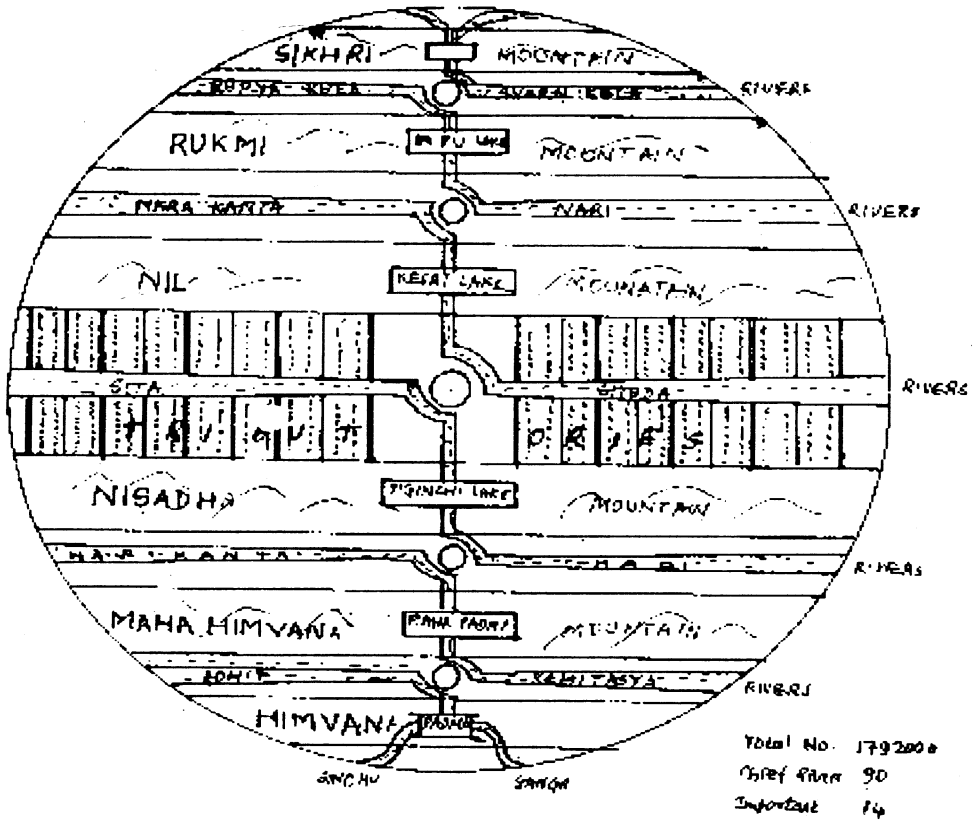


Figure 4.21

The above diagram shows only the main rivers. The map is again a T-O map. There are in all, the family rivers as 1792000, and the main rivers as 90. These 90 rivers have been shown in dotted portions. The tributories have been shown in the central horizontal portion of the figure. Here is the same problem of identification of the rivers on a modern map. For research, the Needham's Science and civilization in China, vol.3, geography and cartography chapters may be consulted.

These may be tabulated as follows:

TABLE NO.4.20

Family etc. mountains in Jambū island [v. 4.2394, et seq [TPT(V)]

Family mountains	6
Vijayārdha	34
Vakṣāragiri	16
Gajadanta mountain	4
Diggajendra mountain	8
Nābigirīndra	4
Vṛṣabha śaila	34
Kañcanaśaila	200
Meru	1
Kūṭa	568
Mahākṣetra	7
Karmabhūmi	34
Mlecchakhaṇḍa	170
Bhogabhūmi	6
Yamakaśaila	4
Jinabhavanas are as many as there are :	Kuṇḍas, Vai... g ...up, Rivers, Devanagaris, Mountains, Torana doors; Cities of Vidyādhara ranges, Ārya khanda, lakes, villages of videhas, śālmali trees, Jambū trees.

(v.4.2398 et. seq.)

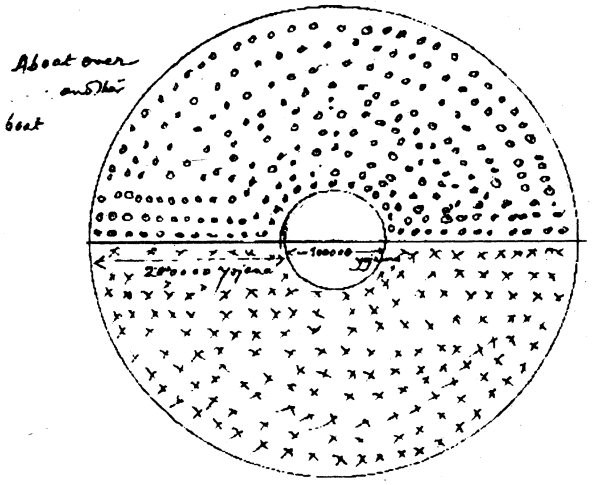


Figure 4.21

Here the central circular area is that of Jambū island,

(v.4.2398-2400)

The remaining area of an angular ring is that of the Lavaṇa sea. From the figure it is evident that the shape of the Lavaṇa sea is as if a boat has been placed over another boat.

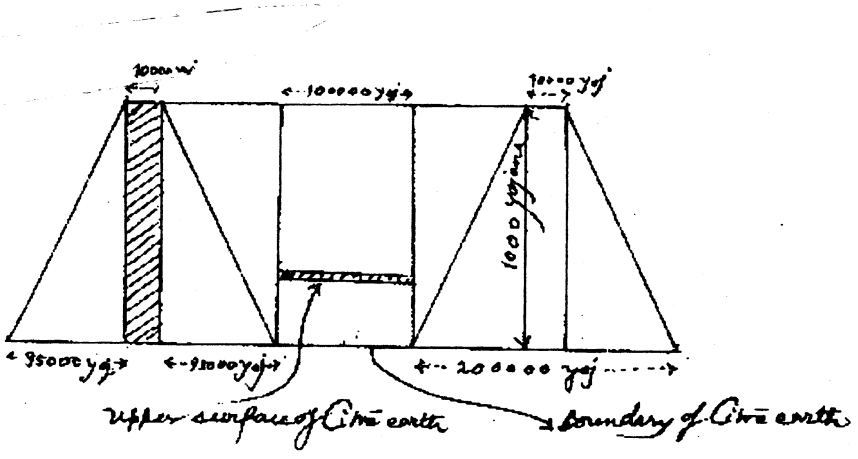


Figure 4.22

From the description, it is clear that the depth of the Lavaṇa sea is 1000 yojanas. The upper width is 10000 yojanas and the bottom width is 200000 yojanas. The sea is said to be 700 yojanas high in the sky in the shape of a peak over the upper serface of the Citrā earth.

(v. 4.2403 et seq.)

The measure of decrease-increase is similar to that of the meru diagram.The measure of decrease-increase is taken as 190, and through this, the width could be found out as from the base or top at a desired height or depth. The shaded portion is the central-most part, where all around there are one thousand eight under-regions (pātālas), the maximal,the medium and the minimal ones.

All these under-regions are in the shape of a vessel, with a conical shape.

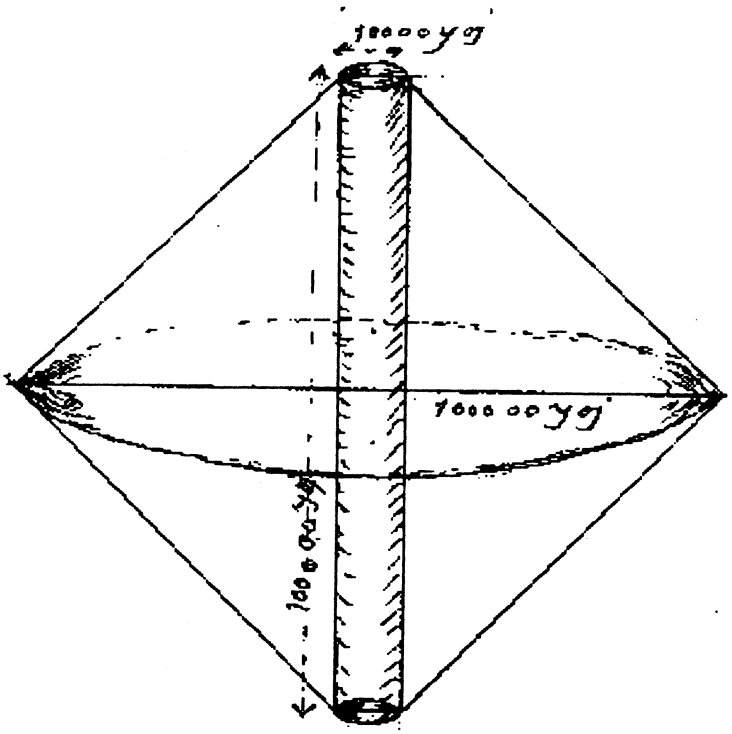


Figure 4.23

The above figure is that of the maximal under region. These under regions are the broadest in the centre and go on decreasing in width in both directions vertically up and down.

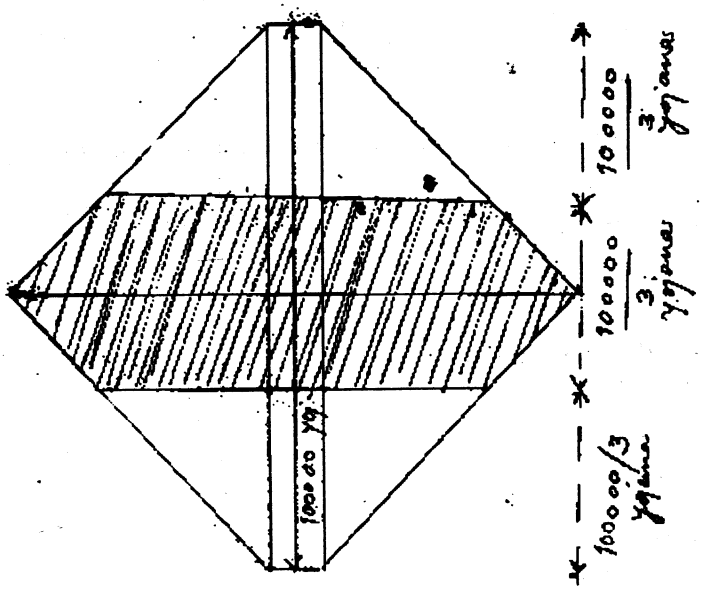


Figure 4.24

These under regions (pātālas), decreasing both ways, are divided into three portions, air part, water as well as air part and air part alone, respectively. The portion with water and air part is motionful and motionless part.

The air of these under regions always increase in the white half naturally and decrease in the dark half. There are in all 15 days in the white half. Everyday, there is an increase of height of air by $2222\frac{2}{9}$ yojanas. Hence, the total rise in the white half is $2222\frac{2}{9} \times 15 = \frac{100000}{3}$ yojanas. Hence water alone remains at the uppermost third part and the air remains in the lower two third part given by $\frac{200000}{3}$ yojanas of height. (vv.4.2431 et seq.TPT,V.).

In the figure 4.24, the shaded portion is the motionful and motionless (calācala) part. In that part, air and water increase and decrease in their heights in accordance with the white and dark halves. When the air increases so as to cover the two-third part, in the end of the white half, water transgresses the boundary and attains a height of 4000 dhanuṣas 2 kośas in the sky. Then in the dark half, it goes on decreasing, and till the end of the day before new moon (amāvaśyā), the surface becomes plane. On this day, there is water in the upper two parts and in the third

lower one third part, there remains only air.

It therefore, seems unnatural that air remains below water, although it is of lower density than that of water. Yet, owing to the under-region's specific shapes of closed cavities, the above explanation may hold good in certain circumstances.

Similar description is about the medium and minimal under regions. The only difference is that one third parts of the maximal etc. are given by $33333\frac{1}{3}$, $3333\frac{1}{3}$ and $333\frac{1}{3}$, in yojanas, respectively.

The following is their depiction through figure.

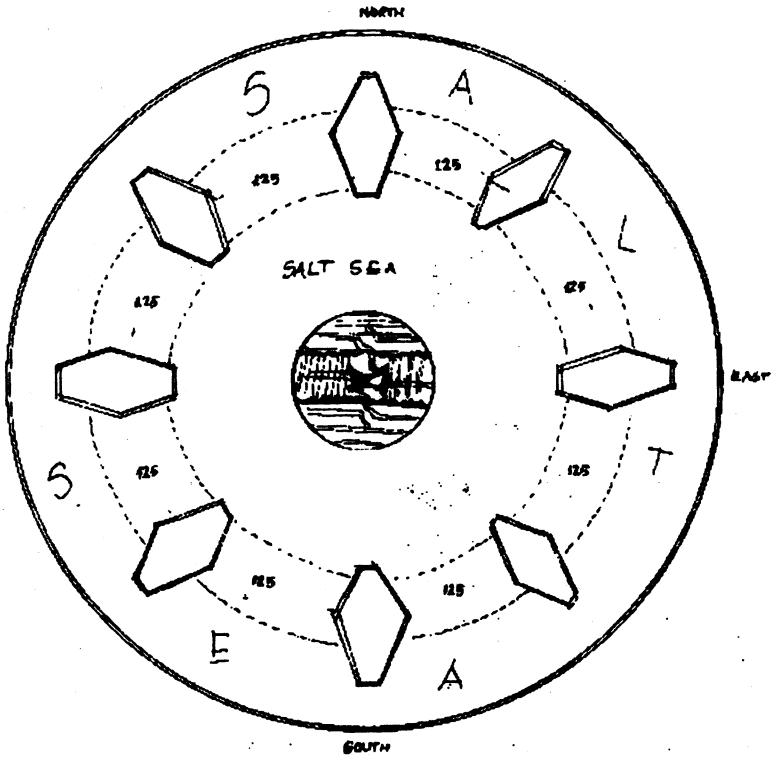


Figure 4.25

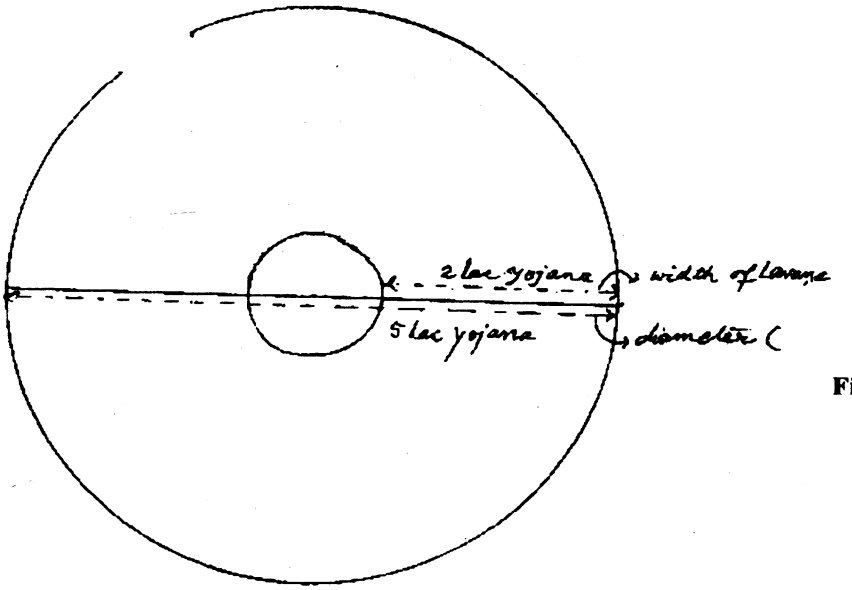


Figure 4.25. 1

(vv.4.2521-2522)

It appears that the author knew that the ratio of the areas of two circles was equal to the ratio of the square of their diameters.

Here, if D_1 = 100000 yojanas, the diameter of the Jambū island, then D_2 = 500000 yojanas, the external diameter of the Lavaṇa sea. $2D_1$ = 2 lac yojanas, the width of Lavaṇa sea.

Then, the formula for finding out the area of the Lavaṇa sea is

$$= \sqrt{\{(500000 \times 2) - (200000 \times 2)\}^2 \times \left(\frac{200000}{2}\right)^2 \times 10}$$

= 189736659610 square yojanas.

(Given in place value from left to right)

In formula form, this is given by

$$= \sqrt{\{(5D_1 \times 2) - (2D_1 \times 2)\}^2 \times \left(\frac{2D_1}{2}\right)^2 \times 10}$$

$$= \quad 6\,D_1^{\,2}\sqrt{10} \text{ square yojanas.} \qquad \text{.....(4.98)}$$

This could also be calculated from modern formula :

$$\text{area of Lavaṇa sea} = \sqrt{10}\left(\frac{5D_1}{2}\right)^2 - \sqrt{10}\left(\frac{D_1}{2}\right)^2$$

$$= \sqrt{10}\;\; 6D_1^{\,2} \quad \text{square yojanas,}$$

where $\sqrt{10}$ serves as π.

The combined area of Jambū island and the Lavaṇa sea

$$= \quad 7905694150 + 189736659610$$

$$= \quad 197642353760 \text{ square yojanas.}$$

The other formula gives the number of Jambū island pieces on dividing the difference of the squares of the diameters by square of the diameter of Jambū island :

$$\left[(500000)^2 - (100000)^2\right] \div (100000)^2 = 24 \text{ pieces}$$

This is the same as

$$\frac{\pi\left(\frac{500000}{2}\right)^2 - \pi\left(\frac{100000}{2}\right)^2}{\pi\left(\frac{100000}{2}\right)^2},$$

where $\pi = \sqrt{10}$.

Thus, the ancient formula is

$$\left[(5\,D_1)^2 - (D_1)^2\right] \div (D_1)^2 = \text{Number of the pieces of Jambū island in its next sea,} \quad \text{.....(4.99)}$$

or $$25\,D_1^2 - D_1^2 \div D_1^2 = 24.$$

Again, $$\frac{D_2^2 - D_1^2}{D_1^2} = \left(\frac{A_2 - A_1}{A_1}\right)$$

or $$\frac{D_2^2}{D_1^2} = \frac{A_2}{A_1} \qquad \text{.....(4.100)}$$

(vv.4.2532-2534)

The third is the ring of the Dhātakīkhaṇḍa island which is 400000 yojanas in width and whose external diameter is

1 + 2 (200000) + 2 (400000) = 1300000 yojanas.

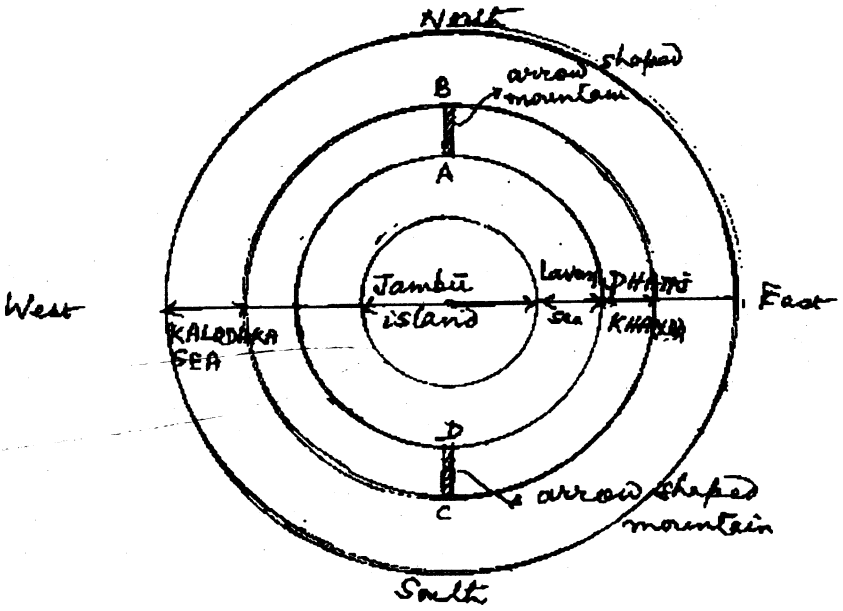


Figure 4.26

Without scale.

Width of mountains AB and CD is 1000 yojanas. Depth is 100 yojanas.

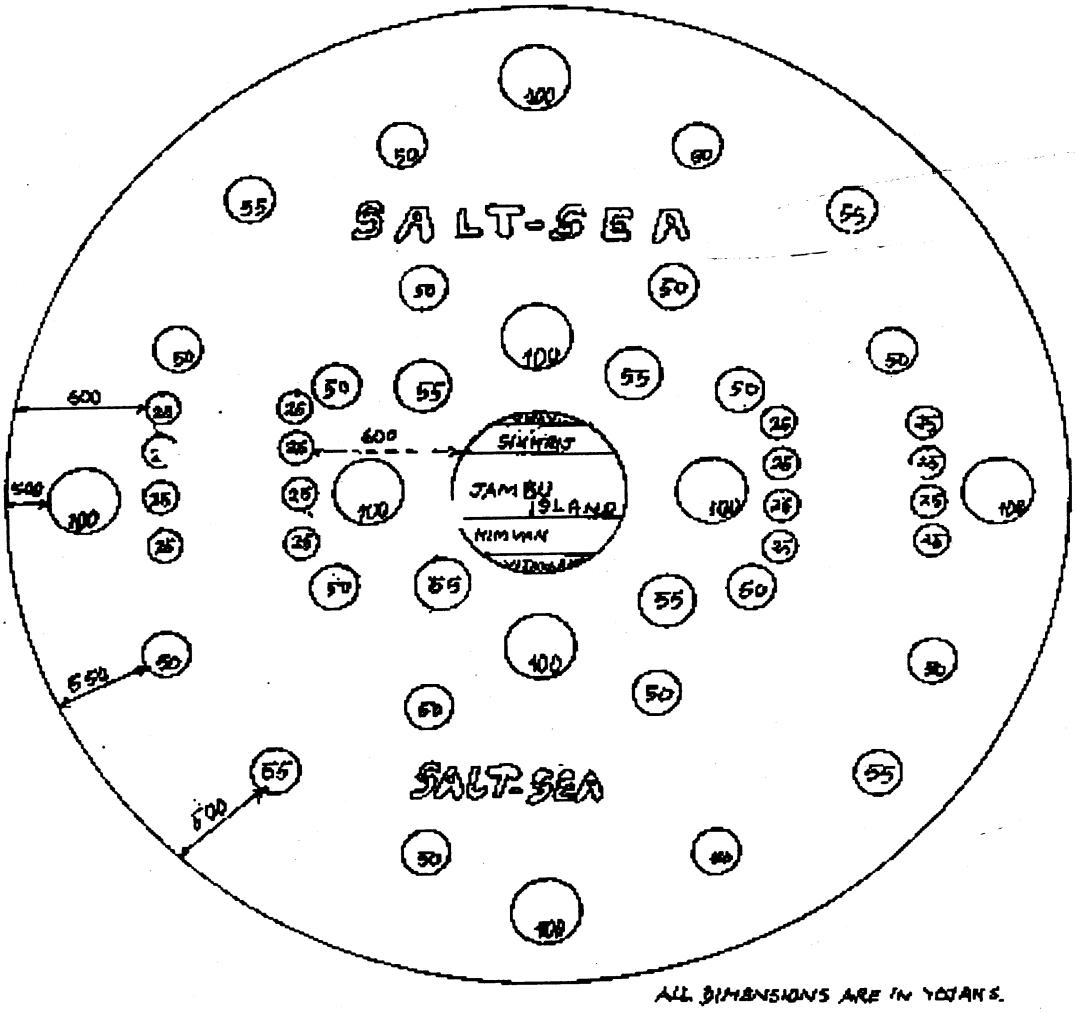

SALT-SEA
JAMBU ISLAND
SALT-SEA
ALL DIMENSIONS ARE IN YOJANAS.

Figure 4.27

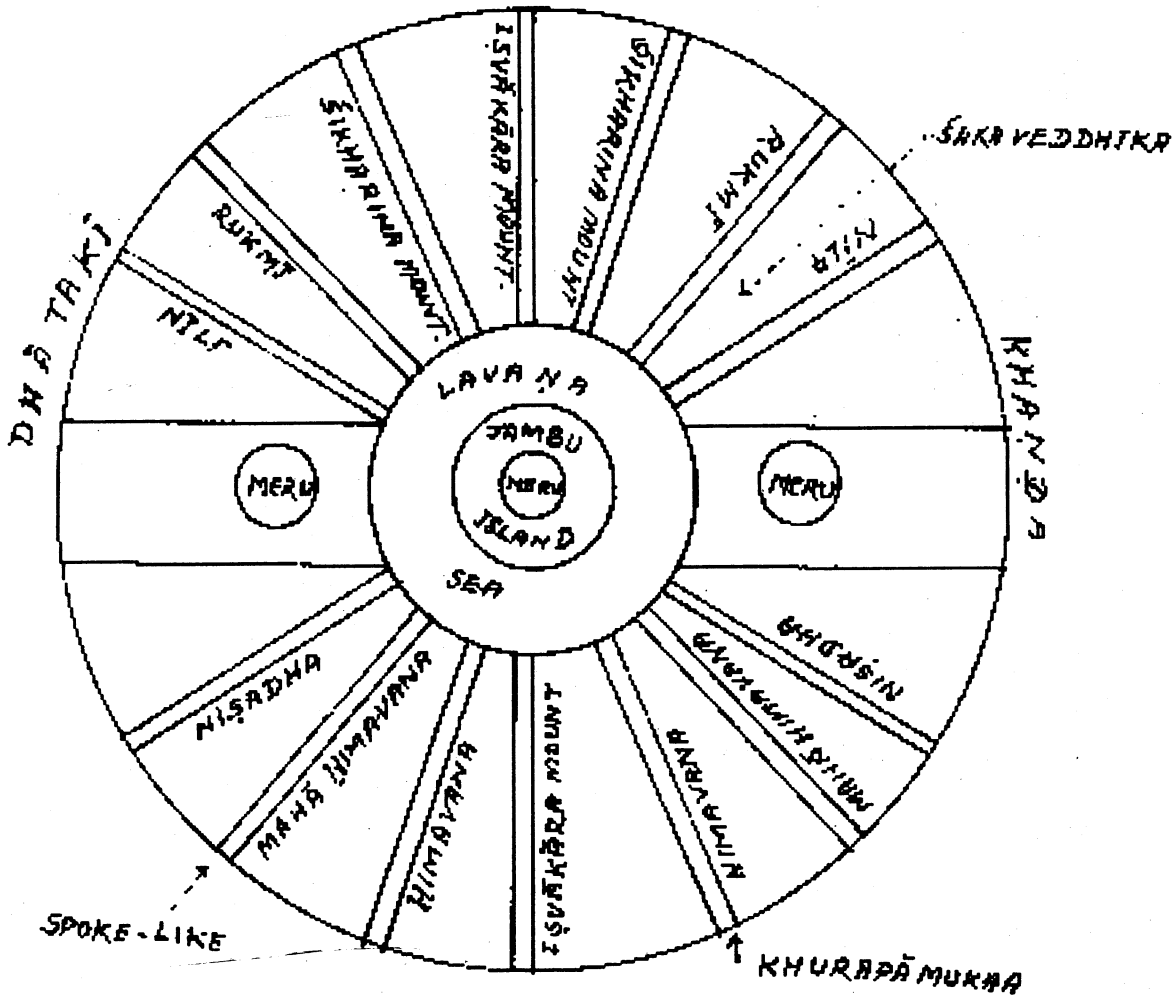

ŚAKA VEDDHIKA
KHAṆḌA MEṚU
KHURAPĀ MUKHA
SPOKE-LIKE
DHĀ TAKĪ
LAVAṆA
JAMBU
ISLAND
SEA
MERU
MERU
NIṢADHA
MAHĀ HIMAVĀNA
HIMAVĀNA
ŚIKHARĪ
HAIRAṆYAVAṆA
NĪLA
RUKMĪ
ŚIKHARĪ MOUNT.
ISVĀKĀRA MOUNT.
GIRIKĀṆḌA MOUNT.
RUKMĪ
NĪLA

Figure 4.28

The width of the Himavān mountain $= 2105\frac{5}{19}$ yojanas.

The width of the Mahāhimavān mountain is 4 times that of preceding $= 8421\frac{1}{19}$ yojanas.

The width of the Niṣadha mountains is 4 times that of the preceding $= 33684\frac{4}{19}$ yojanas.

The width of all family mountains is 4 times that of the sum of the preceding three mountains

$$= 4\left(2105\frac{5}{19} + 8421\frac{1}{19} + 33684\frac{4}{19}\right)$$

$$= 176842\frac{2}{19} \text{ yojanas.}$$

When the width of both bow-arrow shaped mountains is 2000 yojanas, which when added to the above the total area covered by mountains, inner width in Dhātakīkhaṇḍa island is obtained as

$$= 176842\frac{2}{19} + 2000$$

$$= 178842\frac{2}{19} \text{ yojanas.}$$

(v.4.2560) The number is given in decimal value notation, from left to right.

(v. 4.2561) The verse 4.2561describes how the three types of the initial, middle and outer diameters (sūcī) are defined :

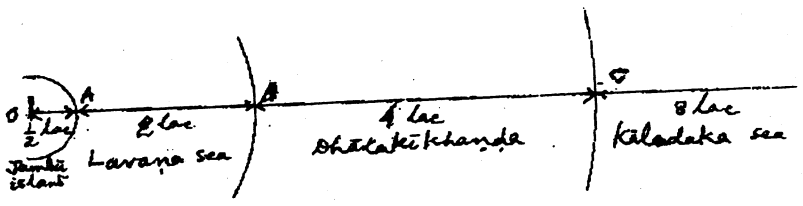


Figure 4.29

It is clear that the initial boundary of the Dhātakīkhaṇḍa island starts from B, the end of Lavaṇa sea. Thus, from the centre of Jambū island, its distance is

$$OB = OA + AB = \frac{1}{2} \text{ lac} + 2 \text{ lac.}$$

Hence, this is the radius of internal boundary of the island and the internal diameter is, therefore, twice of this, ie., $2\frac{1}{2} \times 2 = 5$ lac. The author has given it through a formula as follows:

intial diameter of Dhātakī island

= 2 × width of Dhātkī island − width of Lavaṇa sea − width of Jambū island

= 2 × 4 − 2 − 1 = 5 lac yojanas.

further, medium or middle diameter

= width of Dhātakī island − width of Lavaṇa sea − width of Jambū island

= 3 × 4 − 2 − 1 = 9 lac yojanas.

Similarly,

the outer diameter = 4 × 4 − 3 = 13 lac yojanas.

This can be generalized to the formulae

2 × width − 3 = inner or initial diameter

3 × width − 3 = middle diameter

4 × width − 3 = outer diameter

Thus, for the Kālodaka sea, the diameters are as follows:

2 × 8 − 3 = 13 lac yojanas = initial diameter

3 × 8 − 3 = 21 lac yojanas = middle diameter

4 × 8 − 3 = 29 lac yojanas = outer diameter

The circumferences corresponding to the Dhātakīkhaṇḍa's diameters are given by the usual formulae as follows:

$\sqrt{(500000)^2 \times 10}$ = 1581139 yojanas (inner circumference slightly less)

$\sqrt{(900000)^2 \times 10}$ = 2846050 yojanas (middle circumference slightly less)

$\sqrt{(1300000)^2 \times 10}$ = 4110961 yojanas (outer circumference slightly less.)

It is important to note that these results do not follow on taking $\sqrt{10} = \frac{19}{6}$. However, it is clear that the above value could be obtained approximately to a fine extent by taking $\sqrt{10}$ = 3.16227. It is a topic for research to exactly know how a value of $\sqrt{10}$ could be approximated to 3.16227, and the above three results could be obtained. This has also been seen in the Introduction to Gaṇitānuyoga by L.C.Jain in the Gaṇitānuyoga (op.cit.), pp.13 et seq., 1986, Ahmedabad. We take the case of $\sqrt{(500000)^2 \times 10}$ = 1581139 yojanas, (initial circmference), and it is given that actual is slightly less than this. We find $\sqrt{10}$ = 3.162277..... in actual calculations. When this is taken for being multiplied with 500000, we get 1581138.5, which is slightly less than 1581139 yojanas. If we take $\sqrt{10}$ = 3.1622776, we get the same result as 1581138.8. Thus the approximation by the author has taken to be 1581139.

Similarly,

900000 × 3.1622776 = 2846049.84 yojanas (middle circumference) which has been approximated as 2846050, and 1300000 × 3.1622776 = 4110960.88 has been taken to be 4110961 yojanas (outer circumference).

(vv.4.2566 et seq.)

Here, the widths of the mountains are arcual. Their sum total is $178842\frac{2}{19}$ yojanas. From the three circumferences of the Dhātakīkhaṇḍa, this total arc is subtracted, giving in each case the remaining portion. We have, thus,

$1581139 - 178842\frac{2}{19} = 1402296\frac{17}{19}$ yojanas for the initial circumference

$2846050 - 178842\frac{2}{19} = 2667207\frac{17}{19}$ yojanas for the middle circumference

$4110961 - 178842\frac{2}{19} = 3932118\frac{17}{19}$ yojanas for the outer circumference

When these three remaining portions are separately divided by 4 + 16 + 64 + 128 = 212, we get separately the width of Bharata at the three places (internal, middle and external) as follows:

$\left(1402296\frac{17}{19}\right) \div (212) = 6614\frac{129}{212}$ yojanas as width of Bharata region (internal)

$\left(2667207\frac{17}{19}\right) \div (212) = 12581\frac{36}{212}$ yojanas as width of corresponding Bharata region (middle)

$\left(3932118\frac{17}{19}\right) \div (212) = 18547\frac{155}{212}$ yojanas as width of corresponding Bharata region (external).

Now, in order to find out the masure of decrease-increase at the desired place, the width-initial is subtrated from the outer width of Bharata etc. regions. Difference is divided by 400000.

Thus, $\left(18547\frac{155}{212} - 6614\frac{129}{212}\right) \div 400000 = \frac{2529822}{84800000}$ yojanas.

Here is the use of trio-set rule (trairāśika).

(vv.4.2577 et seq.)

In the Dhātakīkhaṇḍa island, in its Videha region, as in the Jambū island, there is a structure of a mountain called the Mandara. In that island, in its very central portion of the former and latter Videha regions, there are situated a Mandara mountain on each one of them in the similar form,. Each of these Mandaras has a depth of 1000 yojanas and a height of 84000 yojanas. At the bottom portion,the diameter of the meru is 10000 yojanas and the diameter on the surface of the earth is 9400 yojanas. At the top, its diameter is 1000 yojanas. Thus, the measure of decrease with respect to base, or increase with respect to top, is given by the formula

$\frac{\text{base} - \text{top}}{\text{height}}$ = decrease or increase, relatively. .....(4.101)

For depth : $\frac{(10000-9400)}{1000} = \frac{6}{10}$ decrease or increase.

For surface and above : $\frac{9400-1000}{84000} = \frac{1}{10}$ decrease or increase.

Some other preceptors regard the diameter of the bottom of the meru as 9500 yojanas, and accordingly get the measure of decrease or increase as

$$\frac{9500-1000}{85000} = \frac{1}{10}$$ yojanas.

Thus, to get the increase and the value of the widths or diameters of (conical shaped) merus which are small, at a depth, those numbers of yojanas are divided by ten and on adding one thousand to the result, the diameter of the meru at a desired place is known.

For example, the depth desired at a depth of 21000 yojanas is given by

$$(21000 \div 10) + 1000 = 3100 \text{ yojanas.}$$

(vv.4.2593 et seq.)

The arcual length of both Kurus of Dhātakīkhaṇḍa = 925486 yojanas.

* The chord length of both Kurus = 223158 yojanas.
* The arrow length of both Kurus = 366680 yojanas.
* The diameter of a circle for Kuru kṣetras of the Mandara mountains = 400633 yojanas.

The formula for finding out the arrow, when the diameter and chord are given is as follows:

$$\frac{\sqrt{D^2 - C^2} + D}{2} = A,$$ where D = diameter,

C = chord,

A = arrow. .....(4.102)

Thus,

$$\frac{\sqrt{(400633)^2 - (223158)^2} + 400633}{2} = 366680$$ yojanas is the arrow of Kuru region.

On solving the above equat ion, we get, for a check up,

$$\sqrt{(400633)^2 - (223158)^2} = 366680 \times 2 - 400633$$

or $$\sqrt{177475 \times 623791} = 332727$$

or $$\left(\sqrt{110707307725}\right)^2 = (332727)^2$$

or $$110707256529 = 110707307725 .$$

Here, the digits underlined do not tally, hence the square-root taken out by the author is approximate.

The next verse gives the formula for the diameter of a circle, to be calculated from the arrow and the chord as follows :

$$(\text{arrow})^2 \times 4 + (\text{chord})^2 \div (\text{arrow} \times 4) = \text{diameter} \quad \text{.....(4.103)}$$

or $$\frac{(366680)^2 \times 4 + (223158)^2}{366680 \times 4} = 400632\frac{353881}{366680},$$

which is slightly less than 400633 yojanas.

For figure of the Dhātakīkhaṇḍa island which is beyond the salt sea (Lavaṇa samudra), see figure no. 4.26. That is not to the scale.

The structures form a complex geography from this island.

The measure of the curved arrow in the Dhātakīkhaṇḍa island is calculated as follows:

central width of Videha $= 805194\frac{184}{212}$ yojanas

width of meru $= 9400$ yojanas

$\therefore$ width of each Kuru region $= \dfrac{805194\frac{184}{212} - 9400}{2}$

$$= 397897\frac{92}{212} \text{ yojanas} .$$

The island, Dhātakīkhaṇḍa has two interior areas, the north Kuru and the south Kuru, in which there are trees called the Dhātakī, hence the name, and the family trees of this species count to be 560480. The Dhātakīkhaṇḍa contains the same nomenclature of the mountains, forests, rivers, with similar description as that for the Jambū island.

(vv.4.2593 et seq.)

In this verse, here is place-value notation. The number 569259 is written from right to left as usual. This gives the length of every one of the elephant-tusk like mountains (gajadanta parvatas). In the next verse, 925486 has been written as nine lac twenty-five thousand four hundred eighty-six yojanas. These two styles have been followed, through out. This gives the arcual length (dhanuḥpṛṣṭha) of both the kurus in the Dhātakīkhaṇḍa island. The chord of both the Kurus is 223158 yojanas.

The height of the segment (arrow) of both the Kuru regions is 366680 yojanas, and the diameter is 400633 yojanas. (cf. TPT (V), p.705).

The diameter of the meru on the surface of the earth is 9400 yojanas, the Bhadraśāla forest has extension of 107879 yojanas. The Vijaya is $9603\frac{3}{8}$ yojanas.The Vakṣāra mountains are 1000 yojanas each and have 250 Vibhaṅgā rivers. These numbers have been stated through lac and thousand, hundred, etc. decimal notations, from left to right, respectively called as lakkha, sahassa, saya in Prakrit. In verses 2610-2611, however, the numbers as 246346 etc. have been recited from units right hand place towards left, similarly 392000 and 390600 and so on. As already related, the geography of various objects here, now is not that of a circle and its interior, but that of the circular ring and its interior.

(vv.4.2615 to 4.2620)

The diameter of Kacchā is the same as that of Gandhamālinī country. This can be calculated by multiplying the width of the Bhadraśāla forest by two, and adding the width of the Mandara mountain and the middle diameter to it :

$(107879 \times 2) + 9400 + 900000 = 1125158$ yojanas.

From this diameter of the Kacchā land, the circumference is obtained from the formula:

$$\text{circumference} = \sqrt{(\text{diameter})^2 \times 10} \qquad \text{.....(4.104)}$$

$$= (\text{diameter})\sqrt{10}$$

or $= \sqrt{(1125158)^2 \times 10}$

$= 3558062$ yojanas.

The length of the Videha reigon is obtained by subtracting from the above, the region occupied by the fourteen mountains, and then on multiplying the remainder by 64 and dividing by 212. This is again the method of proportion here. Thus,we have

the length $= \frac{(3558062 - 178842) \times 64}{212} = 1020141\frac{188}{212}$ yojanas. Cf. TPT(V), 4.2660.

(vv.4.2625-2629)

These verses give the measure of increase in the plane regions, mountains, rivers and various places in lengths. Method is the same, as per locations in the map of Dhātakīkhaṇḍa, where the same rule of proportion is used.

Thus, the diameters of the Kacchādika Vijaya, Vakṣāra, Vibhaṇgā river, and Divine forest (Devāraṇya) are taken. Their diameters are squared, multiplied by ten and the square-root thereof is multiplied by thirty-two and divided by two hundred twelve. When these separate results are added to diameter of Kacchā, the width of half Videha in each location is obtained separately.

Here in Dhātakīkhaṇḍa, the increase in places of Vijaya lands

$$= \sqrt{\left(9603\frac{3}{8}\right)^2 \times 10} \times 10 \times 32 \div 212 = 4584 \text{ yojanas.}$$

The increase in places of Vakṣāra mountains is

$$= \sqrt{(1000)^2 \times 10} \times 10 \times 32 \div 212 = 477\frac{60}{212} \text{ yojanas.}$$

The increase in locations of the Vibhaṅgā rivers is

$$= \sqrt{(250)^2 \times 10} \times 32 \div 212 = 119\frac{52}{212} \text{ yojanas.}$$

The increase in locations of The Devāraṇya is

$$= \sqrt{(5844)^2 \times 10} \times 32 \div 212 = 2789\frac{92}{212} \text{ yojanas.}$$

It may be noted that the above measures are the increments to be given in their original lengths in order to get the middle-lengths, separately.

Thus, the middle length in case of Kacchā etc. lands is

$$509570\ \frac{200}{212} + 4584 = 514154\ \frac{200}{212} \text{ yojanas.}$$

When to this length, again the same amount is added, one gets the initial length of the both mountains as

$$51415\ \frac{200}{212} + 4584 = 518738\ \frac{200}{212} \text{ yojanas.}$$

When $477\frac{60}{212}$ is added to this original length, the middle length of these (Citrakūṭa and Suramāla) mountains is obtained as

$$518738\ \frac{200}{212} + 477\ \frac{60}{212} = 519216\ \frac{48}{212} \text{ yojanas and so on.}$$

(vv.4.2665-2666)

When the diameter of the meru and twice the diameter of Bhadraśāla forest is subtracted from the middle diameter of the Dhātakīkhaṇḍa, we get the diameter of the land from remaining Padma upto Maṅgalāvatī land. Cf. also TPT(V), 4.2710

This is 900000 – (9400 + 215758) = 674842 yojanas of diameter.

From this, the circumference is obtained as usual :

$$\sqrt{(674842)^2 \times 10} \times 10 = 2134038 \text{ yojanas.}$$

The formula is as usual here.

This description of geographical measures is continued upto 4.2703 verse.

(vv.4.2704 et seq.)

The details of Videhakṣetra are given here: The area of small Himavān is given by the product of its length and breadth:

length= 400000 yojanas

breadth $= 2105\frac{5}{69}$ yojanas,

$\therefore$ its area $= 400000 \times 2105\frac{5}{69} = 842105263\frac{3}{19}$ square yojanas.

On multiplying this area by 4, we get the area of Mahāhimvān as

$$842105263\,4\frac{3}{19} \times 4 = 3368421052\frac{12}{19} \text{ square yojanas.}$$

Again multiplying the above by 4, we get the area of Niṣadha as

$$336821052\frac{12}{19} \times 4 = 13473684210\frac{10}{19} \text{ square yojanas.}$$

Then, due to symmetry, on reversing the process, i.e. on respective division by 4 we get areas of Nīla, Rukmī, and Śikharī, respectively :

$$13473684210\frac{10}{19},\ 3368421052\frac{12}{19}$$

and $842105263\frac{3}{19}$ square yojanas.

Thus here, the area of a rectangle is given as length into breadth.

(vv.4.2737-2739)

The area of the Kāloda sea is given by 5312626469082 square yojanas. This is found out by considering it as a ring of 2900000 yojanas as external diameter and 1300000 yojanas as internal diameter. Hence the area of the ring is given by

$$\left[\ \pi\left(\frac{2900000}{2}\right) - \pi\left(\frac{1300000}{2}\right)\right], \qquad \text{.....(4.105)}$$

where, $\pi = \sqrt{10}$.

Similarly, area of Jambū island is given by

$$\left[\pi\left(\frac{100000}{2}\right)^2\right] \qquad \text{.....(4.106)}$$

Hence, the ratio of (4.105) to (4.106)

$$\frac{\left[\pi\left(\frac{2900000}{2}\right)^2 - \pi\left(\frac{1300000}{2}\right)^2\right]}{\left[p\left(\frac{100000}{2}\right)^2\right]} = 672. \qquad \text{.....(4.105)}$$

This shows that in the area of Kāloda sea, the 672 Jambū islands are contained.

The external circumference of the Kāloda sea is slightly less than 9170605 yojanas.

This is obtained from $\sqrt{10}\ D = \sqrt{10} \times 2900000$

$= 3.1622776 \times 2900000$

$= 910605.04$

Thus, usually $\sqrt{10}$ was taken as its square-root upto seven decimal places.

(vv.4.2757 et seq.)

The external diameter of the Mānuṣottara mountain is obtained on multiplying its width by two and adding 4500000 yojanas to it. Hence, it is

$1022 \times 2 + 4500000 = 4502044$ yojanas.

The external circumference, therefore, works out as

$\pi\ D = \sqrt{10} \times 4502044$

$= 3.16227766 \times 4502044$

= 14236713.16 yojanas

= 14236713 yojanas, approximately.

The author says that this amount is slightly less. He calculates the excess as daṇḍa 1330, hasta 1, aṅgula 10, jau 5, over the above.

This is a subject of research again here. (Problem ?)

Here it seems that o.16 have been converted into units as shown. For this purpose, the method of R.C.Gupta may again be adopted here.[1]

In the inner part of this mountain, the internal diameter is 4500000 yojanas and circumference is 14230249 yojanas. Again, the formula for finding the circumference from diameter may be used. The circumference

$$= \sqrt{10}\ D = \sqrt{10} \times 4500000$$

$$= 3.16227766 \times 4500000$$

$$= 14230249.47$$

= 14230249 yojanas, approximately.

Further, the area is given by the formula :

$$\text{area} = \frac{\sqrt{(D^2)^2} \times 10}{4} \qquad \text{.....(4.107)}$$

$$\text{or area} = \sqrt{\frac{\{(4502044)^2\}^2 \times 10}{4}} = \frac{(4502044)^2\ \sqrt{10}}{4}$$

$$= (2251022)^2 \times \sqrt{10} = 5067100044484 \times 3.16227766$$

= 16023577272510 square yojanas, approximately.

Further, the formula for finding the area of a ring is given as

$$\sqrt{\{(2\times \text{external diameter}) - (2\times \text{width})\}^2 \times \frac{(2\times \text{width})^2}{4} \times 10.} \qquad \text{.....(4.108)}$$

1.IJHS, vol.10, No.1, 1975, 38-46.

Here, area of the ring $= \sqrt{\{(4502044 \times 2) - (1022 \times 2)\}^2 \times \frac{(2044)^2}{4} \times 10}$

$= 14546617907$ square yojanas.

Note : In the results of these verses, use of decimal place value notation is from right to left, as usual.

(vv.4.2816-2818)

Here, the diameter of segment is to be found out. (Cf.4.2025)

The height of segment is arrow (bāṇa), 1486931 = h

The chord is (jīvā), 436916 = c

formula is for diameter of the segment $= \frac{h^2 \times 4 + c^2}{4h}$ ------(4.109)

$$\therefore \quad D = h + \frac{c^2}{4h}$$

Here, $D = 1486931 + \frac{(436916)^2}{4 \times 1486931}$.

(vv.4.2829 et seq.)

Here, the method of proportionate order is applied for finding out the occupied width. The word piṇḍaphala has been used for signifying a proportionate division. First the occupied area width is obtained on multiplication of each of the width of the Mandara mountains by their own order number, and then these widths are summed up and subtracted from eight lac. The remainder is then divided by their own number, giving the width of each of them.

In to twice the width of Bhadraśāla is added the width of the Mandara mountain, the sum is then added to the middle diameter, giving the diameter of the land of Kacchā and Gandha mālinī. This diameter measures 4140916 yojanas out of both merus upto the end of both Bhadraśālas as follows :

$(215758 \times 2) + 9400 + 3700000 = 4140916$ yojanas.

The circumference of this diameter is given as

$$\pi \quad D \quad = \sqrt{10}\ (4140916)$$

$$= 3.1622776\ (4140916)$$

$$= 13094726 \text{ yojanas.}$$

Both of the above results are given in decimal notations.

The region occupied by mountain is subtrated from the above circumference, giving the remainder which is multiplied by 64 and divided by 212. This gives the length of Videha.Thus,

$$\left(13094726 - 355684\ \frac{4}{19}\right) \times \frac{64}{212} = 3845748\ \frac{112}{212}\ .$$

From the above value, the extension of Sītā Sītodā rivers, which is 2000 yojanas, is subtracted. When the remainder is divided by two, the initial length of Kacchā and Gandhamālinī is obtained as

$$\left(3845748\ \frac{112}{212} - 2000\right) \div 2 = 1921874\ \frac{56}{212} \text{ yojanas.}$$

(vv.4.2838 et seq.)

Now the width of Vijaya etc. is multiplied by 10 after being squared. Then, the square-root of the product is taken out and multiplied separately by 32 and divided by 212. This gives the measure of increase in each case. When this increase is added to the Vijaya's etc.initial length, their medium length, and when the increase is added to the middle length, their final lengths are separately produced.

Thus for the Vijayas,

$$\text{increase} \quad = \sqrt{\left(19794\ \frac{1}{4}\right)^2} \times 10 \times 32 \div 212 = 9448\ \frac{56}{212} \text{ yojanas}$$

$\therefore$ middle length $= 1921874\frac{56}{212} + 9448\frac{56}{212} = 1931322\frac{112}{212}$ yojanas

$\therefore$ final length $= 1931322\frac{112}{212} + 9448\frac{56}{212} = 1940770\frac{168}{212}$ yojanas.

For the Vakṣāra mountains

increase $= \sqrt{(2000)^2 \times 10} \times 32 \div 212 = 954\frac{120}{212}$ yojanas

$\therefore$ middle length $= 1940770\frac{168}{212} + 954\frac{120}{212} = 1941725\frac{76}{212}$ yojanas

$\therefore$ final length $= 19401725\frac{76}{212} + 954\frac{120}{212} = 1942679\frac{116}{212}$ yojanas.

For the Vibhaṅgā rivers,

increase $= \sqrt{(500)^2 \times 10} \times 32 \div 212 = 238\frac{136}{212}$ yojanas

$\therefore$ middle length $= 1961576\frac{96}{212} + 238\frac{136}{212} = 1961815\frac{20}{212}$ yojanas

$\therefore$ final length $= 1961815\frac{20}{212} + 238\frac{136}{212} = 1962053\frac{156}{212}$ yojanas.

For the increase in Devāraṅya

increase $= \sqrt{(11688)^2 \times 10} \times \frac{32}{212} = 5578\frac{184}{212}$ yojanas

$\therefore$ middle length $= 2082114\frac{184}{212} + 5578\frac{184}{212} = 2087693\frac{156}{212}$ yojanas

$\therefore$ final length $= 2087693\frac{156}{212} + 5578\frac{184}{212} = 2093272\frac{128}{212}$ yojanas.

The middle lengths and final lengths for all these are found out through the same process after calculating their initial lengths and increase thereof. The place value has been used from right to left, as usual.

(vv.4.2879 et seq.)

The diameter from Maṅgalāvatī to padmā etc.is obtained on subtracting the width of meru and that of twice the Bhadraśāla forest from the middle diameter of puṣkarārdha. Thus,

$$3700000 - (9400 + 431516) = 3259084 \text{ yojanas.}$$

$$\text{Their initial length is } 1500953\ \frac{204}{212} \text{ yojanas.}$$

(vide TPT (V) 4.2924)

But the measure of this diameter (sūcīvyāsa), the measure of its circumference, the method of finding out the length of the Videha region, and the measure of length of Videha region have not been stated, and the four corresponding verses seem to have been missed or lost here. Their calculation is as follows :

The linearity measure from Padmā to Maṅgalāvatī = 3259084 yojanas.

$$\text{The measure of its circumference} = \sqrt{(3259084)^2 \times 10} = 10306129 \text{ yojanas.}$$

$$\text{Length of Videha} = \frac{(\text{circumference} - 355684\ \frac{4}{19}) \times 64}{212}$$

$$= \frac{3003907\ \frac{196}{212} - 2000 \text{ yojara}}{2} = \frac{3001907\ \frac{196}{212}}{2} \text{ yojana}$$

(v.2925.TPT (V) (Additional Verse)

The length of Padmā and Maṅgalāvatī countries

$$= \frac{\text{length of Videha} - \text{width of Sītodā}}{2}$$

$$= \frac{3003907\ \frac{196}{212} - 2000 \text{ yojanas}}{2} = \frac{3001907\frac{196}{212}}{2}$$

$$= 1500953\ \frac{204}{212} \text{ yojanas.}$$

The remaining description is easy to understand.

(vv.4.2914 et seq)

The area of Himvān mountain is given as 3368421052 $\frac{12}{19}$ square yojanas.

This is the description of the area of Puskarārdha island. When this area of the Himvān is multiplied by 8, the area of the collective twelve mountains in a family, is obtained. on adding the area of the Iṣvākāra mountains, the aera occupied by 14 mountains is obtained as follows :

$$282947368421\ \frac{1}{19} + 1600000000 = 284547368421\ \frac{1}{19} \text{ square yojanas.}$$

The area of Puṣkarārdha island is 9360341874098 square yojanas.

The area of Puṣkarārdha island without area of mountain is 9075794505677 square yojanas

On dividing this by 212, the area of Bharata region is obtained as

$$9075794505677 \div 212 = 42810351441\ \frac{185}{212} \text{ square yojanas.}$$

As before, the areas of regions upto Videha are successively four times, and then upto Airāvata region there is successive decrease four times.

As compared with area of Jambū island the area of Puṣkarārdha island is 1184 times. That is, 1184 Jambū like pieces can be placed to cover it. Thus,

$$\frac{\pi}{4}\left[(4500000)^2 - (2900000)^2\right] \div (100000)^2\ \frac{\pi}{4}$$

$$= 1184$$

(vv.4.2926 et seq.)

The measure of the set of human beings is obtained on dividing the world line by the first and third square-root of finger linear width, as reduced by one.

Thus, the total number of ordinary human beings

$$= \frac{L}{(F)^{1/2}\,(F)^{(1/2)^3}} - 1 = \frac{L}{(F)^{5/8}} - 1 \qquad \text{.....(4.110)}$$

Here, L denotes the set of points in a stretch of world-line of 7 rājus. Similary, F denotes the set of points in a stretch of a finger width. L and F are simile measures whose cardinals have already been defined in the first chapter, and this amount is said to be the sum total of the following : developed human set (male):

19807040629566084398385987584 [29 digits] .....(4.11)

female human set:

594211218856982531951579627 52 [29 digits] .....(4.112)

[It appears that females are three times the males]

This is the number for the universe.

The undeveloped set is obtained as the difference of expressions

(4.110) - [(4.111) + (4.112)]. .....(4.113)

This has been expressed as $\frac{7}{1}\left|\frac{1}{2}\right|$ ..... (4.114)

Where 7 rāju stands for a world line. It seems that $\frac{1}{2}$ stands for halving this amount.

The human beings in the inter-islands, are small in number. Finite times these are the human beings in ten Kuru regions and still finite times these are in Harivarṣa and Ramyaka regions. Finite times the preceding are in Hairaṇyavata and Haimavata regions. Finite times again are those in Bharata and Airāvata regions. Finite times the preceding are those in Videha regions. Innumerate times the preceding are the attainment-non-developed human beings. They are spontaneously generated (sammūrchana). Specifically greater in number than these are the ordinary human-beings.

Human beings are of three types

1] developed (paryāpta)

2] finish-non-developed (nirvṛtti-aparyāpta)

3] attainment-non-developed (labdhi-aparyāpta)

In the one hundred and seventy Āryakhaṇḍas, all the three types of human beings are found.

Note: It is really very difficult to understand at present how this number has been given by the author from the tradition, of course ! It is definite that this number of developed human beings corresponds not only to this earth, but also to the other worlds, shown mathematically in their cosmological theory. They take help of the simile measure sets, where L, F predominate and are expressible through P, the palya, etc.

(vv.4.2957 et seq.)

From the human universe, as already described, the emancipation phenomena happens at intervals as follows :

minimal interval period	1 instant (samaya)
maximal interval period	2, 3, etc. instants to 6 months

Apart from this, in eight instants (samayas), bios definetely get accomplished.

During these eight instants, at every instant, at the most thirty-two, forty-eight, sixty, seventy-two, eighty-four, ninety-six, and in the last two instants one hundred eight, one hundred eight bios get accomplished. At the minimal, one gets accomplished.

Interval	maximal	minimal
1st instant	32	1
2nd instant	48	1
3rd instant	60	1
4th instant	72	1
5th instant	84	1
6th instant	96	1
7th instant	108	1
8th instant	108	1

According to averaging knowledge, in all these instants 74 are emancipated at every one of the eight instants.

Thus, $74 \times 8 = 592$ or $\frac{592}{8} = 74$.

When the instants in the set of the past time is multiplied by 592 and divided by 6 months eight instants, the total number of the emancipated souls so far, can be calculated out.

Note: In the verse 4.2926

the set of common men is $\frac{\text{world line}}{[\text{linear finger}]^{5/8}} - 1$.

This measure has been written as 1 | 3 | 1 | showing that first square-root of linear finger, say F, is $(F)^{1/2}$ third square-root of linear finger, F, is $(F)^{(1\backslash 2)^{(3)}} = F^{1/8}$

Then, $\frac{L}{(F)^{1/2}(F)^{1/8}} = \frac{L}{(F)^{5/8}}$

Hence, the given number is $\frac{\text{world line}}{[\text{linear finger}]^{5/8}} - 1$

The same style of writing is similar to that adoptad in the Ṣaṭkhaṇḍāgama of Puṣpadanta and Bhūtabali. In the 17th verse of Dravya pramāṇānugama, the measure of the set of illusive-visioned bios is given in the following words, "--------- tāsiṁ seḍhīṇaṁ vikkhambha sūcīaṅgula vaggamūlaṁ vidiya vaggamūla guṇideṇa", p.131, 1941.

TECHNICAL TERMS

HUMAN UNIVERSE (MANUṢYA LOKA) : In the very central portion of the mobile-bios-channel (trasa nālī), on the upper part of the Citrā earth, there is a cylindrical shaped universe with diameter of 4500000 yojanas of the base and a height of 100000 yojanas (bāhalya). Area of the base is 16009030125000 square yojanas and the volume is 1600903012500000000 cubic yojanas. (vv.4.6-10)

JAMBŪ ISLAND : In the very central portion of the human universe, with a similar circular appearance, there is the Jambū island with a diameter of 100000 yojanas. (v.4.11)

KHA KHA PADASSAṀ SASSA PUḌHAṀ : This denotes the form of a fraction $\frac{23213}{105409}$ in case of circumference portion left after the avasannāsanna unit has been extracted through the square-root operation. Similarly, for area, the fraction is $\frac{48455}{105409}$. Their coefficient is connected with the last unit, ultimately built up of endlessly endless ultimate-particles, denoted by kha kha. All these calculations may be seen in R.C.Gupta's paper, IJHS, 10.1, 1973, 29-46. (vv.4.56-63)

THE METHOD OF THE DIVISOR (JUTTI HĀRASSA) : The plane and mountainous regions have widths in a proportion given by 1, 2, 4, 8,16, 32,16, 8, 2,1, like the belts of latitudes, dividing the Jambū island. The total is 190 reckoning rods (śalākās) which works as a divisor for the proportionate division of the Jambū's diameter. (v.4.104)

CATURTHĀṀŚA PARIDHI :

QUADRANT ARC OF A CIRCLE (DHANUṢA IN FORM OF ONE FOURTH OF CIRCUMFERENCE) :

$$(\text{one fourth circumference})^2 = (\text{chord of one fourth circumference})^2 \times \frac{5}{4} \quad \text{.....(v.4.70)}$$

JĪVA :

CHORD (JĪVA) : Here, height of segment is called bāṇa. In terms of the bāṇa (h) and the diameter (vistāra), the value of the chord is given as follows :

$$\text{chord} = \sqrt{4\left[\left(\frac{\text{diameter}}{2}\right)^2 - \left(\frac{\text{diameter}}{2} - h\right)^2\right]}$$

where, h is the height of the segment. (v.4.180)

DHANUṢA :

ARC (DHANUṢA) : can be given in terms of the diameter and height of segment (bāṇa), or h :

$$\text{Arc} = \sqrt{2\left[(\text{diameter} + h)^2 - (\text{diameter})^2\right]}. \quad \text{(v.4.181)}$$

BĀṆA (HEIGHT OF SEGMENT) :

$$\text{Bāṇa} = \frac{\text{diameter}}{2} - \left[\frac{(\text{diameter})^2}{4} - \frac{(\text{chord})^2}{4}\right]^{1/2}$$

Note: The use of negative sign before the square-root is important. It could be $\pm$ as per rules. (v.4.189)

SAMAYA: The time taken by an ultimate particle to transgress to the next space-point (with minimum velocity) is the indivisible time called instant (samaya). (v.4.284-4.285)

Note : For further technical terms, vide appendix. These terms are concerned with the time units. These lead to number-measure (saṁkhyāmāna) used for denoting the cardinal of the existential sets. For their detailed relations, vide appendix.



PAṂCAMO MAHĀDHIYĀRO

INTRODUCTION

This chapter gives the measure of the immobile-bios universe (sthāvara loka), the horizontal mobile-bios universe (trasa loka), the number of islands and oceans, distribution with name, various types of areas and their comparability. Various types of phasas (pariṇāmas) or transforms of subhuman bios, comparability and immersion (volume) have been described.

The description extends upto Svayaṁbhūramaṇa sea. The initial, middle or average, and external diameters of the ring shaped islands and seas are calculated and then their areas are calculated and compared (vv.5.34 et seq.)

The description of Nandīśvara island is of great importance as it is most popular among the community and its structure alongwith its contents may be seen at very many places and temples. This is the eighth ring island from the Jambū island.

Formulae for finding out the gross area of islands and seas are given, (vv.5.241 et seq.). The comparability between areas of these is given in nineteen aspects of increase of areas among these islands and seas. (vv.5.245.277)

The measure of the sèt of fire bodied bios (tejas kāyika) etc. is calculated through a long procedure and symbolism. The method of spread, give and multiply is again predominant here. The placing of a great amount of symbolism here is important to note, as this appears in abundance in the 13th century A.D. commentary of the Gommaṭasāra, the Jīva Tattva Pradīpikā by Keśava Varṇī. Either it has been from some original text or else from the former, can not be ascertained, or it might have come as tradition. This will be discussed. (vv. 5.278-279 et seq.)

The option of immersion is also given in details, through a repeating mathematical process. (v.318 et seq.)

Table - 5.1

Symbolism	Transliteration	Text	Verse
square rāju area unit	$\overline{\overline{49}}$	$\overline{\overline{४९}}$	(v.5.6)
plus (addition)	dhaṇa	धण	(v.5.33)
one lac	100000	१०००००	(v.5.32)
$\frac{1}{512}$ rāju	$\bar{3}\bar{5}8\bar{4}$	$\bar{३}\bar{५}\bar{८}\bar{४}$	(v.5.33)
minus (subtraction)	ṛṇa	रिण	(v.5.34)
fraction $\left(\frac{9375}{4}\right)$	9375_{4}	$९३७५_{४}$	(v.5.33)
Paṇavaṇṇādhiyachassaya koḍiotettisā lakkhāṇi (decimal notation)	6553300000	६५५३३०००००	(v.5.54)
Tadiyapaṇasatta du kha doigi chattiya suṇṇa ekka aṅka kame (decimal place value)	10361202753	१०३६१२०२७५३	(v.5.55)
Bāhattari juda duscha sakoḍitettisā lakkha cauvaṇṇa sahassāiṁ igisayaṇaudi (decimal-notation)	20723354190	२०७२३३५४१९०	(v.5.56)
base diameter	mu	मू	(v.5.119)
middle diameter	majjha	मज्झ	(v.5.119)
top diameter	sihara	सिहर	(v.5.119)
fraction $\frac{75}{2}$	$7\,5_{2}$	$७५_{२}$	(v.5.182)
kośa	ko	को	(v.5.185)

Symbolism	Transliteration	Text	Verse
daṇḍa	daṇḍa	दंड	(v.5.187)
rajjū	rajjū	रज्जू	(v.5.244)
palya	pa	प	(v.5.244)
minus	–	–	
or (palya-1) or	(pa –1) or	(p –1)	(v.5.244)
jagaśreṇī	–	–	(v.5.249)
$\frac{1}{6}$ rāju	$\overline{42}$	४२	(v.5.249)
yojana	joyaṇa	जोयण	(v.5.249)
yojana	jo	जो	(v.5.249)
khettaphala	khetta	खेत्त	(v.5.249)
kosa	kosa	कोस	(v.5.249)
puḍhavī	pu	पु	(v.5.280)
apa	a	अ	(v.5.280)
teu	te	ते	(v.5.280)
vāu	vā	वा	(v.5.280)
sāhāraṇa	sā	सा	(v.5.280)
patteya	pa	प	(v.5.280)
biindiya	bi	बि	(v.5.280)
tiindiya	ti	ति	(v.5.280)
cauindya	ca	च	(v.5.280)
asaṁjñī	a	अ	(v.5.280)
saṁjñī	sa	स	(v.5.280)

Symbolism	Transliteration	Text	Verse
bādara (thūli)	bā	बा	(v.5.280)
sūkṣma(idara)(suhuma)	su	सु	(v.5.280)
pajjattā	pa	प	(v.5.280)
apajjattā	a	अ	(v.5.280)
asaṁkhyāta loka	≡a	≡a	(v.5.280)
asaṁkhyāta	9	९	(v.5.280)
pratarāṅgula	4	४	(v.5.280)
palya divided by asaṁkhyāta	$\frac{pa}{a}$	प/a	(v.5.280)
loka divided by saṁkhyāta (numerate)	≡ | ś	≡ | श	(v.5.280)
plus one	⌐—	⌐—	(v.5.280 contd.)
savvajīva rāśi	16	१६	(understood ,,)
vaṇapphadikāiya jīva parimāṇa	13 ≡	१३ ≡	[here 13 denotes the saṁsārī jīva rāśi elsewhere, but its multiplication by ≡ (the universe) is not understandable in this view]

[Elsewhere 3 denotes the set of accomplished bios]

minus one	⌐—	⌐—	"
vassa (varṣa) (vāsa)	va	व	(v.5.282)
dina	di	दि	(v.5.282)
māsa	mā	मा	(v.5.282)
puvvaṅga	puvvaṅga	पुव्वंग	(v.5.282)
puvvakoḍi	puvvakoḍi	पुव्वकोडि	(v.5.282)
saṁkhyāta	4	४	(v.5.282)
square-root (mūla)	mū	मू	(v.5.282)
cube of finger (ghanāṅgula)	6	६	(v.5.318)
rāju	rā	रा	(v.5.314)

COMMENTARY

(v.5.5 -12)

The universe of the immobile (sthāvara) bios is the space, related with the aether (dharma) and antiaether (adharma) fluents, in which there is movement and rest of the bios and matter (pudgala). This is denoted by

≡ .....(5.1)

The universe of the mobile (trasa) bios is situated from the base of the mandara mountain, as a cuboid with a square base of side of one rāju and a height of one lac yojanas. This is denoted by

$\overline{\overline{49}} \mid 100000 \mid$ .....(5.2)

The number of the islands and seas both is a total of twenty-five crore squared (half of these are the islands and the remainig are the seas) uddhāra palyas of hair-heads content as detailed in the previous chapter.

Note : Vide verse 5.27 for comparison.

The total number of all the islands and seas is innumerate and they are ring shaped circular. Out of these the first is the Jambū island. At the end of all, there is the sea (?) and in the middle are the islands and seas.

In the very central portion of the Citrā earth, these are situated the islands and seas surrounding one after the other, within a region of one square rāju, one rāju in length and one rāju in breadth.

In may be noted that all the seas are situated on the Vajrā earth, while cutting through the Citrā earth. Actually the thickness of the Citrā earth ia 1000 yojanas and all the seas are having a depth of 1000 yojanas. Hence, the statement about the Vajrā base of the seas is given.

(v. 5.27)

In this verse, the total number of all the islands and seas is given by the hair-head content of the two and half uddhāra sāgaras as reduced by 64.

Note : In the TLS, v.396 and its commentary, the number of all islands seas is given as follows

$$\log_2(\text{jagaśreṇi}) = [\frac{\log_2 \text{palya}}{\text{innumerate}} \times (\text{slightly more } \{\log_2 \text{palya}\}^2) \times 3] . \quad \ldots\ldots (5.3)$$

When 3 $\log_2$ 2 are subtracted from the left hand side. Then the logarithm is base two of a rāju are obtained, as 1 jagaśreṇi = 7 rājus.

$$\therefore \log_2(\text{rāju}) = [\frac{\log_2 \text{palya}}{\text{innumerate}} \times (\text{slightly more } \{\log_2 \text{palya}\}^2) \times 3] - 3. \quad \ldots\ldots (5.4)$$

The $\log_2$ Jambūdvīpa are slightly more $(\log_2 \text{palya})^2$, which are subtracted from those of $\log_2$ (rāju). Whatever remains is the number of island and seas. The names of 32 islands and 32 seas of begining and end have been stated, out of which meny island seas have the similar names, for the words are finite and island seas are innumerate.

Note: In volume 1 of TPT, (v.1.131),

$$\text{jagaśreṇī} = \{\text{ghanāṅgula}\}^{\{\log_2 \text{palya / innumerate}\}} . \quad \ldots\ldots (5.5)$$

Hence, $\log_2^{(\text{jagsreṇī})} = \{\log_2 \text{palya / innumerate}\} \log_2 (\text{aṅgula})^3$

$$= \{\log_2 \text{palya/ innumerate}\} \times 3 \times \log_2 (\text{aṅgula}) . \quad \ldots\ldots (5.6)$$

Note:

1. Comparison of (5.3) and (5.6) may be made. This may be discussed in the TLS, v.396, later on.

2. $\log_2 (\text{aṇgula}) = \log_2 \text{palya}(\log_2 \text{palya})^2$

Hence, from (5.6) we have

$\log_2 (\text{jagaśreṇī}) = [\log_2 \text{palya/ innumerate}] \times 3 \times [(\log_2 \text{palya})^2]$

The difference in the statement of verse 7 and verse 27 of this 5th chapter is worthy of attention, where the idea of logarithms requires special care. Ṭoḍaramala also could not analyse this situation, owing to $\log_2^3$ coming in picture, were either 2 of 4 could be bisected in integers.

(vv. 5.31-36)

The diameter or width of the Jambū island is 100000 yojanas, and the successive rings of islands and seas are double of the preceding : 100000, 200000, 400000, and so on.

The above measures are carries upto the Bhūtavara sāgara sea successively. Above is measures of the widths of the rings of islands and seas are as follows :

Table : 5.2

Here jagaśreṇi or world line will be denoted by L

Name	Width of the ring
Yakṣavara island	$L \div 3584 + \frac{9375}{16}$ yojanas
Yakṣavara sea	$L \div 1792 + \frac{9375}{8}$ yojanas
Devavara island	$L \div 896 + \frac{9375}{4}$ yojanas
Devavara sea	$L \div 448 + \frac{9375}{2}$ yojanas
Ahīndravara island	$L \div 224 +$ 9375 yojanas
Ahīndravara sea	$L \div 112 +$ 18750 yojanas
Svayaṁbhū islands	$L \div 56 +$ 37500 yojanas
Svayaṁbhū sea	$L \div 28 +$ 75000 yojanas

Formula for finding out the initial, middle and exterior diameters of the ring. Before this, it may be noted that after the Svayaṁbhūramaṇa sea. In the above measures L can be convevted into rājus as 7 rājus. Thus $L \div 28$ may be written as $\frac{7}{28}$ rājus or $\frac{1}{4}$ rāju. Hence, the space remaining in the east west direction on the middle universe having a breadth of 1 rāju and a height of 100000 yojanas, is given by the following :

$$\{1 \text{ rāju} - [(\tfrac{1}{4} \text{ rāju} + 75000 \text{ yojanas}) + (\tfrac{1}{8} \text{ rāju} + 37500 \text{ yojanas})$$

$$+ (\tfrac{1}{16} \text{ rāju} + 18750 \text{ yojanas}) + \text{------} + 50000 \text{ yojanas}]\} \quad \text{.....(5.7)}$$

Although, an infinite series is subtracted from one rāju, still then, that length remains slightly less than $\frac{1}{2}$ rāju. This proves that the tradition was in the knowledge of the limit of the sum of the series haning innumerate number of terms in geometrical progression.

(5.35)

Generalized formula :

Let the initial diameter of the ring shaped island or sea be D_a^d , the middle and external being denoted by D_m^d and D_b^d . Let $2n^{th}$ sea have a width of D_{2n} and the width of the (2n+1)th island be D_{2n+1}. Further, let the diameter of Jambū island be D_1. Then

$$D_a^d = D_{2n+1} \times 2 - D_1 \times 3 \quad \text{.....(5.8)}$$

$$D_m^d = D_{2n+1} \times 3 - D_1 \times 3 \quad \text{.....(5.9)}$$

$$D_b^d = D_{2n+1} \times 4 - D_1 \times 3 \quad \text{.....(5.10)}$$

The circumference of n th island or sea

$$= \frac{D_1\sqrt{10}}{D_1} \times [\text{ Diameter of n th island or sea}] \quad \text{..... (5.11)}$$

(v. 5.35)

(v.5.36)

The formula for the similarity of two ratios are given as earlier.

Let the exterior diameter of n th island or sea be D_{nb} and the internal diameter be D_{na}^d .

Then,

$$\frac{\left(D_{nb}^d\right)^2 - \left(D_{na}^d\right)^2}{\left(D_1\right)^2} = \frac{\frac{\pi}{4}\left(D_{nb}^d\right)^2 - \frac{\pi}{4}\left(D_{na}^d\right)^2}{\frac{\pi}{4}\left(D_1\right)^2}.$$

.....(5.12)

= The number of Jambū like areal pieces contained on the area of island or sea given.

Note: $D^d_{na} = D^d_{(n-1)b}$, because the external diameter of any island or sea is the initial diameter of the succeeding sea or island.

For example, D_a etc. for Svayaṁbhūramaṇa sea are

$$D^d_a = \left(\frac{L}{28} + 75000\right) \times 2 - 3 \text{ lac} = \frac{L}{14} - 150000 \text{ yojanas}$$

$$D^d_b = \left(\frac{L}{28} + 75000\right) \times 3 - 3 \text{ lac} = \frac{3L}{28} - 75000 \text{ yojanas}$$

$$D^d_c = \left(\frac{L}{28} + 7500\right) \times 4 - 3\text{lac} = \frac{L}{7} \quad \text{or} \quad 1 \text{ rāju}$$

The next verse (5.35) gives the formula for finding out the circumferance (gross and fine) of the desired island or sea from data of Jambū island.

Gross circumference of Jambū island = 300000 yojanas

Fine circumference of Jambū island = 316227 yojanas, 3 kośa, 128 dhanuṣa and slightly greater than $13\frac{1}{2}$ aṅgula.

Thus,

circumference of Lavaṇa sea =

$$\frac{\text{(circumference of Jambū island)} \times \text{(external diameter of Lavaṇa)}}{\text{cirumference of Jambū island}} \quad \ldots\ldots\ldots(5.13)$$

Gross circumference of Lavaṇa sea $= \frac{300000 \times 500000}{100000}$

Fine circumference of Lavaṇa sea $= \frac{\left(316227\text{yoj.}3\text{kosa.}128\text{dha.}13\frac{1}{2}\text{ang}\right) \times 500000}{100000}$

Similarly these two types of circumferences can be obtained for any island or sea.

(v.4.36)

The examples are as follows :

Jambū like areal pieces of Lavaṇa sea

$$= \frac{(\text{external diameter})^2 - (\text{initial diameter})^2}{(\text{diameter of Jambū island})^2} \quad \text{.....(5.14)}$$

$$= \frac{(500000)^2-(100000)^2}{(100000)^2} = 24 \text{ pieces}$$

Jambū like areal pieces of Dhātakikhaṇḍa island

$$= \frac{(1300000)^2-(500000)^2}{(100000)^2} = 144 \text{ pieces}$$

Similarly, for Kāloda, the pieces are 672.

(vv. 5.52-61)

The eighth island from the Jambū island is the world noted "Nandīśvara" island surrounded by the Nandīśvara sea.

The ring shaped island has a width of 1638400000 yojanas. For getting the width of the desired order of the ring (either island or sea), two is raised to the order of the ring as reduced by unity, and the result is then multiplied by one lac.

Here, the order number of the Nandīśvara island is 15 th as counted from the Jambū island, hence, as per methodic rule given earlier, 2 is raised to power (15 −1) or 14 and the result is multiplied by 100000. Thus, the width is given by

$$2^{(15-1)} \times 100000 = 1638400000 \text{ yojanas.}$$

As per rule already given,

initial diameter of Nandīśvara island = (1638400000 × 2) − 300000

= 3276500000 yojanas

middle diameter of Nandīśvara island = (1638400000 × 3) − 300000

= 4914900000 yojanas

external diameter of Nandīśvara island = $(1638400000 \times 4) - 300000$

= 6553300000 yojanas.

Similarly,

initial circumference of Nandīśvara island = $\sqrt{(3276500000)^2 \times 10}$

= 10361202753 yojana, 2 kośa, 237 dhanuṣa, 3 hastas and slightly greater than 12 aṅgulas.

middle cirumference of Nandīśvara island = $\sqrt{(4914900000)^2 \times 10}$

= 15542278471 yojanas, 3 kośas, 1692 dhanuṣas 2 hastas and slightly greater then 5 aṅgulas,

external circumference of Nandīśvara island = $\sqrt{(6553300000)^2 \times 10}$

= 207223354190 yojanas, 1 kośa, 1051 dhanuṣas, 2 hastas and slightly greater than 2 aṅgulas

In the very central portion of the Nandīśvara island, towards the east is the Añjanagiri mountain, which is 1000 yojanas deep, 84000 yojanas high and having an all round width of 84000 yojanas. In all the four directions of that mountain there are four rectangular lakes. Out of these, every lake has rectangle-section with a width of 100000 yojanas, and a depth of 1000 yojanas. This is the structure in all the four directions. Then is a mountain for each, with a height of 10000 yojanas, width 10000 yojanas and depth 1000 yojanas. On both external corners of the lakes, there are two mountains, called Ratikara, with a width and height of 1000 yojanas and depth of 250 yojanas.

Note :1. In the Tattvārtha rājavārtikam, ch.3, v.35, p.198, the inner interval between the lakes is 65545 yojana, middle interval is 140602 yojanas and external interval is 223661 yojanas.

Note :2 This is on consideration of the three types of intervals between the ractangular lakes of the Nandiśvara island.

A few years earlier a problem was raised by Shri D. C. Jain, principal, of Gaurajhamara (Saugor, M. P.) about the space interval between any two adjacent lakes of the Nandīśvara island[1] situated in the four directions of the cylindrical mount, Añjanagiri, in each cardinal direction, having a diameter of 84000 yojanas each, and the lakes having each side equal to 100000 yojanas and a depth equal to 1000 yojanas.

The Nandīśvara island and the Añjana giris

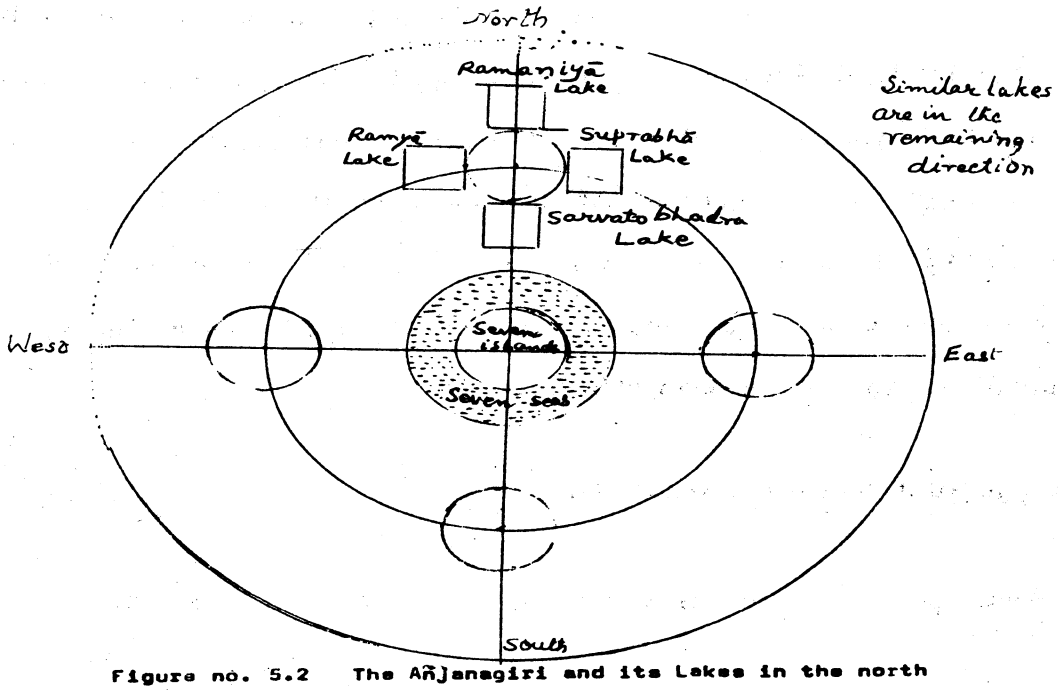


Figure no. 5.2 The Añjanagiri and its Lakes in the north

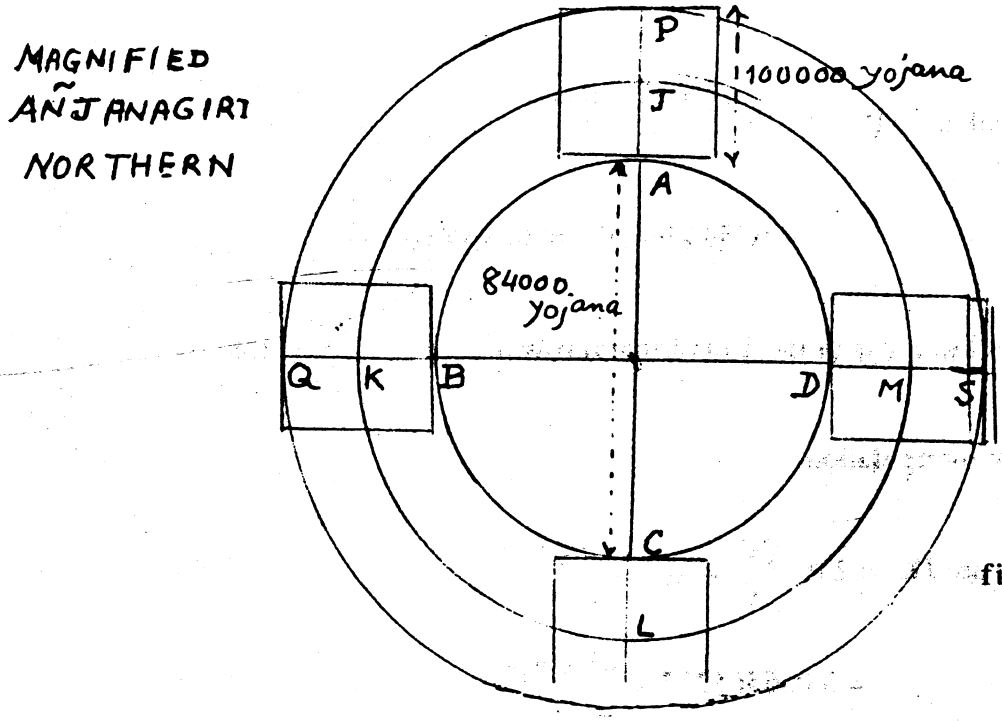


figure 5.1

Let us take the lakes touching the mount at each of the four cardinal directions. Each one projects out wards to a distance of 100000 yojanas. The points in context are the A, B, C, D, J, K, L, M and P, Q, R, S respectively, as initial, intermediate and exterior, joined with circles of radii 42000 yojanas, 92000 yojanas and 142000 yojanas holding relation with the diameter 84000 yojanas of the Añjanagiri, AC, then the points JL and PR. The intervals are the circular arcs AB, JK and PQ, respectively, called the initial, intermediate and the exterior between the lakes in the northern and the western directions, as shown in the figure 5.2. Let the centre of the Añjangiri be denoted by o.

Thus, the circular intervals are given as under :

$$4\times \text{ initial interval} = 4 \times \text{arc AB} = 2\pi\ OA = \pi \times AC = \pi \times 84000$$

$$= 3.121190476 \times 84000 = 262179.999999$$

or

$$\text{initial interval arc AB} = \frac{262179.999999}{4}$$

$$= 65544.99997 = 65545 \text{ yojanas.}$$

This is the value given in the Tattvārtharājavārtika, ch.3, v.35, p.198.

Similarly, on interpolation,

$$\text{intermediate arc JK} = 2\pi \frac{OJ}{4} = \pi \times \frac{184000}{4}$$

$$= 3.056565217 \times \frac{184000}{4}$$

$= 140601.9999$

$= 140602$ yojanas approximately.

again,

exterior arc $PQ = 2\pi \frac{OP}{4} = \pi \times \frac{284000}{4}$

$= 3.150154929 \times \frac{284000}{4}$

$= 223660.9999$

$= 223661$ yojanas approximately.

From the above calculations of the arcs AB, JK, PQ, it is important to note that the values of π have been taken, respectively, as 3.121190476, 3.056565217 and 3.150154929 in order to get the values of the arcs as 65545, 140602 and 223661, respectively, as quoted in the Tattvārtharājavārtikaṁ of Akalaṅkācārya (c. 8 th century A.D.)[2] : these values are not have been given elsewhere.

Thus, the problem has shifted to the problem of a uniformity in the values of π .

REFERENCES:

1. For description of the Nandīśvara island, cf. The Tiloyapaṇṇattī of Yativṛṣabhācārya, ed. A. N. Upadhye and H. L. Jain, Part 2, Jivaraj Granthamala, Sholapur, 1952, vv.52 et seq. Vide also the Tiloyapaṇṇattī of Yativṛṣabhācārya, part 3, com. Āryikā Viśuddhamati Mātājī, ed. C. P. Patni, Lucknow,1988, vv.52 et seq.

2. For the measures of circular arcs vide Tattvārtha Rājvārtika/Tattvārthavārtikaṁ of Ācārya Akalaṅka with Hindi summary, parts1, 2, Jnana Pith Kashi, 1949, 1957.

The follwing is the full diagram of the Nandīśvara island and its contents:

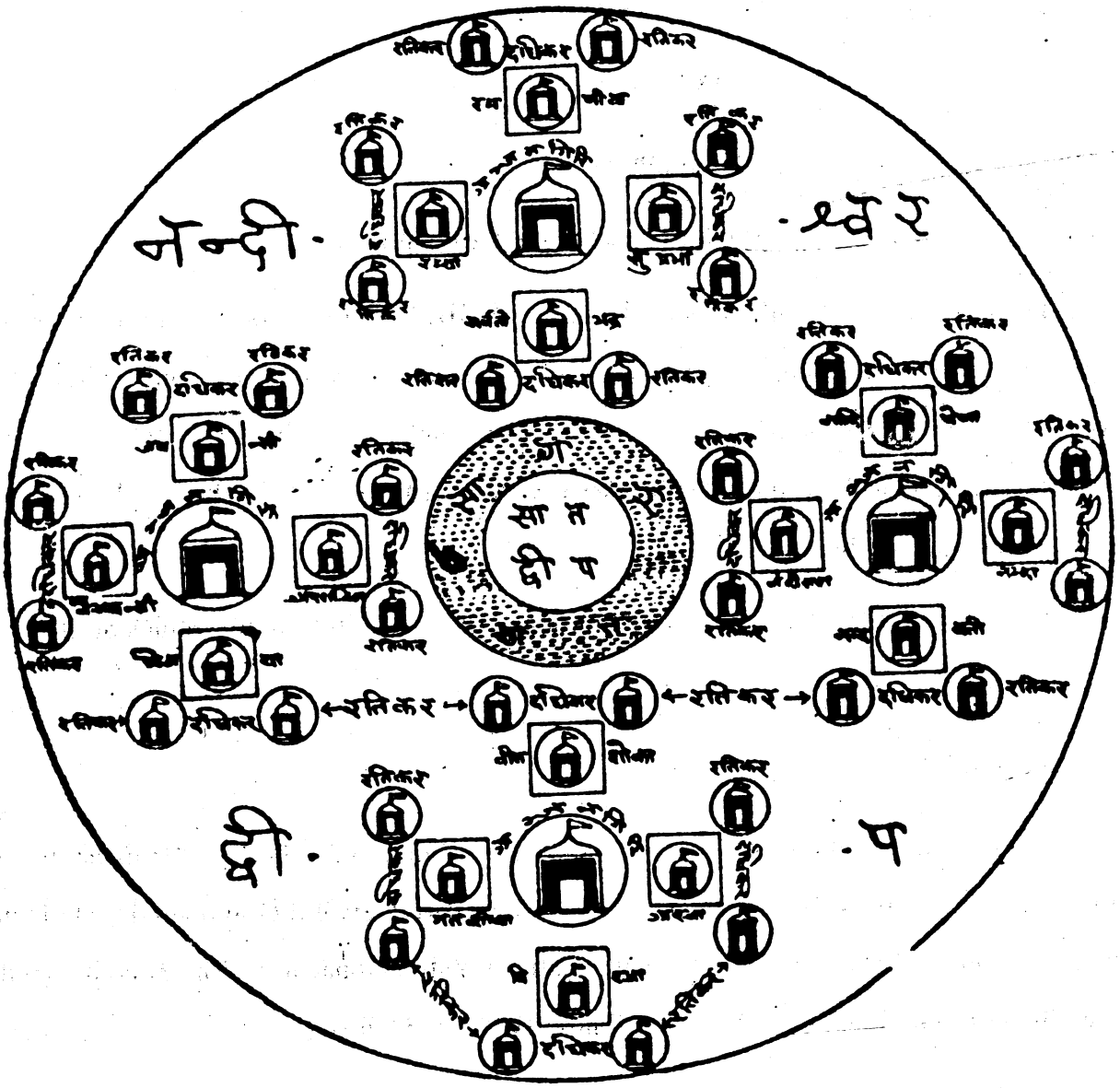


figure 5.3

(v.5.127-130)

Here the figure is given about the Kuṇḍalavara island, and the Kuṇḍalavara mountain is situated in its centre. Jinendra peaks are situated on it, and other 16 peaks, alongwith the names of the lords of these peaks are as shown in the diagram.

The Jaina temples situated on the accomplishment-peak of the Niṣadha mountain as described in IV.155 [TPT (V)] , have the similar diameter etc., with a length of one kośa, breadth of $\frac{1}{2}$ kośa and height of $\frac{3}{4}$ kośa.

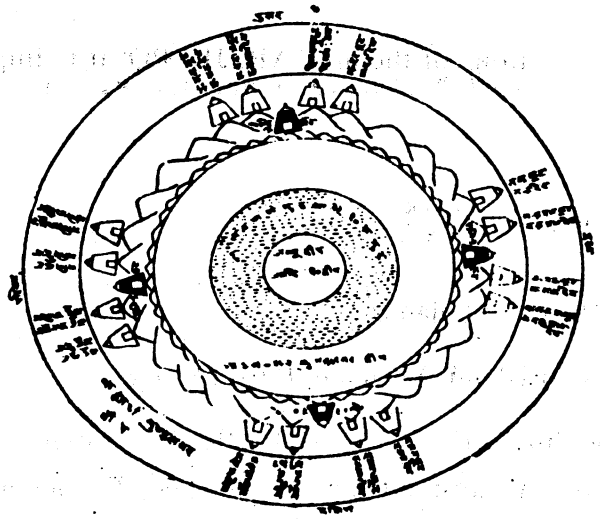


Figure 5.4.1

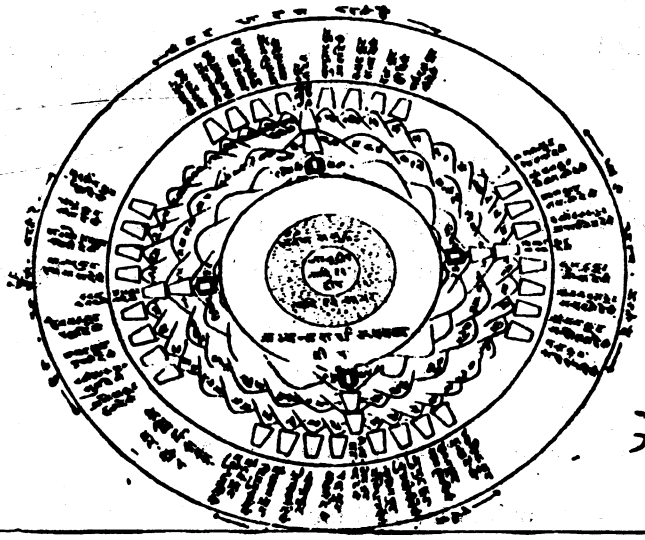


Figure 5.4.2

V. 5.166 :

(v.5.166)

In the interior part of these peaks there are four accomplishment peaks, on which, as shown earlier, there are similar Jaina temples as those situated on the Niṣadha mountain. Some preceptors accept the eight accomplishment peaks, four in cardinal directions and four in sub-cardinal directions, similar is those of Niṣadha mountain in height etc.

(vv.5.241 et. seq.)

From here and what follows, areas and their comparison for ring islands and seas have been studied. First of all gross areas are found out. The formula is given by takin $\pi = 3$. Thus, circumference is 3 times the (gross) diameter, and on multiplying this circumference by $\frac{\text{Diameter}}{4}$, gives the gross area of the circular region. (v.5.241)

For example, Diameter of Jambū island is 100000 yojanas, hence, its circumference (gross) = $\pi D = 3 \times 100000 = 300000$ yojanas. .....(5.15)

Similarly, its area (gross) = $C \times \frac{D}{4} = 300000 \times \frac{10000}{4}$ ..... (5.16)

= 7500000000 square yojanas.

General formula for finding out the area of island and sea in form of rings:

From the desired area's diameter (width), one lac is reduced, the remainder is multiplied by nine, giving the length (āyāma) for the desired island or sea. Then this length is multiplied by the width of the island or sea ring, which gives the area for the islands or seas.

For example, width of Lavaṇa sea is 2 lac yojanas (2 lac – 1 lac) = 1 lac and 1 lac × 9 = 9 lac length in yojana. Then 9 lac × 2 lac = 180000000000

Square yojanas is the area of Lavaṇa sea.

The gross area could also be calculated on adding the measures of the initial, middle and external diameters, and then on multiplying the diameters sum by the width.

(v.5.242-243)

For example :

The sum of the three types of diameter for the Lavaṇa sea

= 1 lac + 3 lac + 5 lac = 9 lac.

Then 9 lac × 2 lac gives 180000000000 square yojanas of area of the Lavaṇa sea.

The new symbolic formula is :

Area of the n th island or sea = $[D_n - D_1] (3)^2 \{D_n\}$ ..... (5.17)

where D is the width of any island or sea.

Here, $[D_n - D_1] (3)^2$ has been called length.

D_n is the width of n th island or sea.

This formula may also be written in the form, on writing

$$D_n = 2^{(n-1)} D_1, \qquad \text{.....(5.18)}$$

The area of n th island or sea

$$= 9 [2^{n-1} D_1 - D_1] 2^{n-1} D_1$$

$$= (3 D_1)^2 [2^{n-1} - 1] 2^{n-1} \qquad \text{..... (5.19)}$$

Formula for finding area of ring shaped region is :

$$\text{Gross area} = D_n \left[D^d_{na} + D^d_{nm} + D^d_{nb} \right] \qquad \text{..... (5.20)}$$

Where, D^d_{na} etc. are diameters and not widths.

Here,

$$D^d_{na} = [2\{2^{n-2} + 2^{n-3} + \ldots\ldots + 2\} + 1] D_1 \qquad \text{.....(5.21)}$$

$$D^d_{\cdot} = [2\{2^{n-1} + 2^{n-2} + 2^{n-2} + \ldots\ldots + 2^2 + 2\} + 1] D_1 \qquad \text{..... (5.22)}$$

Now,

$$D^d_{nm} = \frac{D^d_{nb} + D^d_{na}}{2} \qquad \text{..... (5.23)}$$

Hence, on substituting the above values

$$\text{Gross area} = 2^{n-1} D_1 \left[D^d_{na} + \frac{1}{2}\left(D^d_{na} + D^d_{nb}\right) + D^d_{nb} \right] \qquad \text{..... (5.24)}$$

$$= 2^{n-1}(D_1)^2\left[\frac{3}{2}\left\{2+2\left(\frac{2(-1+2^{n-2})}{1-2}\right)+2\left(\frac{2(-1+2^{n-1})}{1-2}\right)\right\}\right] \quad \text{..... (5.25)}$$

$$= 3(2^{n-1})(D_1)^2\left[1+2^{n-1}-2+2(-1+2^{n-1})\right]$$

$$= 3^2\left[2^{n-1}\right](D_1)^2\left[2^{n-1}-1\right] \quad \text{..... (5.26)}$$

(v. 5.243)

Application of formulae:

Hence gross area of Jambū islands etc. are given in the following table :

TABLE - 5.3

S.No.	Name	(width −1 lac)× 9 = length	length × width = gross area
1.	Lavaṇa sea	(2 lac−1 lac) × 9 = 9 lac yojanas	9 lac × 2 lac = 180000000000 square yojanas
2.	Dhātakīkhaṇḍa island	(4 lac − 1 lac) × 9 = 27 lac yojanas	27 lac× 4 lac =1080000000000 squareyojana
3.	Kāloda sea	(8 lac − 1 lac) × 9 = 63 lac yojanas	63 lac × 8 lac = 5040000000000 square yojanas
4.	Puṣkaravara island	(16 lac − 1 lac) × 9 = 135 lac yojanas	35 lac × 16 lac = 21600000000000 square yojanas
5.	Puṣkaravara sea	(32 lac − 1 lac) × 9 = 279 lac yojanas	279 lac × 32 lac = 89280000000000 square yojanas

(v. 5. 244)

This formula is similar to earlier one.

The area of the $[\log_2 \{A_{pj}\} - 1]$th island or sea will be given by

$(A_{pj})\,(A_{pj}-1)$ {9000 crore yojanas} square yojanas. ..... (5.27)

In the previous verse (v.243) of this chapter, the are a of the nth ring-region has been shown to be

$3^2\,(D_1)^2\,[2^{n-1}]\,[2^{n-1}-1]$, which is $9\,(100000)^2\,[2^{n-1}]\,[2^{n-1}-1]$. ..... (5.28)

If we take $n = \log_2 A_{pj} + 1$, then $n-1 = \log_2 A_{pj}$ and

$\therefore \quad 2^{n-1} = A_{pj}$. ..... (5.29)

Thus, the author has demonstrated the use of logarithm here. He has symbolized the minimal peripheral innumerate as 16, and the minimal peripheral innumerete (16 – 1) has been written as 15 .

Similarly, the area of the $\{\log_2 P+1\}$th island. ..... (5.30)

= P (P – 1) × 90000000000 square yojanas,

where P is the palyopama.

Example

Taking Jambū as the initial island, the area of the island which is situated as the one more ahead of the logarithm to base two of the minimal peripheral-innumerate th island, is given by

16 × (16 – 1) × 90000000000 square yojanas, ... (5.31)

where 16 stands for the minimal peripheral innumerate or A_{pj} .

Similarly, taking Jambū as initial island, the area of the island which is situated as the one more ahead of the logarithm to base two of the palyopama th island, is given by

palya × (palya – 1) × 90000000000 square yojanas. ..... (5.32)

The last choice (vikalpa) is about the calculation of area of the last, Svayaṁbhūramaṇa sea. For it, the formula used is of the verse 5.243 or 5.244, i.e.,

the gross area $= D_n\,(3^2)\,(D_n - D_1)$. ..... (5.33)

The width of this sea is

$$D_n = \frac{\text{Universeline}}{28} + 75000 \text{ yojanas.}$$

$$= \frac{L}{28} + 75000 \text{ yojanas} \quad \ldots\ldots (5.34)$$

$$\therefore \text{ gross area } = [\frac{9L}{28} + 675000]\ [\frac{L}{28} + 75000 - 100000 \text{ square yojanas}$$

$\ldots\ldots(5.35)$

$$= \frac{9L^2}{784} + L\,[\frac{9}{28} \times (-25000) + \frac{675000}{28}) - (25000 \times 675000) \text{ square yojanas}$$

$$= \frac{9L^2}{784} + [112500 \text{ square yojanas} \times 1 \text{ rāju}] - 16875000000 \text{ square yojanas}$$

$\ldots\ldots$ (5.36)

This has been estblished as

$$\frac{=9}{784} \text{ dhaṇa rajju } \overline{7}|112500 \text{ riṇa joyaṇāṇi } 16875000000 \quad \ldots\ldots (5.37)$$

application of formula

gross area of Svayaṁbhūramaṇa sea

= (width of Svayaṁbhūramaṇa sea) × 9 × (width of Svayaṁbhūramaṇa sea – 1 lac yojanas)

$\ldots\ldots$ (5.38)

$$= (\frac{\text{jagaśreṇi}}{28} + 75000 \text{ yojanas }) \times 9 \times (\frac{\text{jagaśreṇi}}{28} + 75000 \text{ yojanas} - 10000 \text{ yojanas})$$

$$= \frac{9}{784} (\text{jagaśreṇī})^2 + (112500 \text{ square yojanas} \times 1 \text{ rāju}) - 16875000000 \text{ square yojanas.}$$

$\ldots\ldots(5.39)$

NINETEEN ASPECTS OF COMPARABILITY

(vv 5. 245 et seq.)

This gives a study in group theoretic complex modulo.

From here, the comparability among the widths and areas of the islands and seas in succession through 19 choices has been given.

As a first step, the increase in widths is described.

FIRST ASPECT (1) on comparability

Let the desired island or sea be the n th in number of serial, its width be D_n, and its initial diameter be D^d_{na}. Then,

$$\text{the remaining increase} = 2D_n - \left(\frac{4D_n + D^d_{na}}{3}\right) \qquad \text{.....(5.40)}$$

$$= \frac{2D_n - D^d_{na}}{3}. \qquad \text{..... .(5.41)}$$

Here, $D_n = 2^{n-1} D_1$ and $D^d_{na} = 1 + 2\,[\,2 + 2^2 + \ldots\ldots + 2^{n-2}]$ .....(5.42)

Thus,

$$D^d_{na} = [\,1 + 2\,(2^{n-1} - 2)\,]\,D_1 \qquad \text{..... (5.43)}$$

$$\therefore \quad \frac{2D_n - D^d_{na}}{3} = \frac{2^n D_1 + \left[-1 - 2^n + 4\right]D_1}{3} = D_1 \qquad \text{..... (5.44)}$$

$$= 100000 \text{ yojanas.} \qquad \text{..... (5.45)}$$

Explanation

Thus, the sum of the widths of the preceding islands and seas in succession, when added by one lac yojanas, becomes the width of the next succeeding island or sea. For example, the sum of the widths of Jambū island and Lavaṇa sea is 1 + 2 = 3 lac. The width of the next island in the same direction is 4 lac. Thus, the increase is 4 lac – 3 lac = 1 lac yojanas.

The general formula for finding this increase is given below. This increase has been called the remainder increase.

Remainder increase

$$= 2 \text{ (width of desired island or sea)} - \frac{(4 \times \text{width of desired island or sea} + \text{its initial diameter })}{3}$$

$$= \frac{2 \text{ (desired island's or sea's width)} - \text{(its initial diameter)}}{3}$$

Example

Let us take the case of Puṣkaravara island. To find out an increase in its width, it is given that the width of the ring Puṣkaravara island is 16 lac yojanas and its initial diameter is 29 lac yojanas.

Hence, the remaining increase

$$= (2 \times 16 \text{ lac}) - \left(\frac{4 \times 16\text{lac} + 29\text{lac}}{3}\right) = 32 \text{ lac} - \frac{93 \text{ lac}}{3} \quad \text{..... (5.46)}$$

$$= 32 \text{ lac} - 31 \text{ lac yojana} = 1 \text{ lac yojana.} \quad \text{..... (v. 5.245)}$$

FIRST ASPECT

(2) On comparability of Increase in width

From the width of the desired islands or seas, two lac is subtracted. The remainder is added to exterior diameter and divided by five. The quotient becomes half of the initial diameter of desired island or sea alongwith half lac.

Symbolically.

$$50000 \text{ yojanas} + \frac{D^d_{na}}{2} = \frac{D^d_{nb} + (D_n - 200000)}{5}. \qquad \ldots\ldots\ldots (5.47)$$

Example

It is required find out the initial diameter of Dhātakīkhaṇḍa island with half lac yojanas. The width of this ring island is 4 lac yojanas, initial diameter is 5 lac yojanas and the external diameter is 13 lac yojanas. Hence,

$$50000 \text{ yojanas} + \frac{\text{initial diameter of Dhātakīkhaṇḍa island}}{2}.$$

$$= \frac{\text{its external diameter} + (\text{width} - 200000 \text{ yojanas})}{5} \qquad \ldots\ldots\ldots (5.48)$$

$$= \frac{1300000 + (400000 - 200000)}{5} = \frac{1500000}{5} = 300000 \text{ yojana s.}$$

Thus,

$$\frac{\text{initial diameter}}{2} = 300000 - 50000 = 250000, \qquad \ldots\ldots\ldots (5.49)$$

and on solving this, we easily get the identily that initial diameter is 5 lac yojanas.

..(vv. 5.246-247)

SECOND ASPECT

First Principle

Relative to width along a direction of (arbitrary) all internal islands seas, there is an increase of $1\frac{1}{2}$ lac yojanas along the direction about the successive island or sea.

$$\text{The increase} = \left\{\frac{1}{2}\left(D^d_{nb}\right) - D^d_{na}\right\} = 1\frac{1}{2} \text{ yojanas} \qquad \ldots\ldots (5.50)$$

Thus,

relative to half width of Jambū island the width in mono direction of Lavaṇa sea is $1\frac{1}{2}$ yojanas more. This process continues upto the Svayaṁbhūramaṇa sea.

..... (v. 5. 248)

Example

Let the desire sea be Kālodaka. To obtain the increase in its width relatively,

width of Kālodaka sea is 8 lac yojanas

external diameter is 29 lac yojanas

initial diameter is 13 lac yojanas

$$\text{The desiried increase} = \frac{2900000}{2} - 1300000 \text{ yojanas}$$

$$= 150000 = 1\frac{1}{2} \text{ lac yojanas.}$$

..... (v.5.248)

Second Principle

The sum of the widths of the preceding islands or seas, from the desired island or sea is half of the initial diameter.

Let the desired island be Puṣkaravara. Its width is 16 lac yojanas and initial diameter is 29 lac yojanas. Half of this initial diameter is $\frac{29}{2}$ = 1450000 yojanas. This is equal to the sum of widths of Jambū island, Lanaṇa sea, Dhātakīkhaṇḍa and Kāloda sea in one direction from the centre of Jambū. Thus,

$$\left(\frac{1}{2} \text{ lac} + 2 \text{ lac} + 4 \text{ lac} + 8 \text{ lac}\right) = 1450000 \text{ yojanas.}$$

.....(v. 5.249)

THIRD ASPECT

Symbolically,

here the described increase (v. 5.250)

$$= \frac{(3D_n - 300000) - \left\{3\frac{D_n}{2} - 300000\right\}}{2} \quad \text{.....(v.5.51)}$$

Relative to the width of a desired sea, there is four times increase in the mono-direntional width of the successive sea.

Example

Width of Lavaṇa sea = 2 lac yojanas

Relative to it the increase in width of Kāloda sea = 8 – 2 = 6 lac yojanas.

Relative to width 8 lac yojanas of Kāloda sea, there is an increase of

(32 lac yojanas – 8 lac yojanas =) 24 lac yojanas.

Relative to 32 yojanas width of Puṣkaravara sea, the mono-directional increase in width of Vāruṇīvara sea = 128 lac – 32 lac = 96 lac yojanas. This is 24 × 4. Hence, there is four times increase.

The last choice is the increase in Svayaṁbhūramaṇa sea in a single direction relative to width of Ahīndra..ara sea. It is

$$= \frac{\text{universe line} \times 3}{112} + 56250 \text{ yojanas.} \quad \text{..... (v. 5.250)}$$

As per formula given above, that increase of Puṣkaravara sea relative to Kāloda sea, the increase

$$= \frac{(3 \times 3200000 - 300000) - \left(\frac{3 \times 3200000}{2} - 300000\right)}{2} \text{ yojanas}$$

= 2400000 yojanas.

Similarly, the described increase in the width of Svayaṁbhūramaṇa sea, relative to that of Ahīndravara sea

$$= \frac{3\left(\frac{L}{28} + 75000\right) - 300000\} - \{\frac{3}{2}\left(\frac{L}{28} + 75000\right) - 300000\}}{2}$$

$$= \frac{3L}{112} + 56259 \text{ yojanas.} \qquad \ldots\ldots\ldots (5.52)$$

This can be proved to be fourtimes the width of the preceding sea.

FOURTH ASPECT

(1) There is an increase of four times as reduced by two lac in the width in monodirection of the succeeding sea over the preceding collection of seas.

Example

The width of Kāloda sea is 8 lac and that of Lavaṇa sea is 2 lac,

thus, it is 8 – 2 = 6 lac yojanas in excess, i.e., (2 × 4 – 2) lac yojanas.

Similarly, relative to sum of widths of Lavaṇa and Kāloda seas,

it is (2 + 8 = 10 lac yojanas),

the mono-directional increase in the width 32 lac yojanas of Puṣkaravara sea is

(32 lac – 10 lac) or 22 lac yojanas, which is 6 × 4 – 2 lac yojanas.

The last choice is regarding the width of Svayaṁbhūramaṇa, in which the increase over the sum of widths of all the preceding sea's widths is given by

$$\overline{42} + \frac{350000}{3} \quad \text{or} \quad \frac{1}{6} \text{ rāju} + \frac{350000}{3} \text{ yojanas.} \qquad \ldots\ldots (5.53)$$

Symbolically, the increase is given by the formula

$$= \frac{3}{4} D_n - \left\{\frac{D_n - 800000}{12}\right\}. \qquad \ldots\ldots (5.54)$$

(v. 5.251)

Example

Let the desired sea be Vāruṇīvara whose width is 128 lac yojanas, hence the described increase

$$= \frac{3}{4}(12800000) - \left(\frac{12800000 - 800000}{12}\right)$$

= 9600000 – 1000000 = 8600000 yojanas.

Thus, the described increase for Svayaṁbhūramaṇa sea which is a width of

$\frac{L}{28} + 75000$ yojanas is

$$= \frac{3}{4}\left[\frac{L}{28} + 75000\right] - \left[\frac{\frac{L}{28} + 75000 - 800000}{12}\right]$$

$$= \frac{L}{42} + \frac{350000}{3} \text{ yojanas,} \qquad \text{..... (5.55)}$$

where L is universe line or Jagaśreṇī.

(2) Symbolically, this increase is described as half of the described own increase as reduced by 200000. Thus, it is given by formula for the increase,

$$= \frac{\text{described own increase} - 200000}{2}$$

$$= \frac{I_n - 200000}{2} \qquad \text{..... (5.56)}$$

where, I_n is the increase of the n th sea. (v. 5.252)

Example

Let the desired sea be the Vāruṇīvara sea. The increase of this sea is 86 lac yojanas, hence the sum of the widths of all the preceding seas is (2 lac + 8 lac + 32 lac) or 42 lac yojanas.

From the formula, we have the sum of these widths as

$$= \frac{8600000 - 200000}{2} = 4200000 \text{ yojanas.}$$

FIFTH ASPECT

There is three times increase in the width of the succeeding island as compared with the width of its preceding island. The width of Jambū island is 100000 yojanas, and the width of Dhātakīkhaṇḍa is 4 lac yojanas, hence the increase in width = 4 – 1 = 3 lac yojanas. Similary, relative to width of Dhātakīkhaṇḍa, the increase in its next, Puṣkaravara island, has been 16 – 4 = 12 lac yojanas which is 3 times the width of its preceding island.

Similarly, ultimately, the increase in the width of Svayaṁbhūramaṇa relative to its preceding island is $\frac{3}{32}$ rāju + 28125 yojanas.

For finding out the above type of increase, the formula is

$$\text{described increase} = \frac{3D_n - 300000) - (\frac{3D_n - 300000)}{2}}{2}. \qquad \text{..... (5.57)}$$

(v. 5.253)

This is the same as the formula in (v.5.250), except that here, there is case for islands, and there it was for seas.

Note : The widths of islands are in geometrical progression, 1, 2, 4, 8,..... . The widths of the islands are 1, 4, 16, 64, and so on, where as these of seas are 2, 8, 32. ..... In both cases, the common ratio is 4.

Example :

Let the desi d island be Puṣkaravara island, having a width of 16 lac yojanas. Its increase is

$$= \frac{3 \times 1600000 - 300000) - (\frac{3 \times 1600000}{2} - 300000)}{2}$$

= 1200000 yojanas.

[This is three times the width 400000 of the preceding island Dhātakīkhaṇḍa]

Similarly, th.- last choice is the Svayaṁbhūramaṇa island with a width of

$\frac{L}{2\times 28}+\frac{75000}{2}$ yojanas, of which the increase beyond its preceding is

$$= \frac{\left\{3\times\left(\frac{L}{2\times 28}+\frac{75000}{2}\right)-300000\right\}-\left[3\times\frac{1}{2}\times\left(\frac{L}{2\times 28}+\frac{75000}{2}\right)-300000\right]}{2}$$

$$= \frac{3L}{2\times 2\times 2\times 4\times 7}+\frac{3\times 75000}{2\times 2\times 2}=\frac{3\text{rāju}}{32}+28125 \text{ yojanas.} \quad \ldots\ldots\ldots (5.58)$$

SIXTH ASPECT

(1) There is an increase of four times as reduced by two and half lac in the width of the successive island relative to half the width of its preceding island in a mono-direction.

For example, the half of width if Jambū island is $\frac{1}{2}$ lac and the width of Dhātakikhanda is 4 lac yojana, hence the increase is $3\frac{1}{2}$ lac yojanas. Similarly, the width of Puṣkaravara island is 16 lac and the sum of the Jambū's half width and the width of the Dhātakīkhaṇḍa island is $\frac{1}{2}+4=4\frac{1}{2}$ lac yojanas.

Thus, the increase described is $= 16-4\frac{1}{2}$ lac yojanas = 1150000 yojanas.

This is the same as $\left(3\frac{1}{2}\text{ lac}\times 4-2\frac{1}{2}\text{ lac}\right)$ yojana = 14 lac $-2\frac{1}{2}$ lac =1150000 yojanaṣ.

Such an increase goes on till the last island, the Svayaṁbhūramaṇa.

The formula for finding out such an increase is as follow

$$\text{increase} = \frac{D_n - 100000}{3} \times 2 + \frac{300000}{2} . \quad \ldots\ldots (5.59)$$

Example

Let the increase for Puskaravara be required.

$$\text{The described increase} = \left(\frac{1600000 - 100000}{3} \right) \times 2 + \frac{300000}{2}$$

$$= 1150000 \text{ yojanas} \quad \ldots\ldots (5.60)$$

as before.

Similarly, the increase in the width of Svayambhūramaṇa island

$$= \left(\frac{L + \frac{75000}{2} - 100000}{28 \times 2} \right) \times 2 + \frac{300000}{2}$$

$$= \frac{L}{84} + \frac{325000}{3} \text{ yojanas.} \quad \ldots\ldots (5.61)$$

(2) Finding out the total width of the preceding islands from the desired succeeding island, initiating from half Jambū.

The formula is as follows: Let the desired succeeding island be the n th from the Jambū island. Then the total of the widths

$$= \frac{D_n}{4} + \frac{D_{n-1} - 100000}{3} - \frac{100000}{2} . \quad \ldots\ldots (5.62)$$

(vv. 5.255 - 256)

D_{n-1} can also be represented by D_{n-2} and $D_n = 4\ D_{n-2}$, for the comparability of the islands alone.

Example :

Let the total width of islands from Jambū half upto Puṣkaravara island be required. when the width of Puṣkaravara is 16 lac and that of Vāruṇivara is 64 lac yojanas.

$$\text{Total width as shown} = \frac{6400000}{4} + \frac{1600000 - 100000}{3} - \frac{100000}{2}$$

$$= 20500000 \text{ yojanas .}$$

..... (5.63)

SEVENTH ASPECT

(1) There is four times increase as reduced by five lac yojanas in the mono-directional width of the successive island relative to bidirectional widths of desired island.

There is 3 lac yojanas of increase in mono-directional width of Dhātakīkhaṇḍa which is 4 lac, over the width one lac of Jambū island. Including Jambū's width, the bidirectional width of Dhātakīkhaṇḍa is 4 + 4 + 1 = 9 lac yojanas, and thus the increase in mono-directional width of Puṣkaravara island is 1600000 – 900000 = 700000 yojanas. In this way, relative to bidirectional width of desired islands upto Dhātakīkhaṇḍa, in the width (mono-directional) of the successive island has been (3 lac × 4 = 12 lac), 12 lac – 7 lac = 500000 less four times increase, and carried on upto the Svayaṁbhūramaṇa island.

Similarly, the described increase for the casse of Svayaṁbhūramana island

$$= \frac{L}{7 \times 24} + \frac{537500}{3} \text{ yojana, or rāju } \frac{1}{24} + \frac{537500}{3} \text{ yojana.} \quad \text{..... (5.64)}$$

Formula

$$\text{described increase} = \frac{D_n - 100000}{3} + 200000 \text{ yojanas} \quad \text{..... (v. 5.257)}$$

$$= \frac{D_n + 500000}{3} \text{ yojanas.} \quad \text{..... (5.65)}$$

Example

Let the desired island be Puṣkarvara. Then the described increase,

$$= \frac{1600000 - 100000}{3} + 200000$$

= 7000000 yojanas. ..... (5.66)

The same increase for Svayambhūramaṇa sea is

$$= \frac{\frac{L}{56} + 37500 - 100000}{3} + 200000 \text{ yojanas}$$

$$= \frac{L}{7} \times \frac{L}{24} + \frac{537500}{3} \text{ yojanas.} \qquad \ldots\ldots (5.67)$$

(2) Finding out the sum of the widths in both directions for the islands preceding a desired island: Such a sum, taking one lac as initial, continues upto Ahīndravara island, becoming four times as in excess of five lac. The formula for such an increases as follows:

$$\text{sum of described widths} = \frac{2 \times D_n - 500000}{3}. \qquad \ldots\ldots (5.68)$$

where n is the serial number of desired island. (v. 5.258)

Example

Let the desired island be Puṣkaravara. Its diameter is 1600000 yojanas. The sum of the widths in both directions of all its preceding islands

$$= \frac{2 \times 1600000 - 500000}{3} = 900000 \text{ yojanas.}$$

EIGHTH ASPECT

(1) The increase in width of a desired sea relative to the sum of the bidirectional widths of the preceding all seas is four times as reduced by 4 lac yojanas.

The bidirectional width of Lavaṇa is 2 lac + 2 lac = 4 lac yojanas. Hence, the increase width of Kāloda sea in a single direction (8 lac yojanas) is

8 lac – 4 lac = 4 lac or 400000 yojanas.

The sum of bidirectional widths of Lavana and Kāloda seas

$= (2 + 2) + (8 + 8) = 20$ lac yojanas.

Relative to this, the increase in the mono-directional width of Puṣkaravara sea is

32 lac − 20 lac yojanas = 12000000 yojanas.

This increase is 4 lac × 4 lac − 4 lac = 12 lac yojanas, as per statement : This is carried over upto the Svayaṁbhūramana sea, for which the increase is found to be

$$\frac{1}{12}\text{ rāju} + \frac{475000}{3}\text{ yojanas.}$$

The formula for finding out such increase in width is

$$= \frac{D_{\text{desired}} + 400000}{3} \qquad \ldots\ldots\ldots (5.69)$$

where D_{desired} is the width of the desired sea . (v. 5.259)

Example

Let the desired sea be Vāruṇīvara sea with a width of 128 lac yojanas. For it,

$$\text{described increase} = \frac{12800000 + 400000}{3} = 4400000 \text{ yojanas.} \qquad \ldots\ldots\ldots (5.70)$$

Similarly, for the Svayaṁbhūramaṇa sea,

$$\text{described increase} = \frac{\frac{L}{28} + 75000 + 400000}{3} = \frac{L}{7 \times 4 \times 3} + \frac{475000}{3} \text{ yojanas}$$

$$= \frac{1}{12}\text{ rāju} + \frac{475000}{3}\text{ yojanas .} \qquad \ldots\ldots(5.71)$$

(2) The increase bidirectional width of the successive desired sea relative to the sum of bidirectional widths of the preceding seas is four times as in excess of four lac. For example, the bidirectional width of Lavaṇa sea is 400000 yojanas. The sum of the preceding sea's bidirectional widths preceding the Puṣkaravara sea is 2000000 yojanas.

Hence this is 400000 × 4 + 400000 = 2000000 yojanas.

described bidirectional width corresponding to n th sea is .

$$= \frac{2D_n - 400000}{3} \qquad \text{..... (5.72)}$$

(v.5.260)

Example

Let the island desired be the Puṣkaravara, whose width is 32 lac yojanas. Then the sum of the bidirectional widths of its preceding all the seas (Lavaṇa and Kālodaka) is

$$= \frac{(3200000 \times 2) - 400000}{3} = 2000000 \text{ yojanas} . \qquad \text{.....(5.73)}$$

As the next step, the increase in areas is described.

NINTH ASPECT

This was ment for finding out the number of pieces, each equal to the area of the Jambū island in any desired island or sea.

The area of Lavaṇa sea relative to the gross or fine area of the Jambū island is twenty-four times. The area of Dhātakīkhaṇḍa as compared with that of Jambū island is one hundred forty-four times. This is to be carried to Svayaṁbhūramaṇa sea.

The gross area of Jambū island $= 3 \times \left(\frac{100000}{2}\right)^2$

$= 3 \times 2500000000$ square yojanas.

The fine area of Jambū island $= \sqrt{10} \times (2500000000)$ square yojanas.

The gross area of Lavaṇa sea $= 3 \times \left[\left(\frac{500000}{2}\right)^2 - \left(\frac{100000}{2}\right)^2\right]$

$= 3 \times [\ 600000000000]$ square yojanas.

The fine area of Lavaṇa sea $= \sqrt{10} \times [60000000000]$ square yojanas.

Hence, the gross and fine areas of the Lavaṇa sea, as compared above are each 24 times that of the Jambū island.

Similarly, the area of Dhātakīkhaṇḍa is 144 times of that of Jambu island,

because the gross area is $3 \times \left[\left(\frac{1300000}{2}\right)^2 - \left(\frac{500000}{2}\right)^2\right]$

or $= 3 \times |\ 3600000000000\ |$ square yojanas.

Its fine area $= \sqrt{10}|3600000000000|$ square yojanas.

The last choice is that of the Svayaṁbhūramaṇa sea, whose area divided by area of Jambū island

$$= \left[(L \times L \times 3) \div 1960000000000\right] + \left[\left\{(L \times 3) \div 1400000\right\} - 9 \text{ kosa}\right] \text{squareyojanas.} \quad \ldots.(5.74)$$

Symbolically, the described ratio of area, (number of pieces each being equal to Jambū island)

$$= \frac{3\ (D_n - 100000) \times 4D_n}{(100000)^2} \quad \ldots\ldots\ldots(5.75)$$

(v. 5.261)

Example

Let the desired sea be the Vāruṇīvara, whose width is 128 lac yojanas, it contains the number of Jambū pieces

$$= \frac{3 \times (12800000 - 100000) \times 4 \times (12800000)}{(100000)^2} = 195072 \text{ pieces.} \quad \ldots\ldots (5.76)$$

Similarly, for the Svayaṁbhūramaṇa sea, the content of pieces each equivalent to that of Jambū island

$$= \frac{3\left(\frac{L}{28} + 75000 - 100000\right) \times 4 \times \left(\frac{L}{28} + 75000\right)}{100000^2}$$

$$= \frac{3 \times L^2}{1960000000000} + \frac{3L}{1400000} - 9 \text{ kosas.} \quad \ldots\ldots\ldots (5.77)$$

TENTH ASPECT

The Lavaṇa sea area contains 24 pieces as each equal to Jambū island area. The piece-reckoning logs of Dhātakīkhaṇḍa are six times those of the Lavaṇa sea. The piece-reckoning logs (rods) of the Kāloda sea are four times and in excess of 96 than those of Dhātakīkhaṇḍa. This may be continued upto the Svayaṁbhūramaṇa sea, for each successive island or sea, doubling successively.

Example

Thus, the following gives the comparison between the fine areas of the island and sea in succession:

area of $D_1 = \sqrt{10}\,(\frac{100000}{2})^2 = \sqrt{10}\,(25)\,(10)^8$ square yojanas ..... (1)

area of $D_2 = \sqrt{10}\,[(\frac{500000}{2})^2 - (\frac{100000}{2})^2] = \sqrt{10}\,(600)\,(10)^8$ square yojanas ..... (2)

area of $D_3 = \sqrt{10}\,[(\frac{1300000}{2})^2 - (\frac{500000}{2})^2] = \sqrt{10}\,(36)\,(10)^{10}$ square yojanas ..... (3)

area of $D_4 = \sqrt{10}\,(10)^8\,[\,(\frac{290}{2})^2 - (\frac{130}{2})^2\,] = \sqrt{10}\,(168)\,(10)^{10}$ square yojanas ..... (4)

area of $D_5 = \sqrt{10}\,(10)^8\,[(\frac{610}{2})^2 - (\frac{290}{2})^2] = \sqrt{10}\,(72)\,(10)^{11}$ square yojanas. ..... (5)

From the above, we have

$$\frac{(2)}{(1)} = \frac{\sqrt{10}\;600)\;(10)^8}{\sqrt{10}\;(25)\;(10)^8} = 24 \qquad \text{..... (5.78)}$$

$$\frac{(3)}{(1)} = \frac{\sqrt{10}\;36)\;(10)^8}{\sqrt{10}\;25)\;(10)^8} = 144 \qquad \text{..... (5.79)}$$

$$\frac{(4)}{(3)} = \frac{\sqrt{10}\ 168\ (10)^{10}}{\sqrt{10}\ (25)\ (10)^{8}} = 672 \qquad \text{..... (5.80)}$$

$$\frac{(5)}{(3)} = \frac{\sqrt{10}\ 72\ (10)^{11}}{\sqrt{10}\ (25)\ (10)^{8}} = 2880 \qquad \text{.....(5.81)}$$

Here, $672 = (144 \times 4) + 96$ ..... (5.82)

$2880 = (672 \times 4) + (96 \times 2)$. ..... (5.83)

and so on, showing that the successive ratios go on increasing by four times with twice the 96 each time, relative to its preceding pieces each equivalent to that of Jambū island.

(v. 5.262)

The same could be studied by replacing $\sqrt{10}$ by 3 for the case of gross areas.

It has already been told that the area of n th island or sea

$$= \sqrt{10}\left\{\left(D^{d}_{nb}\right)^{2} - \left(D^{d}_{na}\right)^{2}\right\}.$$

Here, the area of Lavaṇa sea is $(10)^{8\frac{1}{2}}$ [600] square yojanas, which is 24 times the area of Jambū island, $(10)^{8\frac{1}{2}}$ [25] square yojanas. The area of Dhātakīkhaṇḍa island is $(10)^{8\frac{1}{2}}$ [3600]square yojanas which is 144 times that of Jambū island.

Similarly, the area of Kālodadhi sea is $(10)^{8\frac{1}{2}}$ [16800]square yojanas which is 672 times that of Jambū island, and this area of the Kālodadhi sea is greater than the piece reckoning rods by four times in excess of 96×2. That is $2880 = (4 \times 672) + 2\ (96)$, etc.

Generally, if the piece counting rods of any preceding island or sea be assumed to be $K_{s(n'-1)}$ where n' is reckoned from the Dhātakī island, then the number of piece reckoning rods of the succeeding sea or island is $(4 \times K_{s(n'-1)} + 2^{n'}\ (96)$. [If the piece reckoning rods of n'th island or sea are required to be found out, when n' reckons the initial as Dhātakī island,

then: in the (n' − 1)th preceding island, we have piece reckoning rods as 4, multiplied by the piece reckoning rods of the project 96 as multiplied by $2^{n'-1}$.

Thus,

The piece reckoning rods of Puṣkaravara sea = $412880 + 2^{3-1}$ (96)

The piece reckoning rods of Vāruṇīvara sea = $4 \times 11904 + 2^{4-1}$ (96).

$$\text{Projection } 96 = \frac{\text{Kn's}}{\frac{\text{Dn'}}{100000} - 1} = \frac{672}{\frac{800000}{100000} - 1} = 96 \text{ as additional measure.}$$

In this formula, the $K_{n's}$ is the number of piece reckoning-rods of the corresponding island or sea and $D_{n'}$ is the width.

Now the piece reckoning-rods of the Svayaṁbhūramaṇa sea are greater than those of Svayaṁbhūramaṇa island by 9 in excess of three times the universe-line as divided by 700000 :

$$\frac{L.3}{700000} + 9. \qquad \ldots\ldots\ldots (5.84)$$

The formula for finding out additional piece reckoning-rods or projection (prakṣepa)

$$= \frac{\text{own piece reckoning rods of a region}}{\frac{\text{own width}}{100000} - 1} \qquad \ldots\ldots\ldots (5.85)$$

(v. 5.264), TPT (V)

Example

(1) Let additional number of piece reckoning-rods over the 4 times piece reckoning-rods be required to be calculated. The width of Kāloda sea is 8 lac yojanas. On dividing this by 1, again 800000 is obtained. One is subtracted from 8, then 7 is obtained, which divides the piece reckoning-rods of Kāloda, getting the measure of projection (praksepa).

This projection = $\frac{672}{\frac{800000}{100000}-1} = \frac{672}{7}$ = 96, as the aditional measure . ..... (5.86)

(2) The piece-reckoning rods in the area of Svayaṁbhūramaṇa island, each being equivalent to the area of Jambū island area:

According to the above formula,

gross area of Svayaṁbhūramaṇa island

$= 3\times\frac{L}{56}+37500$ square yojanas, ...(5.87)

Hence, described increase = $\frac{3\times\left(\frac{L}{56}+37500-100000\right)\times 4\times\left(\frac{L}{56}+37500\right)}{(100000)^2}$

$= \frac{3\times(L)^2}{784\times(10)^{10}}-\frac{3L}{5600000}-\frac{45}{16}$ square yojanas ..... (5.88)

This number of piece reckoning rods is multiplied by 4 and the product is subtracted by piece reckoning rods of Svayaṁbhūramaṇa sea, getting the additional projectional number of Svayaṁbhūramaṇa sea.

Thus, the piece-reckoning-rods are

$= \left[\left(\frac{3L^2}{196\times 10^{10}}\right)+\left(\frac{3L}{1400000}\right)-\left(\frac{9}{4}\right)\right]-\left[\frac{3L^2}{784\times 10^{10}}-\frac{3L}{5600000}-\frac{45}{16}\right]\times 4$

$= \frac{3L}{700000}+9$, ... (5.89)

as given in the text.

ELEVENTH ASPECT

(1) The increase in the piece-reckoning-rods of Dhātakīkhaṇḍa island over the 24 piece reckoning-rods of Lavaṇa sea is (144 – 24) = 120. The 672 piece reckoning-rods of Kāloda sea are in excess of the combined piece reckoning-rods of those of the Lavaṇa and Dhātakīkhaṇḍa island, (24 + 144) or 168, is given by 672 –168 = 504, which is given as 504 = (120 × 4) + 24.

Further, the increase in the piece reakoning-rods of the Svayaṁbhūramaṇa sea over those of all preceding islands and seas is given by

$$\frac{L^2}{98\times(10)^{10}}+\frac{3L}{700000}-14 \text{ kośas.} \qquad \text{..... (5.90)}$$

The above increase can be found out from the following formula :

the described increase in piece-reckoning rods

$$=\left\{\left(\frac{D_{n'}}{100000}\right)^2-1\right\}\times 8\,, \qquad \text{..... (5.91)}$$

(v. 5.264)

where $D_{n'}$ is the width of n' th island or sea.

This measure is the n'th term of that arithmeticogeometric progression whose successive terms are four times as in excess of $24\times 2^{n'-1}$. This series is different from the modern series. $D_{n'}$ itself describes a geometric sequence, which begins with 8, and takes values 16, 32, 64, 128 and so on successively. This is a series worth being closely studied. On solving this term, one gets the increase

$$=\frac{(Dn'+100000)(Dn'-100000)}{(100000)^2}\times 8\,.$$

Example :

The increase in piece-reckoning-rods as described for Vāruṇīvara sea

$$= \left[\frac{12800000}{100000})^2 - 1 \right] \times 8 ,$$

$$= 131064 \qquad \text{..... (5.92)}$$

Similarly, the increase as described above in piece-reckoning-rods

$$\left[\left(\left\{ \frac{\frac{L}{28}}{100000} + 75000 \right\}^2 \right) - 1 \right] \times 8$$

$$= \frac{L^2}{980000000000} + \frac{3L}{700000} - 14 \cdot \qquad \text{..... (5.93)}$$

(2) Now, is described the method of sum of piece-reckoning-rods of all preceding islands-seas, corresponding to desired island and sea.

This is the description of the mixed piece-reckoning rods of the preceding islands-seas, about the successive or desired island or sea.

We shall now write prr as abbreviation for piece reckoning rods.

The sum of prr of the Dhātakīkhaṇḍa along with those of Lavaṇa (24 + 144 = 168) is seven times those of Jambū island, that is (24 × 7 = 168).

Similarly, the sum of prr of Jambū, Lavaṇa and Dhātakī with Kāloda is

(24 + 144 + 672 =) 840 prr.

The sum of prr of Lavaṇa and Dhātakī is

(24 + 144 =) 168.

Hence, 168 × 5 = 840 gives the comparability of both sums.

Similarly,

	24 + 144 + 672 = 840,	preceding prr,
	840 + 2880 = 3720,	succeeding prr
where,	(840 × 4) + 360 = 3720,	giving the relation between the two sums.

.....(5.94)

Again,

$24 + 144 + 672 + 2880 = 3720$, preceding prr,

and $3720 + 11904 = 15624$, succeeding prr,

where, $3720 \times 4 + 744 = 15625$, giving the relation between two sums.

.....(5.95)

In this way, upto the Svayaṁbhūramaṇa sea, the described increase is 4 times in addition to projectible prr, as 24 over twice of 744, and so on.

Formula

On adding the 48384 prr of the Vāruṇīvara island in the total of its preceding islands-seas as (24 + 144 + 672 + 2880 + 11904) or 15624 prr, the grand total is

$$15624 + 48384 = 64008 \text{ prr},$$

where, $64008 = [(15624 \times 4) + (744 \times 2) + 24]$. ..... (5.96)

Formula

For getting such increase, the verse formula is given as follows:

$$\text{increase} = \left[\frac{D_{n'}}{2} - 100000\right] \times [D_{n'} - 100000] \div 1250000000, \quad \text{..... (5.97)}$$

(v.5.264)

where the counting of n' is to be started from the Dhātakīkhaṇḍa island.

This measure could otherwise be obtained. Since this demonstrates the prr, each being equivalent to Jambū island, in the circumference of $D^d_{n'a}$, hence, this measure could also be shown as

$$\frac{\sqrt{10}\left[\frac{D^d_{n'a}}{2}\right]^2 - \sqrt{10}\,(25)\,(10)^8}{\sqrt{10}\left[\frac{100000}{2}\right]^2} \quad \text{..... (5.98)}$$

This may be the rationale of the above formula.

Example:

Let the desired island be the Kṣīravara whose width is 25600000 yojanas.

The total of the islands and seas preceding the Kṣīravara island is

$$= \left(\frac{25600000}{2} - 100000\right) \times \left(\frac{25600000 - 100000}{1250000000}\right)$$

$$= \frac{12700000 \times 25500000}{1250000000} = 259080 \text{ yojanas} . \qquad \ldots\ldots (5.99)$$

For getting additional measure, these is the following verse formula

$$\text{additional measure} = 744 = \frac{K_{sn'}}{D_{n'} \div 200000} . \qquad \ldots\ldots (5.100)$$

Example

Let the desired island be the kṣīravara island whose width is 25600000 yojanas and prr are 783360 .

$$\text{described excess} = \frac{783360}{25600000 \div 200000} = 6120 . \qquad \ldots\ldots (5.101)$$

TWELFTH ASPECT

Excluding the Jambū island, the width of the Lavaṇa sea is 200000 yojanas, and length is 900000 yojanas.

For finding out the length, the formula is

$$\text{length} = (D_n - 100000) \times 9 . \qquad \ldots\ldots (5.102)$$

(v.5.266)

From the above, the area of that island or sea is

$$= 3 \left[\left(\frac{D^d_{nb}}{2}\right)^2 - \left(\frac{D^d_{na}}{2}\right)^2 \right], \qquad \ldots\ldots (5.103)$$

and hence,

$$9\,D_n\,(\,D_n - 100000) = \quad = \quad 3\left[\left(\frac{D^d_{nb}}{2}\right)^2 - \left(\frac{D^d_{na}}{2}\right)^2\right], \qquad \text{..... (5.104)}$$

where, 3 is the value of π, giving the gross area.

The length for Dhātakīkhaṇḍa $= [(4-1)100000 - 100000]9$

$= 2700000$ yojanas.

The length for Kāloda sea $= [(800000 - 100000) - 100000]9$

$= 6300000$ yojanas. ..... (5.105)

The area of the succeeding island or sea is four times, and in excess of 72000 crore yojanas relative to preceding island or sea.

The area of Jambū island is $3 \times (50000)^2$ or 7500000000 square yojanas, which is the area of prr.

The area of Dhātakīkhaṇḍa island is $24 \times 6 = 144$ prr, as compared with that of Lavaṇa sea. The area of the Kālodaka sea is $672 = (144 \times 4) + 96$ prr, as compared with area of Dhātakīkhaṇḍa island.

When one prr is 750 crore square yojana, what would be the prr of 96.

Thus, we get 750 crore $\times$ 96 = 72000 crore square yojanas in excess. This continues upto the Svayaṁbhūramaṇa sea.

The last abstraction is as follows:

The width of Svayaṁbhūramaṇa island

$$= \frac{L}{56} + 37500 \text{ yojanas} = \frac{1}{8} \text{ rāju} + 37000 \text{ yojanas} \qquad \text{.....(5.106)}$$

Length of Svayaṁbhūramaṇa island

= (width of the island – 100000) $\times$ 9

$$= \left(\frac{L}{56} + 37500 - 100000\right) \times 9$$

$$= \frac{L \times 9}{56} - 562500 \text{ yojanas or } \frac{9}{8} \text{ rāju} - 562500 \text{ yojanas}. \quad \text{.....(5.107)}$$

Area of Svayaṁbhūramaṇa island is given as follows:

area of the island = its width $\times$ its length

$$= \left(\frac{1}{8} \text{ rāju} + 37500 \text{ yojanas}\right) \times \left(\frac{9}{8} \text{ rāju} - 562500 \text{ yojanas}\right)$$

$$= \frac{9}{64} \times (\text{rāju})^2 + \text{rāju}\left(-\frac{562500}{8} + \frac{9 \times 37500}{8}\right) - 37500 \times 562500 \text{ square yojanas.}$$

$$= \frac{9}{64} (\text{rāju})^2 - \frac{2250000}{8} \text{ rāju} - 21093750000 \text{ square yojanas.} \quad \text{..... (5.108)}$$

The area of Svayaṁbhūramaṇa island has been related to be slightly less than $\frac{9}{64}$ $(\text{rāju})^2$.

This slight less amount is $= -28125$ rājus $-$ 21093750000 square yojanas.

For finding out area of Svayaṁbhūramaṇa sea:

the width $= \frac{L}{28} + 75000$ yojanas $= \frac{1}{4}$ raju $+ 75000$ yojanas,

the length $= \left(\frac{1}{4} \text{ rāju} + 75000 - 100000\right) \times 9$

$$= \frac{9}{4} \text{ rāju} - 225000 \text{ yojanas}$$

$\therefore$ its area = (width $\times$ length)

$$= \left(\frac{1}{4} \text{raju} + 75000 \text{yojana}\right) \times \left(\frac{9}{4} \text{raju} - 225000 \text{yojanas}\right)$$

$= \frac{9}{16} \times (\text{rāju})^2 + (112500)\ \text{rāju} - 16875000000$ square yojanas. .....(5.109)

Formulae

Formula for finding the increase in length:

the said increase = $D_n \times 900000$.

Here, n is to be reckoned from island succeeding the Kāloda sea. This is the successive increase in length. .. (5.110)

(v. 5.267)

Example

Let the desired island be the Nandīśvara island, whose width is 1638400000 yojanas.

the length of Nandīśvara island = (1638400000 – 100000) × 9 yojanas.

= 14744700000 yojanas

∴ area of Nandīśvara island

= 1474470000 × 1638400000

= 24157716480000000000 square yojanas.

.....(5.111)

Formula for finding the excess in the areaof successive island or sea over the area of its preceding island or sea :

the excess = (width of the island or sea succeeding Kāloda) × 9 .

Let the excess (projection) of Nandīśvara sea be desired.

The width of its preceding one is 1638400000 yojanas.

Hence, the increase is

1638400000 × 900000 = 1474560000000000 yojanas,

which is twice of 72000 crore yojanas and is multiple of 2048,

for 72000 crore × 2048 = 1474560000000000.

..... (5.112)

THIRTEENTH ASPECT

This is for finding out the area of the successive island or sea from the projected (excess) of area over the total and the total area of the preceding island and sea.

The area of Jambū island is 1 prr and that of Lavaṇa sea is 24 prr. Sum of these two = 1 + 24 = 25 prr.

The area 144 prr of Dhātakīkhaṇḍa is 5 times as also 19 prr over, say,

$(25 \times 5) + 19 = 144.$ ..... (5.113)

Here, one prr (piece reckoning-rod) is $3\ (50000)^2$ or $75\ (10)^8$ square yojanas.

Hence, we have 19 prr or $[19 \times 3\ (50000)^2]$ or 142500000000 square yojanas.

This is also the excess in the measure of Dhātakīkhaṇḍa.

The total prr of Jambū, Lavaṇa and Dhātakīkhaṇḍa areas is 1 + 24 + 144 = 169 prr, over which the prr, 672, of Kāloda is 3 times and in excess of 165 prr.

Thus, $672 = (169 \times 3) + 165$ ..... (5.114)

A prr is $75 \times (10)^8$ square yojanas, hence the measure of 165 prr is

$165 \times 75 \times (10)^8 = 1237500000000$ square yojanas.

The same measure of prr has already of Kāloda above.

Thus, the area of 672 prr of Kāloda is

$= (1 + 24 + 144) \times 3 + 1237500000000$ square yojanas. ..... (5.115)

Let the project increasebe required to find prr for the Puṣkara island.

The total of Jambū, Lavaṇa, Dhātakīkhaṇḍa and Kāloda is 1 + 24 + 144 + 672 = 841 prr. Over this, the area of the Puṣkaravara, 2880 prr, is thrice and in excess of 357 prr.

Thus, $2880 = (841 \times 3) + 357$ ..... (5.116)

As 1 prr is $75 \times (10)^8$ square yojanas,

hence, 357 prr is $357 \times 75 \times (10)^8 = 2677500000000$ square yojanas.

This is the projective (in excess) regional area of the Puṣkaravara island, which is 202500000000 square yojanas in excess of twice the projective area of the Kālodadhi.

As per formula,

projected (in excess) area of Puṣkaravara island

$= (\text{projected area of Kālodadhi} \times 2) + 2025 \times (10)^8$ ..... (5.117)

Or,

$26775 \times (10)^8 = (1237500000000 \times 2) + 202500000000$.

In the method of finding out the area of the successive island or sea over the Kālodadhi, two rules are described :

1. The areas of the successive islands seas in form of total sum is thrice the mass of areas of the preceding islands and seas, upto the end.

2. The projection of the successive island or sea is, as per rule, twice the projection, $[12375 \times (10)^8]$ of island and sea which is the preceding one.

Now, it is shown how the excess sum of projection and beyond, $2025\ (10)^8$ is obtained.

The projection of Puṣkaravara island is in excess of $2025\ (10)^8$ square yojanas over twice the projection of the Kāloda sea. Now, this projection excess, $2025\ (10)^8$ square yojanas, is regarded as 1 piece reckoning-rod, then the excess is this one piece over twice of the preceding.

Formula

excess sum of desired island or sea

$= [(\text{prr of preceding island or sea} \times 2) + 1] \times 2025 \times (10)^8$ ..... (5.118)

excess sum of Puṣkara sea $[(1 \times 2) + 1] \times 202500000000$

= 6075000000000 square yojanas. ..... (5.119)

Hence, the excess sum of Puṣkaravara sea

= [excess of projection and the projection] − [projection × 4]

or

$6075 \times (10)^8 = [55575 \times (10)^8] - [12375 \times (10)^8 \times 4]$ . ..... (5.120)

Similarly, the excess in projection of Vāruṇīvara island

$= [(3 \times 2) + 1] \times 2025 \times (10)^8$

$= 1477500000000$

$= [7 \times 202500000000]$ square yojanas. ..... (5.121)

This may be carried on further.

The last abstraction is now related :

the total area of all the islands and seas lying between the Jambū island and the Svayaṁbhūramaṇa sea is given as

$$= \left[\left\{\frac{3 \times (\text{rāju})^2}{16}\right\} + 9375000000 \text{ square yojanas}\right] - (\text{rāju} \times 112500 \text{ yojanas}). \quad \ldots\ldots (5.122)$$

Formula for finding out the above:

the total sum of areas of preceding islands-seas (excluding Jambū area) from n th island or sea

$$= [D_n - 100000][9(D_n - 100000) - 900000] \div 3 \quad . \quad \ldots\ldots (5.123)$$

Through another method this would be

$$= 3\left(\frac{D^d_{na}}{2}\right)^2 - 3 \times 25\,(10)^8 \quad \ldots\ldots (5.124)$$

Example :

Let the desired island be the Nandīśvara island with a width of 1638400000 yojanas and the length be

$[(1638400000 - 100000) \times 9]$ or 14744700000 yojanas;

hence, the total area of islands and seas from Lavaṇa to Kṣaudravara sea

$= (1638400000 - 100000) \times (14744700000 - 900000) \div 3$

$= 80515891800000000000$ square yojanas. ..... (5.125)

Similarly, the sum total area of all the islands and seas lying between the Jambū island and Svayambhūramaṇa sea

$$= \left[\frac{L}{28} + 75000 - 100000\right] \times \left[\left(\frac{L}{28} + 75000 - 100000\right) \times 9 - 900000\right] \div$$

$$= \frac{3L^2}{28)^2} - \frac{L}{28} \text{ (450000) yojanas + 9375000000 square yojanas.}$$

$$= \frac{3\,(\text{rāju})^2}{16} + \text{(9375000000) square yojanas} - (\text{rāju} \times 112500 \text{ yojanās})$$

or

$\overline{\overline{49}} \left| \frac{3}{16} + 9375000000 - \overline{7} \right|$ 112500. Here + is dhaṇa and − is riṇa. .... (5.126)

Formula for finding out the excess measure corresponding to a desired island or sea:

excess measure

$$= 3\left\{[2D_n - 200000](300000) - 3\left(\frac{100000}{2}\right)^2\right\}. \qquad \text{..... (5.127)}$$

(v. 5.269)

Example :

Let the desired sea be Puṣkaravara, whose width is 3200000 yojanas. Its excess (projection) is given as

$$= 3\left[\{2 \times 3200000 - 200000\} \times 300000 - 3 \times 2500000\right]$$

$$= 3\,[1852500000000] = 5557500000000 \text{ square yojanas.} \qquad \text{..... (5.128)}$$

This shows that the area of Puṣkaravara sea is obtained by multiplying the area of Puṣkaravara island and adding to it

$55575 \times (10)^8$ square yojanas.

FOURTEENTH ASPECT

This is for finding out the excess in width and length of a succeeding sea over the width and length of the preceding sea.

The width of the succeeding sea over the relative preceding sea is four times as follows:

width of Kālodaka sea is 800000 yojanas = width of Lavaṇa sea $\times 4$

$= 200000 \times 4$ yojanas

width of Puṣkaravara sea is 3200000 yojanas = width of Kālodaka sea $\times 4$

$= 800000 \times 4$ yojanas

width of Vāruṇīvara sea is 12800000 yojanas = width of Puṣkaravara sea $\times 4$

$= 3200000 \times 4$ yojanas.

..... (5.129)

The length of the succeeding sea over the relative preceding sea is four times and in excess of 2700000 yojanas:

length of Kāloda sea is 6300000 yojanas $= (900000 \times 4) + 2700000$ yojanas

length of Puṣkaravara sea is 27900000 yojanas $= (6300000 \times 4) + 2700000$ yojanas

length of Vāruṇīvara sea is 114300000 yojanas $= (27900000 \times 4) + 2700000$ yojanas.

..... (5.130)

Comparability of area of succeeding sea relative to area of the preceding sea:

Let us take the area of Jambū island, and $3 \times (50000)^2$ square yojanas be regarded 1 piece reckoning-rod or 1 prr.

Thus, prr of Lavaṇa sea = 24

prr of Kālodaka sea = 672

prr of Puṣkaravara sea = 11904

prr of Vāruṇīvara sea = 195072 ..... (5.131)

From the above

prr 672 = 24 prr $\times 28$ ..... (5.132)

Showing that area of Kālodaka in prr is 28 times, the prr area of the Lavaṇa sea.

Similarly,

prr 11904 = 672 prr $\times$ 17 + 3600000000000 square yojanas ..... (5.133)

prr 19072 = 11904 prr $\times$ 16 + 34560000000000 square yojanas. .....(5.134)

Ahead of this, the area of the succeeding sea, relative to the area of the preceding sea, upto the last sea, has been sixteen times over the projection (excess) of 3456 $\times$ $(10)^{10}$ square yojanas as multiplied by 4.

Example :

Let the desired sea be Kṣīravara whose width is 51200000 yojana and prr 3139584.

Then,

3139584 – (195072 $\times$ 16 prr) = 18432 prr as excess over Vāruṇīvara sea.

or 3139584 = (195072 $\times$ 16 prr) + [18432 $\times$ 3 $(50000)^2$]

= (195072 $\times$ 16 prr) + 1382240000000000 square yojanas ..... (5.135)

Thus the projection, 138224 $(10)^{10}$ square yojanas of Kṣīravara four times that of Vāruṇīvara sea, which is 3456 $\times$ $(10)^{10}$ square yojanas.

The fine abstraction is about the Ahīndravara sea:

$$\text{width of Ahīndravara sea} = \text{rāju} \times \frac{1}{16} + 18750 \text{ yojanas} \quad \ldots\ldots (5.136)$$

$$\text{the length of the sea} = \left(\frac{\text{rāju}}{16} + 18750 - 100000\right) \times 9$$

$$= \frac{9\,\text{rāju}}{16} - 731250 \text{ yojanas} \quad \ldots\ldots (5.137)$$

Similarly,

$$\text{The width of the Svayaṁbhūramaṇa sea} = \frac{L}{28} + 75000 \text{ yojanas} \quad \ldots\ldots (5.138)$$

the length of this sea $= \left(\frac{L}{28} + 75000 - 100000\right) \times 9$

$$= \frac{9L}{28} - 225000 \text{ yojanas.} \qquad \ldots\ldots (5.139)$$

Area of the Ahīndravara sea is as follows:

the area = length × width

$$= \left(\frac{9}{16}\text{raju} - 731250\right) \times \left(\frac{1}{16}\text{raju} + 18750\right)$$

$$= \frac{9(\text{raju})^2}{256} - \left(\frac{\text{raju}}{4} \times 140625\right) - 13710937500 \text{ square yojanas} \quad \ldots\ldots(5.140)$$

Area of the Svayaṁbhūramaṇa sea is as follows:

the area $= \left(\frac{9L}{28} - 225000\right) \times \left(\frac{L}{28} + 75000 \text{ yojanas}\right)$

$$= \frac{9\,(\text{rāju})^2}{16} + \text{rāju} \times 112500 \text{ yojanas} - 16\,875000000 \text{ square yojanas.}$$

$\ldots\ldots\ldots$ (5.141)

For finding out the excess, the formula is as follows:

described excess quantity = (succeeding desired sea's width) × 2700000.

$\ldots\ldots$ (5.142)

(v. 5.270)

Let the excess quantity required be for the Kṣīravara sea whose width is 51200000 yojanas. Hence, the excess quantity is

$$51200000 \times 2700000 = 138240000000000. \qquad \ldots\ldots (5.143)$$

FIFTEENTH ASPECT

The area-comparability between that of the succeeding sea and that of the sum total plus excess of the preceding sea is as follows:

the area of Kālodaka is 672 prr, which is 28 times that of Lavaṇa.

the area of Lavaṇa is 24 prr, hence $28 \times 24 = 672$ prr ..... (5.144)

the area of Puṣkaravara (11904 prr), as compared with that of the Lavaṇa + Kāloda (24 + 672 = 696 prr) is seventeen times with in excess of $54 \times (10)^{10}$ square yojanas

its area with excess

$= 11904 = (696 \times 17 \text{ prr}) + (72 \times 7500000000)$

$= (696 \times 17 \text{ prr}) + 540000000000$ square yojanas .....(5.145)

sum of areas of Lavaṇa, Kāloda, and Puṣkaravara seas is

$= 24 + 672 + 11904 = 12600$ prr

area of Vāruṇivara sea = 195072 prr.

Thus,

$195072 = (12600 \times 15 \text{ prr}) + [6072 \text{ prr} \times (10)^8]$

$= (12600 \times 15 \text{ prr}) + 45540000000000$ square yojanas.

Similarly,

the area of Vāruṇīvara in prr along with all the preceding seas is

$= (24 + 672 + 11904 + 195072) = 207672$ prr

the area of Kṣīravara = 3139584 prr, which is expressed as

prr $3139584 = (207672 \text{ prr} \times 15) + (24504 \text{ prr})$ ..... (5.147)

Or, the other way, we get

$207672 \times 15 = 3115080$ prr area $+ [4554 \times (10)^{10} \times 4]$

$+ 1620000000000$ square yojanas

$= 3115080 \text{ prr} + 18216 \times (10)^{10} + 1620000000000$ square yojanas.

..... (5.148)

Alternate Method

The excess of area in Kṣīravara is 1620000000000 square yojanas. Taking this excess as 1 prr, the excess of the succeeding sea is four times and 1 prr more than that of the preceding sea. The formula is thus as follows:

excess quantity of desired sea = [(prr of preceding sea × 4) + 1] × 162 × $(10)^2$. ..... (5.149)

excess sum of the Ghṛtavara sea = [(1 × 4) + 1] × 162 × $(10)^2$.

= 5 × 162 × $(10)^{10}$ =8100000000000 square yojanas. ..... (5.150)

HISTORICALLY IMPORTANT FORMULA

This is for finding out the excess of all the seas preceding the Svayaṁbhūramaṇa sea, through the collective area the formula as follows:

$$\text{area of all the preceding seas} = \frac{(D_{2n} - 300000)[9(D_{2n} - 100000) - 900000]}{15}, \quad \text{..... (5.151)}$$

where D_{2n} represent the width of the desired sea. (v.5.271)

Example 1.

Width of Puṣkaravara sea is 3200000 yojanas and its length (āyāma) is 27900000 yojanas.

$$\text{Described area} = \frac{3200000 - 300000) \times (27900000 - 900000)}{15}$$

$$= \frac{2900000 \times 2700000}{15} = 5220000000000 \text{ square yojanas.} \quad \text{.....(5.152)}$$

This is the combined area of the Lavaṇa and Kāloda seas.

Example 2.

Area of all preceding seas, precedent to Svaṁbhūramaṇa.

$$\text{Width of Svaṁbhūramaṇa} = \frac{\text{rāju}}{4} + 75000 \text{ yojanas.}$$

Length of Svaṁbhūramaṇa = $\frac{9 \text{ rāju}}{4}$ − 225000 yojanas.

Area of all preceding seas, preceding to Svaṁbhūramaṇa

$$= \frac{\frac{\text{rāju}}{4} + 75000 - 300000] \times [\frac{9 \text{ rāju}}{4} - 225000 - 900000]}{15} \quad \text{.....(5.153)}$$

$$= \frac{3 (\text{rāju})^2}{80} - 52500 \text{ rāju yojanas} + 16875 \times 10^6 \text{ square yojanas.}$$

The formula for finding out the described excess :

$$\text{described excess} = [(D^d_{na} + D^d_{nm} + D^d_{nb}) \times 400000\ ]\ 180000000000. \quad \text{.....(5.154)}$$

(v.5.272)

Here, the reckoning of n starts with the Vāruṇīvara sea. In this way, the area of the sucessive sea as compared with the areas of all of its preceding seas is not only 15 times but also four times 45540000000000 and in excess of 1620000000000 yojanas.

Example 1.

Excess in relation to Vāruṇīvara sea

= (25300000 + 38100000 + 50900000) × 400000 − 180000000000

= 45540000000000 square yojanas. ..... (5.155)

Example 2.

The internal diameter of Svayaṁbhūramaṇa is $\frac{1}{2}$ rāju − 150000 yojana, intermidiate diameter is $\frac{3}{4}$ rāju − 75000 yojana, and external diameter is 1 rāju. Relative to these,

$$\text{excess in relation to seas} = \left[\left(\frac{1}{2}\text{rāju} - 150000.\right) + \left(\frac{3}{4}\text{rāju} - 75000\text{yojana}\right) + (1\text{rāju})\right]$$

$\times$ 400000 $-18\ (10)^{10}$ yojanas ..... (5.156)

= 900000 rājus $- 27 \times (10)^{10}$ yojanas.

Area of preceding seas

$= [\frac{3}{80}$ (rāju)^2 $-$ 52500 rājus $\times$ yojana + $16875 \times (10)^6$ square yojanas]. .... (5.157)

When this is multiplied by 15 and the excess is added, the area of Svayaṁbhūramaṇa is obtained :

Area of Svayaṁbhūramaṇa sea = $[\frac{3}{80}$ (rāju)$^2 -$ 52500 rājus $\times$ yojana + $16875 \times (10)^6]$

$\times$ 15 + 900000 rājus $- 27 \times (10)^{10}$ square yojanas.

$= \frac{9}{16}$ (rāju)^2 $-$ 112500 rājus $\times$ yojana $-$ 16875000000 square yojanas]. .... (5.158)

SIXTEENTH ASPECT

This relates how much in excess is the width and length of the succeeding island as compared with the width of preceding islands.

This is found to be 4 times

width of Dhātakī island is 400000 yojanas = (width 10000 of Jambū) $\times 4$

width of Puṣkara island is 1600000 yojanas = (width 400000 of Dhātakī) $\times 4$

width of Vāruṇīvara is 6400000 yojanas = (width 1600000 of Puṣkaravara) $\times 4$

and so on. ..... (5.151)

The length of the succeeding island is four times that of its preceding and in excess of 2700000 yojanas.

Thus,

length of Dhātakī island is 2700000 yojanas = (400000 $-$ 100000) $\times$ 9

length of Puṣkaravara is 13500000 yojanas = (2700000 $\times$ 4) + 2700000 yojanas

length of Vāruṇīvara is 56700000 yojanas = (13500000 $\times$ 4) + 2700000 yojanas

and so on . ..... (5.160)

Comparison of the Area of the succeeding Island with that of its preceding

The area of Jambū island is $75 \times (10)^8$ square yojanas. Let this be piece-reckoning-rod, and counted as unity, or one. According to this measure the measures of area of Dhātakī is 144, that of Puṣkara island is 2880 and that of Vāruṇīvara island is 48384 prr respectively.

The area of the Puṣkaravara island is 20 times that of Dhātakī as $2880 = 144 \times 20$. ..... (5.161)

The area of Vāruṇīvara is 16 times over $1728 \times (10)^{10}$ yojanas of Puṣkaravara's area.

for $48384 - (2880 \times 16) = 2304$ prr

or $48384 = (2880 \times 16 \text{ prr}) + (2304 \text{ prr} \times 75 \times (10)^8)$

$= 2880 \times 16 + 17280000000000$ square yojanas. ..... (5.162)

Ahead of this, the area of the succeeding island, upto the last island has been 16 times that of its preceding and in excess of projection $1728 \times (10)^{10}$ square yojanas as multiplied by four.

Example

Let the Kṣīravara island be desired. Its width is 256 lac yojanas, and prr are 783360.

Thus, we have

$783360 \text{ prr} - (48384 \times 16 \text{ prr}) = 9216$ prr in excess of Vāruṇīvara

or

$783360 \text{ prr} = (48384 \times 16 \text{ prr}) + (9216 \times 75\ (10)^8)$

$= (48384 \times 16 \text{ prr}) + 69120000000000$ square yojanas. ..... (5.163)

The area as $6912 \times (10)^{10}$ square yojanas of Kṣīravara island excess (prakṣepa) is 4 times $1728 \times (10)^{10}$ square yojanas of Vāruṇīvara island.

The final abstractions about width and length as well as area are now related:

the width of Ahīndravara island $= \text{rāju} \times \frac{1}{32} + 9370$ yojanas,

its length $= \left[\text{rāju} \times \frac{1}{32} + 9370 - 100000\right] \times 9$

$$= \frac{9 \text{ rāju}}{32} - 815670 \text{ yojanas.} \qquad \text{..... (5.164)}$$

58

The area of Ahīndravara island = width $\times$ length, hence,

$$\text{its area} = \left(\frac{\text{rāju}}{32} + 9375\right) \times \left(\frac{9\text{raju}}{32} - 815625 \text{ yojanas}\right) \qquad \text{..... (5.165)}$$

$$= \frac{9 \text{ rāju})^2}{(32)^2} - \frac{\text{rāju}}{16} \times 365625 \text{ yojanas} - 7646484375 \text{ square yojanas.}$$

Width, Length and Area of the Svayaṁbhūramaṇa island

we have, here,

$$\text{width} = \frac{\text{rāju}}{8} + 37500 \text{ yojanas}$$

$$\text{length} = \left(\frac{\text{rāju}}{8} + 37500 - 100000\right) \times 9 = \frac{9}{8} \text{ rāju} - 562500 \text{ yojanas}$$

Hence, area = width $\times$ length

$$= \left(\frac{\text{rāju}}{8} + 37500 \text{ yojanas}\right) \times \left(\frac{9\text{rāju}}{8} - 562500 \text{ yojanas}\right)$$

$$= \frac{9}{64} (\text{rāju})^2 - 28125 \text{ rājus} \times \text{yojana} - 21093750000 \text{ square yojanas.} \qquad \text{..... (5.166)}$$

Formula

formula for finding out the excess

$$\text{excess} = (D^{d}_{nm}) \times 900000 + 270000000000 \qquad \text{.....(v. 5.273)}$$

Example 1.

The medium diameter of Vāruṇīvara island is 18900000 yojanas. Hence

its excess = (18900000 × 900000) + 270000000000 square yojanas. .....(5.167)

Example 2.

The medium diameter of Svayaṁbhūramaṇa island

$= \frac{3}{8}$ rāju − 187500 yojanas.

Its excess measure = $[(\frac{3}{8}$ rāju − 187500 yojanas) × 900000]

+ 27 × $(10)^{10}$ square yojanas.

= 337500 rājus × yojana + 101250000000 square yojanas. .....(5.168)

In this excess, the 16 times area of Ahīndravara island when added gives the area of Svayaṁbhūramaṇa sea

16 times area of Ahīndravara island

$= \frac{9}{64}$ rāju^2 − 365625 rāju × yojana − 122343750000 square yojanas.

Adding the above (5.168) amount into the above, we get the area of Svayaṁbhūramaṇa island as

$\frac{9}{64}$ rāju^2 − 28125 rāju × yojana − 21093750000 square yojanas. .....(5.169)

SEVENTEENTH ASPECT

Comparision between the area of the succeeding island with its area of precceding island (total area + projection)

The area of Dhātkīkhaṇḍa as multiplied by 20 gives the area of Puṣkaravara island,

prr 2880 = 144 prr × 20

The prr of Vāruṇīvara is 48384 = (sum of prr of Dhātkīkhaṇḍa 144 and prr of Puṣkaravara 2880) × 16

or 48384 prr = (3024 prr) × 16 .....(5.170)

The prr of Kṣīravara is 783360 alongwith excess

= (sum of areas of Dhātkīkhaṇḍa, Puṣkaravara and Vāruṇīvara) $\times$ 15

+ [183360 prr − (51408 prr $\times$ 15)] + 918 $\times$ $(10)^{11}$ square yojanas.

= (51408 $\times$ 15 prr) + 91800000000000 square yojanas. .....(5.171)

In this way, the succeeding island in area relative to area of all of its preceding islands from Kṣīravara island is15 times in excess of 918 $\times$ $(10)^{11}$ as multiplied by four and in excess of 108 $\times$ $(10)^{10}$ square yojanas.

Example

The Ghṛtavara island is succeeding island of Kṣīravara, whose width is 1024 lac yojanas, length is [(1024 lac) $\times$ (1024 lac − 1 lac) $\times$ 9 yojanas. The prr of this is 12570624, which are 15 times 144 + 2880 + 48384 + 783360, or in all, 834768 prr, and in excess of $\left[12570624-(834768\times15)+49104\text{prr}\right]$ or 918 $\times$ $(10)^{11}$ square yojanas as multiplied by 4, as well as in excess of 108 $\times$ $(10)^{10}$ square yojanas.

Thus,

12570624 = (834768 prr $\times$ 15) + (49104 prr) or

$= \left[(834768\times15)=125252\text{prr}\right]$

+[918 $\times$ $(10)^{11}$ $\times$ 4 = 3672000000000000]

+ 10800000000000 square yojanas. ..... (5.172)

DATA

Sum of the areas of all the islands preceding to the area of Svayaṁbhūramaṇa island is

$$= \frac{3\,(\text{rāju})^2}{320} + 13593750000 \text{ yojanas} - (\text{rāju} \times 31875). \quad \ldots\ldots (5.173)$$

Area of Svayaṁbhūramaṇa is

$$= \left[\frac{9\,(\text{rāju})^2}{64}\right] - (1 \text{ rāju} \times 28125) - 21093750000. \quad \ldots\ldots (5.174)$$

Formula

Formula for finding the sum of the areas of all the preceding islands is as follows:

sum of the areas of all preceding islands

$$= \frac{(\text{width of last island} - 100000) \times (\text{length of it} - 2700000)}{15} \quad \text{.....(v.5.274)}$$

Example 1.

Let the last desired island be Vāruṇīvara, whose width is 6400000 yojanas and length is 56700000 yojanas. Then,

combined area of Dhātakī and Puṣkara islands

$$= \frac{(6400000 - 100000) \times (56700000 - 2700000)}{15}$$

$$= \frac{6300000 \times 54000000}{15} = 22680000000000 \text{ square yojanas.} \quad \text{.....(5. 175)}$$

Example 2.

The formula in general is as follows:

(Leaving the Jambū island),

when the desired island is given,

the sum of all areas of all the preceding islands is

$$= (D_{2n-1} - 100000)[(D_{2n-1} - 100000)9 - 2700000] \div 15$$

.....(v.5.274)

Here,

width of Svayambhūramaṇa island $= \frac{1}{8}$ rāju + 37500 yojanas

length of Svayambhūramaṇa island $= \frac{9}{8}$ rāju − 562500 yojanas.

Hence, its area

$$= \frac{\left(\frac{1}{8}\text{ rāju} + 37500 - 100000\right) \times \left(\frac{9}{8}\text{ rāju} - 562500 - 2700000 \text{ square yojanas}\right)}{15}$$

$$= \frac{3\,(\text{rāju})^2}{320} - \text{rāju} \times \text{yojanas} \times 31875 + 135593750000 \text{ square yojanas.} \quad \ldots.(5.176)$$

Formula for obtaining excess :

= When Kṣīravara is the initial one, or n" is reckoned from this isl and,

described excess = $(D_{n"+2} - 100000)\,9 \times 400000.$ .....(v.5.275)

Example 1. We have, length of Kṣīravara island is 229500000 yojanas,

excess = $229500000 \times 400000 = 91800000000000$ square yojanas. .....(5.177)

This is the excess as 15 times of the area of the sum of all the preceding islands from the Kṣīravara island, which is obtained in the Kṣīravara island,

Example 2. The measure of this excess as 15 times its sum of all the preceding island areas, for the case of Svayaṁbhūramaṇa island is as follows:

length of Svayaṁbhūramaṇa island = $\frac{9}{8}$ rāju – 562500 yojanas.

Hence, increase measure in area = $\left(\frac{9}{8}\text{ raju} - 562500 \text{ yojanas}\right) \times$ 400000 yojanas

= 450000 rāju yojanas $- 225 \times (10)^9$ square yojanas, ... (5.178)

∴ area of Svayaṁbhūramaṇa

$$= \frac{9}{64}\,(\text{rāju})^2 - 478125 \text{ rāju} \times \text{yojanas} + 203906250000 \text{ square yojanas.} \quad \ldots. (5.179)$$

Excess is given in (5.178). Hence, on adding it into (5.179),

$$= \frac{9}{64}\,(\text{rāju})^2 - 28125 \text{ rāju yojanas} - 21093750000 \text{ square yojanas.} \quad \ldots.. (5.180)$$

EIGHTEENTH ASPECT

This is for finding out the diameters of the successive islands se... through the three types of diameters of the preceding islands and seas.

The following table gives measures of the internal, medium and external diameters of Lavaṇa sea etc., along with the excess to be added to them, for getting the corresponding measures of internal, medium and external diameters in yojanas, of their succeeding island or sea:

TABLE 5.5

Name of sea or island and excess	internal diameter and excess in yojanas	medium diameter and excess in yojanas	external diameter and excess in yojanas
Lavaṇa sea	100000	300000	500000
	+	+	+
Excess	400000	600000	800000
Dhātakīkhaṇḍa	500000	900000	1300000
island	+	+	+
Excess	400000×2	600000×2	800000×2
Kālodaka sea	1300000	2100000	2900000
	+	+	+
Excess	800000×2	1200000×2	1600000×2
Puṣkaravara island	2900000	4500000	6100000

Formula for finding out the three increases :

Before this, the increasse in the initial diameter of Svayaṁbhūramaṇa island is $\frac{1}{4}$ rāju + 75000 yojanas for geting the initial diameter of Svayaṁbhūramaṇa sea. The increase, similarly, for getting medium and external diameter are, respectively, $\frac{3}{8}$ rāju + 112500 yojanas and $\frac{1}{2}$ rāju + 150000 yojanas.

According to verse,

the respective increase $= \frac{D_{n'}}{2} \times 2; \frac{D_{n'}}{2} \times 3; \frac{D_{n'}}{2} \times 4,$ ..... (5.181)

(v.5.276)

where n' is reckones from the Dhātakīkhaṇḍa island.

Example 1.

Let the desired sea be the Kṣīravara sea here,

whose width is 51200000 yojanas.

Hence, the described three excesses are, respectively,

$\frac{51200000}{2} \times$ 2, 3 and 4, that is ,

51200000 yojanas, as increase in initial diameter

76800000 yojanas, as increase in medium diameter

102400000 yojanas, as increase in external diameter

..... (5.182)

When the above amounts are added, respectively, to the three types of diameter of Kṣīravara island, the results give the three types of diameters of Kṣīranara sea.

Example 2.

Here, the last sea is desired, whose width is

$\frac{1}{4}$ rāju + 75000 yojanas ,

hence the three excesses in the last sea

$= \frac{\frac{1}{4} \text{ rāju} + 75000 \text{ yojanas}}{2} \times$ 2, 3, 4, respectively, giving

$\frac{1}{4}$ raju + 75000yojanas,

$\frac{3}{8}$ raju + 112500 yojanas,

$\frac{1}{2}$ raju + 150000 yojanas .....(5.183)

The initial diameter of Svayambhūramaṇa island is $\frac{1}{4}$ rāju – 225000 yojanas,

medium diameter is $\frac{3}{8}$ rāju – 187500 yojanas and

external diameter is $\frac{1}{2}$ rāju – 150000 yojanas.

In these when the above excess (5.183) added, it gives the three types of diameters of the last sea as follows :

initial diameter of Svayambhūramaṇa island = $\frac{1}{4}$ rāju – 225000 yojanas

excess = $\frac{1}{4}$ rāju + 75000 yojanas

∴ initial diameter of Svayambhūramaṇa sea = $\frac{1}{2}$ rāju - 150000 yojanas

medium diameter of Svayambhūramaṇa island = $\frac{3}{8}$ rāju – 187500 yojanas

excess = $\frac{3}{8}$ rāju + 112500 yojanas

$\therefore$ medium diameter of Svayambhūramaṇa sea = $\frac{3}{8}$ rāju – 75000 yojanas

external diameter of Svayambhūramaṇa island = $\frac{1}{2}$ rāju - 150000 yojanas

excess = $\frac{1}{2}$ rāju - 150000 yojanas

$\therefore$ external diameter of Svayambhūramaṇa sea = 1 rāju.

..... (5.184)

NINETEENTH ASPECT

The increase in length of Svayambhūramaṇa sea as compared with length of Svayambhūramaṇa island is given by $\frac{9}{8}$ rāju + 337500 yojanas .

The length of the Lavaṇa sea is $[(2 \text{ lac} - 1 \text{ lac}) \times 9] = 9$ lac yojana s, that of Dhātakī is $[(4 \text{ lac} - 1 \text{ lac}) \times 9] = 27$ lac yojana s and that of Kāloda sea is 63 lac yojanas.

The described increase = $\frac{D^{n'} \times 9}{2}$ .....(v. 5.277)

Example 1.

Let the desired sea be Kālodaka, whose width is 8 lac yojanas, hence described increase

$= \frac{800000}{2}$ yojanas $\times$ 9

= 3600000 yojanas.

Thus, the length of Kālodaka sea

= 2700000 + 3600000

= 63 lac yojanas. .....(5.185)

Example 2.

The width of Svayaṁbhūramaṇa sea is $\frac{1}{4}$ rāju + 75000 yojanas . Hence,

increase in length

$$= \frac{\frac{1}{4} \text{ rāju} + 75000 \text{ yojanas}}{2} \times 9$$

$$= \frac{9}{8} \text{ rāju} + 337500 \text{ yojanas} \qquad \ldots\ldots (5.186)$$

This means that this is

= [length of Svayaṁbhūramaṇa sea] – [length of Svayaṁbhūramaṇa island]

$$= \left[\frac{9}{8} \text{ rāju} - 225000 \text{ yojanas}\right] - \left[\frac{9}{8} \text{ raju} - 562500 \text{ yojanas}\right]$$

$$= \frac{9}{8} \text{ rāju} + 337500 \text{ yojanas} .$$

(vv. 5.281-322)

This portion consists of description of 24 types of one-sensed bios and 34 types of two sensed, three-sensed, four-sensed and five-sensed bios.

One-sensed bios are earth bodied, water bodied, fire-bodied, air-bodied and vegetable-bodied. Each of the first four types are subdivided into gross and fine, and each of this subdivision is further divided into the developed and underdeveloped (aparyāpta). The vegetable-bodied is of two types, general (sādhāraṇa) and individual (pratyeka) and former of this subdivision is divided into gross and fine. The individual is divided into the established-common and non-established-uncommon (pratiṣṭhita and apratiṣṭhita).

These are all further divided into developed and underdeveloped. They are all called immobile (sthāvara).

The subhuman mobile (tiryañca-trasa) are of five kinds :

two-sensed (developed and under-developed)

three-sensed (developed and under-developed)

four-sensed (developed and under-developed)

five-sensed (developed and under-developed)

(irrational)

five-sensed (developed and under-developed)

(rational)

PROCEDURE FOR GENERATING THE FIRE-BODIED BIOS-SET

INTRODUCTION

[1]The five types of immobile (sthāvara) bios which are earth-bodied, water-bodied, fire-bodied, air-bodied and every-vegetable (individual), two sensed, three-sensed, four-sensed, five-sensed, being with their subdivisions are each innumerate-innumerate in number. The general vegetable-bodied (nigoda), are infinite-infinite.

When the mobile bios-set (trasa jīva rāśi) is subtracted from the transmigrating bios-set (saṁsārī jīva rāśi), the set of one-sensed bios is obtained as 13 − (numeral symbolism).

When this one-sensed set is divided by numerate 5 (numeral symbolism), its major part is the set of developed one sensed bios $13 - \left| \frac{4}{5} \right|$. The one part denotes the set of underdeveloped one-sensed bios, $13 - \left| \frac{1}{5} \right|$

When the one-sensed bios-general set is divided by the innumerate- universe (denoted by number 9), one part thereof is the gross one-sensed bios-set $\frac{13-1}{9}$, and its major part, $\frac{13-8}{9}$, is the measure of fine one-sensed bios-set. There, 5 denoted the numerical symbol for numerate and here, 9 denoted the numerical symbol for innumerate universe (set of points in innumerate-universe). Again, on dividing the gross one-sensed bios-set by innumerate-universe (numerically denoted by number 7), the one part becomes the gross one-sensed

1.Vide GJK, vol.1, p.303 et seq.

developed bios-set $\begin{matrix}13-\\9\end{matrix} \mid 7$ and its major part becomes the gross one-sensed under-developed bios-set as $\begin{matrix}13-6\\9\mid 7\end{matrix}$. Here, 7 denotes a numerical symbol for innumerate universe.

When the fine one-sensed bios-set is divided by numerate 5, its major part of fine one-sensed bios-set is the developed $13-\begin{matrix}8\\9\end{matrix} \mid \begin{matrix}4\\5\end{matrix}$ and one part is that of the underdeveloped set $13-\begin{matrix}8\\9\end{matrix} \mid \begin{matrix}1\\5\end{matrix}$. Here, 5 is the numerical symbol for numerate.

The symbolism for generating the bios-set of the one-sensed, has been adopted in TPT, after a few sentences, from page 599.

As shown earlier, the cubic-universe (ghana loka) denotes the set of space-points (a point being the space occupied by an ultimate particle). If L denotes the universe line, for which the symbol in the text is $-$, L^3 or $\equiv$ denotes the set of points in cubu-universe. When L^3 is raised to the same power, it is said to be operated once by vargita-saṁvargita. We denote it, as shown earlier as $\overline{L^3}\Big|^1$. Once operated, there is said to be one reckoning-rod count one for the mutual product. The total measure of this count of the mutual product will be the same, as many as times the vargaṇa-saṁvargaṇa (squaring-over-squaring) is performed. Actually, L^3 set is establised at three places, one serves the purpose of spread into units, the second serves as being given each time to each unit for performing mutual product, and third represents the number as many times the operation is to be performed, and is subtracted by unity, each time the squaring-over-squaring mutual product between the distributed L^3, on L^3 units is performed.

Now, what ever is the product, obtained at the end of these L^3 operations, it is to be reserved for further operations in a similar manner.

Here, the author states the following :

The mutual product reckoning-rod set count will be the same number L^3, and further

$$\log_2 \log_2 \left[\overline{L^3}\Big|^1\right] = \frac{P}{A}$$

where A is the symbol for the innumerate as denoted earlier, and this may be Aam,

that is in between Aaj and Aau, a variable symbol.

For example

if $\overline{L^3|}^1 = 2^B$, or $\log_2\left[\overline{L^3|}^1\right] = B$,

then B measures innumerate-universe. Here, there is no clasification, either of the cubic-universe or universe. They may be different ?

Such a generated set has been called having a measure of innumerate-universe. When this is again operated upon by the process of vargita-samvargita, $\overline{L^3|}^2$ is produced and the measure of mutual-product reckoning-rods count two. Thus, on continuing this process L^3 times, we get, $\overline{L^3|}^{L^3}$ or $\overline{L^3|}_1$. At this instant, the mutual product reckoning-rods is L^3. At this end, the set $\overline{L^3|}_1$ is still innumerate-universe, which may be denoted by $\equiv a$.

Here, $\log_2 \log_2 \left[\overline{L^3|}_1\right]$ is also innumerate-universe. If $\overline{L^3|}_1 = 2^{B'}$, then B' is also innumerate universe.

Now the same process is started again for a second round. $\overline{L^3|}_1$ is eatablished at three places. One set is taken and spread, the other is taken and distributed to each unit of the spread. Then they are mutually multiplied and as the end of operation, one reckoning-rod is withdrawn from the mutual-product reckoning-rod set of. $\overline{L^3|}_1$. We get $\overline{\overline{L^3|}_1|}^1$, and when this process is repeated, one gets, $\overline{\overline{L^3|}_1|}^2$ and so on, till at the end of the third mutual-product reckoning-rod counts reach $\overline{L^3|}_1$. This process gives $\overline{\overline{L^3|}_1|}^{\overline{L^3|}_1}$ or $\overline{L^3|}_2$ at the end of

L^3 and $\overline{L^3}|_1$ total of mutual product reckoning-rod count.

[The author tells that even after $L^3 + 2$ operations, the generated great set, its $\log_2$ $\log_2$ and $\log_2$ reckoning rods are still innumerat-universe. He states that as two plus universe measure of mutual product reckoning-rods enter into maximal numerate universe as reduced by unity, all the four sets remain innumerate-universe.

$L^3 + 2 + [Su]\ L^3 - 2 = [Su + 1]\ L^3$ and we know that $Su + 1 =$ Apj . Thus all the four sets; on being operated upon the process of vargaṇa-saṁvargaṇa, will become innumerat-universe.]

Thus, we now take the next round with $\overline{L^3}|_2$ as placed at three places, one set being destributed to the second set spread into units, and the mutual-product continues to $\overline{L^3}|_2$ processes. Let us now denote the generated set as $\overline{L^3}|_3$. It is to be noted that on generation of either $\overline{L^3}|_2$ or $\overline{L^3}|_3$ of all the four sets, i.e., these quantities, their $\log_2$ $\log_2$, their $\log_2$ and the mutual-product reckoning-rods, remain innumerate-universe.

Now, at the 4th round, the set $\overline{L^3}|_3$ is assumed to be established, and it is squared-over-squared (vargita-saṁvargita) as many as

$$\overline{L^3}|_3 - \overline{L^3}|_2 - \overline{L^3}|_1 - L^3 \text{ times.}$$

After these operations, the fire-bodied set is generated, which is innumerate cubic-universe in measure. Mark the difference between the universe and the cubic universe. The author has given the symbol ≡ a to this set[1]. Thus, the mutual product reckoning-rod set of the fire-bodied bios-set is $\overline{L^3}|_3$ because

1 Note that this symbol a in the TPT (V), has been written as रि, taken from Kannaḍa manuscript which I have not been able to see, in both the cases, from the original. Both need a sophisticated touch in prints.

$$\overline{L^3}\Big|_3-\left(\overline{L^3}\Big|_2+\overline{L^3}\Big|_1+L^3\right)+\left(\overline{L^3}\Big|_2+\overline{L^3}\Big|_1+L^3\right)=\overline{L^3}\Big|_3 .$$

The author has used the word, "transgressed mutual-product reckoning-rods count" to $\overline{L^3}\Big|_2+\overline{L^3}\Big|_1+L^3$. Here, the author, now proceeds with a new symbol ९ or 9 for the innumerate-universe.

At this juncture, note the statement of Vīrasenācārya from his Dhavalā commentary of the Saṭkhaṇḍāgama[1]

Many preceptors, regard the generation of the fire-bodied bio-set, as after the exhaustion of half the set of established $\overline{L^3}\Big|_3$ at the fourth round of generation, and many preceptors do not regard and accept this statement, because, as they hold that in the (dyadic) square sequence, the generation due to three and a half times of operations, is not found (in the divergent sequence). Here, Vīrasenācārya has tried to prove both opinions to be with the similar motivation, on the basis of poly-ends (anekānta) theory, supported by the measures of the $\log_2 \log_2$ and $\log_2$. The dialogue is as follows:

DOUBT

It is correct that the $3\frac{1}{2}$ times operated process produced set-collection is not square-generated, but how is it known that the mutual-product reckoning-rods of the fire-bodied set are generated in the square sequence ?

Explanation

This fact is known from Parikarma. Several preceptors tell thus that this $3\frac{1}{2}$ times process generated earlier mentioned set is not in form of measure of the multiplier-reckoning-rod-set of fire-bodied set. Then what is that set which has the same measure of multiple-reckoning-rod-set of the fire-bodied-(bios) set ?

Explanation they give, that what ever is the number of reckoning-rods of the universes having got entry as multiplier of the multiple universe, that number is the mutual-

1 DVL,Book-3, p.337 et seq.For three and half, the word in Prakrit addhuṭṭha has been used.

product-reckoning rod-set of the fire-bodied set. These mutual-product reckoning-rods have been generated in square, not in form of the three and a half times (processed) set. Hence, it is not contradictory to instruction that the instruction for $3\frac{1}{2}$ times set measure about (mutual-product) multiplier reckoning-rods is contradictory.

But this statement also does not hold, because on dividing the $\log_2$ of fire-bodied set by $\log_2$ of universe, the quotient set is spread and to every one of its unit is given the cubic universe and mutually multiplied. This generates the fire-bodied set, and the lower spread set also have the same measure as the mutual-product reckoning-rods of fire-bodied set. But in this school, the speciality is that the mutual-product reckoning-rods become innumerate times the $\log_2 \log_2$ of fire-bodied set, because, whatever mutual-product-reckoning-rods are produced in this way, they become innumerate times the first square root of $\log_2$ of fire-bodied set. But this is not desired, because the mutual-product reckoning-rods-set is innumerate times less than the $\log_2 \log_2$ of fire-bodied set.

DOUBT

How is this known?

Explanation

This is known from Parikarma. Its explanation is as follows:

When the mutual-product-reckoning-rods of fire bodied set are successively squared innumerate-universe times, i.e. raised from lower squares by innumerate times, the $\log_2 \log_2$ of fire bodied set is generated.

Secondly, this spread set, is the set of such reckoning-rods of universes having got entry as multiplier, has not been generated through squaring, because, that is divided by $\log_2$ of universe, measuring $\log_2$ of fire-bodied set.

DOUBT

As is known, the spread set and distribution set being equal, and as the fire-bodied set has been generated in the cube-non-cube sequence, the $\log_2$ of fire-bodied set is also not square-generated ?

Explanation

This is not so, because this fact is desired by us, and in this way, there is no

contradiction with the Parikarma, because the Parikarma works only for its purpose of interpretation. Here, only this is to be accepted that the mutual-product-reckoning-rods are only three and a half times corresponding to fire-bodied set, because the traditional preceptors' instruction has been like this. The mutual-multiplier-reckoning-rods are not generated by squaring, hence the instruction, that it is three and a half times is not correct, is also not a fact, because the '$3\frac{1}{2}$ times' instruction can not be otherwise. From this, the fact is known that multiplier-reckoning-rods are not square-generated. Their square-ness (vargatva) is also not proved through the Parikarma, because there is polyendedness (anekānta), of this with the $\log_2$ of fire-bodied set.

Herein and what follows we shall abbreviate as follows:

mutual-product-reckoning-rods	as	mprr
fire-bodied bios-set	as	f
cubic universe set	as	L^3
vargita-saṁvargita (squared over square) as the case may be		
as shwon earlier	as	$\overline{\vert}^{1}$ and $\overline{\vert}_{1}$
(or raised to the same power as it is it self) and ahead	or	operation as $\overline{\vert}$

FURTHER ANALYSIS

Or, the mprr of f are placed in rr form, and on $\overline{\vert}$ of generating sets, the f may be generated. The f is taken as divisor, and f^2 is dividend, for stating the knowledge of sectioning (khaṇḍita) dividing (bhājita), spreading (viralita) snatching (apahṛta). Its measure is $\frac{f^2}{f}$. The reason is that $\frac{f^2}{f}$ is = f. As there is no doubt here hence, there is no need of stating the definition (nirukti).

Abstraction is of two types: lower abstraction and the upper abstraction. But here, the lower abstraction is not possible, because f is $\sqrt{f^2}$ alone.

The upper abstraction is of 3 types: the adopted (gṛhīta), the adopted-adopted (gṛhīta-gṛhīta) and adopted multiplier (gṛhīta-guṇakāra).

Commentary

Here, the author, Vīrasenācārya, mentions two more opinions of preceptor-tradition. Taking L^3, and operating the spread, distribute and multiply, respectively, three times at the end of which the great set is so generated. From it the first, second and third mprr when reduced, gives the remaining mprr, number of times of which, the great quantity (set) is operated upon the fourth time. This is how the L^3 operated upon through spread, give and multiply three and a half times. This school is authentic due to preceptor-tradition.

The opinion of the second school is that after the great set has been generated after three operations of spread, give and multiply, it should be subjected again to spread and give multiply as many times as half of the generated great set. Then the three and a half measure of mprr is produced and measured. But, several preceptors oppose this school. In their opinion, this three and a half times spread give, multiply process instruction is not square-generated, hence it is not authentic. The mprr of f are square-generated.

For confirming their school, these preceptors take the basis of the Parikarma. Then, there are other preceptors, who state that in as many universe-measure-set spread, on every one of its unit, the universe is distributed, and then mutually multiplied for producing f, that much universe-measure-set gives the mprr of f. They regard these mprr as square-generated (varga-samutpanna). But, Vīrasenācārya has not regarded this school as authentic as he disregards the second school. The reason is that, the mprr obtained in this manner becomes innumerate times the $\log_2 \log_2$ f. Actually the $\log_2 \log_2$ f should be innumerate times the mprr.

The following further treatment is symbolic and will be treated both in the symbols in the text and in the working symbols :

TABLE - 5.4

Description	Ancient Symbols	Working Symbols
1. The measure of earth bodied bios-set is obtained on adding the innumerate part of the fire-bodied set into the fire-bodied set.	(Fire bodied set $+ \frac{\text{fire - bodied set}}{\text{innumerate univ.}}$	$(f + \frac{f}{9})$
	or ≡ a ≡ a ९ pakkhitta	or $L^3\text{ক} + \frac{L^3\text{ক}}{9}$
	or ≡ a | ९० ९	or $L^3\text{ক} - \left(\frac{10}{9}\right)$
2. The measure of water-bodied bios-set	≡ a | ९० ९ plus	$\left(f + \frac{f}{9}\right) + \frac{f}{9}\left(\frac{10}{9}\right)$
	≡ a . ९० ·९ ९	or $L^3\text{ক}\left(\frac{10}{9}\right) + \frac{L^3 a}{9}\left(\frac{10}{9}\right)$
	or ≡ a |९०| ९० ९ ९	or $L^3\text{ক}\left(\frac{10}{9}\right)\left(\frac{10}{9}\right)$
3. The measure of the air-bodied bios-set (Here 10 represents again the 9+ 1 or innumerate universe plus one.)	≡ a ९० . ९० ९ ९ plus	$f.\frac{10}{9}\cdot\frac{10}{9} + \frac{f}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}$
	≡ a . ९० . ९० ९ ९ ९	or $L^3\text{ক}\frac{10}{9}\cdot\frac{10}{9} + L^3\frac{\text{ক}}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}$
	≡ a ९० ९० ९० ९ ९ ९	or $L^3\text{ক}\cdot\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}$

4. The measure of the gross fire-bodied bios set	$\equiv a_{९}$	$\frac{f}{9}$ or $\frac{L^3क}{9}$
5. The measure of the fine fire-bodied bios set (Here, 8 represents again the 9 −1 innumerate universe minus one).	$(\equiv a)\, rina\, (\equiv a)_{९}$ or $(\equiv a)\,[१ \text{ रिण } ९^{१}]$ or $(\equiv a)\,[९^{\text{रिण}}_{९}\,१]$ or $\equiv a_{९}^{८}$	$f-\frac{f}{9}$ or $L^3क-\left(\frac{L^3क}{9}\right)$ or $L^3क\left(1-\frac{1}{9}\right)$ or $L^3क\left(\frac{8}{9}\right)$
6. The measure of air-bodies gross bios-set	$\equiv a_{९}^{१०\,१०\,१०}$	$\frac{f}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}$ or $\frac{L^3क}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}$
7. The measure of fine air-bodied bios-set	$\equiv a_{९}^{१०.१०.१०\ \text{रिण}}$	$f\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}-\frac{f}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}$
	$\equiv a_{९}^{१०\,१०\,१०}$	or $L^3क\cdot\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}-\frac{L^3क}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}$
	$\equiv a_{९}^{१०\,१०\,१०}\left(९^{\text{रिण}}_{९}\,१\right)$	or $L^3क\cdot\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}\left(\frac{9-1}{9}\right)$

	or ≡ a ९० ९० ९० ८ ९ ९ ९	$L^3\text{क्ष}\cdot\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}\cdot 8$
8. The measure of gross	≡ a ९० ९ ९	$f\frac{10}{(9)(9)}$
earth-bodied bios-set		or $L^3\text{क्ष}\frac{10}{(9)(9)}$
9. The measure of fine	earth-bodied bios set minus	
earth-bodied bios-set	gross earth-bodied bios-set	$f\frac{10}{9}-f\frac{10}{(9)(9)}$
or	≡ a ९० रिण ≡ a ९० ९० ९ ९ ९	or $f\frac{10}{9}\frac{8}{9}$
or	≡ a ९० ८ ९ ९	or $L^3\text{क्ष}\frac{10}{9}\cdot\frac{8}{9}$
10. The measure of gross	water bodied bios set	$f\frac{10}{9}\cdot\frac{10}{9}\div 9$
water-bodied bios-set	divided by innumerate-universe	$L^3\text{क्ष}\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{1}{9}$
	or ≡ a ९० ९० ९ ९ ९	
11. The measure of fine	water bodied bios set	$f\frac{10}{9}\cdot\frac{10}{9}-f\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{1}{9}$
water-bodied bios-set	minus its gross set	or $f\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{8}{9}$
	or ≡ a ९० ९० रिण ≡ a ९० ९० १ ९ ९ ९ ९	or $L^3\text{क्ष}\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{8}{9}$
	or ≡ a ९० ९० ८ ९ ९ ९	

12.The measure of earth-bodied gross developed bios-set	$\frac{(\text{universe line})^2}{(\text{finger})^2 \times 2 \frac{\text{āvali}}{\text{innumerate}}}$ palya ÷ innumerate = ४ २ ५ ९ a	$\frac{L^2}{F^2 \times \frac{A}{\bar{\text{क}}}}$ $P \div \bar{\text{क}}$ where L is the universe line, F is the aṅgula (finger), A is the āvalī (trail), P is the palya, $\bar{\text{क}}$ is the innumerate, and $\bar{\text{क}}$ ' is the another approximate innumerate with symbol ९
13.Measure of gross water-bodied bios-set	earth bodied gross developed multiplied by $\frac{\bar{\text{avali}}}{\text{innumerate}}$ = ४ २ ५ ९ २ ९ a or = ४ ५ a	$\frac{L^2}{F^2 \times \frac{A}{\bar{\text{क}}'}} \times \frac{A}{\bar{\text{क}}}$ $P \div \bar{\text{क}}$ where A' is the symbol for 9 or $\frac{L^2}{F^2} \cdot \frac{a}{P}$

14.Measure of fire-bodied gross developed bios-set	$\frac{\text{avali cubed}}{\text{innumerate}}$ or ८ a	$\frac{A^3}{क}$
15.Measure of gross air bodied developed bios-set	$\frac{\text{universe - line cube}}{\text{numerate}}$ ९ or ≡ ७	$\frac{L^3}{ङ}$, where S is the numerate symbol.
16.Measures of gross under developed bios set : earth bodied	≡ a १० रिण = ४ २ ५ ९ a	$L^3 \; क \; \frac{10}{9} - \frac{L^2}{\left(F^2 \div \frac{P}{क}\right)\frac{A}{क}}$
Water-bodied	≡ a १० १० रिण = ४ ५ a	$\frac{L^2 क (10)(10)}{(9)(9)(9)} - \frac{L^2}{F^2 \div \frac{P}{क}}$
Fire-bodied	≡ a रिण ८ a	$\frac{L^3 क}{9} - \frac{A^3}{क}$
Air-bodied	≡ a १० १० १० रिण ≡ ७	$\frac{L^2 क (10)(10)(10)}{(9)(9)(9)(9)} - \frac{L^3}{ङ}$
17. Measure of fine developed bios-set : earth-bodied bios-set	major part of $\frac{\text{earth bodied fine bios set}}{\text{numerate}}$	$f\frac{10}{9}\cdot\frac{8}{9}\cdot\frac{4}{5}$

	or ≡ a ९० ८ ४ / ९ ९ ५	or L^3की $\frac{10}{9}\cdot\frac{8}{9}\cdot\frac{4}{5}$
water-bodied bios-set	major part of water-bodied	$f\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{8}{9}\cdot\frac{4}{5}$
	bios-set as divided by numerate	L^3की $\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{8}{9}\cdot\frac{4}{5}$
	or ≡ a ९० ९० ८ ४ / ९ ९ ९ ५	—
fire-bodied fine bios-set	major part of $\frac{\text{fire bodied fine bios set}}{\text{numerate}}$	$f\frac{8}{9}\cdot\frac{4}{5}$
	or ≡ a ८ ४ / ९ ५	L^3की $\frac{8}{9}\cdot\frac{4}{5}$
air-bodied bioset	major part of $\frac{\text{air bodied fine bios-set}}{\text{numerate}}$	$f\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{8}{9}\cdot\frac{4}{5}$
	or ≡ a ९० ९० ९० ८ ४ / ९ ९ ९ ९ ५	L^3की $\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{8}{9}\cdot\frac{4}{5}$
18.Measure of the fine underdeveloped bios-set	only one part of all the above separately	$\frac{f}{9}\cdot\frac{10}{9}\cdot\frac{8}{9}$
earth bodied bios-set	≡ a ९० ८ / ९ ९ ९	or I^3की $\cdot\frac{10}{9}\cdot\frac{8}{9}\cdot\frac{1}{5}$
water bodied bios-set	≡ a ९० ९० ८ / ९ ९ ९ ५	L^3की $\cdot\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{8}{9}\cdot\frac{1}{5}$

fire-bodied bios-set	$\equiv a^{\frac{८}{५}}_{९}$	L^3 क्ष $\frac{8}{9}\cdot\frac{1}{5}$
air-bodied bios-set	$\equiv a^{\frac{९०\ ९०\ ९०\ ८}{९\ ९\ ९\ ९\ ५}}$	L^3 क्ष $\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{10}{9}\cdot\frac{8}{9}\cdot\frac{1}{5}$.

MEASURE OF COMMON VEGETABLE-BODIED BIOS-SET

The msasure is given as

= (total bios-set) minus {(accomplished bios-set) plus (mobile bios-set) plus (fire-bodied bios-set) plus (earth-bodied bios-set) plus (air-bodied bios-set) plus (water-bodied bios-set)}

The above right handed side is

$$(16)\ \text{रिण}\ \left(\left\{(3)\ \text{धण}\ \left(\begin{matrix}=\\ ४\\ २\\ a\end{matrix}\right)\ \text{धण}\ (\equiv a)\ \text{धण}\ (\equiv a^{\frac{१०}{९}})\ \text{धण}\ (\equiv a^{\frac{१०\ १०}{९\ ९}})\ \text{धण}\ (\equiv a^{\frac{१०\ १०\ १०}{९\ ९\ ९}})\right\}\right.$$

$$\text{or}\quad (13)\ \text{रिण}\ \left\{\left(\begin{matrix}=\\ ४\\ २\\ a\end{matrix}\right)\ \text{धण}\ \equiv a\ \text{धण}\ \left(१\ \text{धण}\ {}^{१०}_{९}\ \text{धण}\ \left(\begin{matrix}१००\\ ८१\end{matrix}\ \text{धण}\ \begin{matrix}१०००\\ ७२९\end{matrix}\right)\right)\right\}$$

$$\text{or}\quad (13)\ \text{रिण}\ \left\{\left(\begin{matrix}=\\ ४\\ २\\ a\end{matrix}\right)\ \text{धण}\ \left(\equiv a\ \begin{matrix}३४३९\\ ७२९\end{matrix}\right)\right\}$$

$$\text{or}\quad (13)\ \text{रिण}\ \left\{\left(\begin{matrix}=\\ ४\\ २\\ a\end{matrix}\right)\ \text{धण}\ \left(\equiv a\ \begin{matrix}३४३९\\ ७२९\end{matrix}\right)\right\},\ \text{can be written as}$$

$$\text{(or)},\qquad [J - J_{e^*}] - \left\{\left(\frac{L^2}{F^2}\cdot\frac{\text{क्ष}}{A}\right) + \left(L^3\ \text{क्ष}\ \frac{3439}{729}\right)\right\},$$

where J is the set of all living-beings, J_{e^*} is set of accomplished (siddha) bios-set.

Further, in order to find out the measure of the common gross vegetable-bodied and the common fine vegetable-bodied, the following formulae are applied :

Common gross vegetable-bodied bios-set :

$$= \frac{\text{Common vegetable - bodied bios - set}}{\text{innumerate universe}}$$

or ९३ ≡ ९

or $\frac{(J - J_{e^*})L^3}{9}$, where $J\text{-}J_{e^*} = 13$.

The remaning is the majar art of the latter, which is

९३ ≡ | ८ ९

or $\frac{J - J_{e^*}}{9} L^3$ 8, the common fine vegetable-bodied bios set.

Now, common gross developed vegetable-bodied

$$= \frac{\text{common gross vegetable-bodied bios-set}}{\text{innumerate universe}}$$

or ९३ ≡ ९ ९ ७

or $\frac{J - J_{e^*}}{9} \frac{L^3}{7}$, where 7 is the innumerate universe.

Similarly, common gross underdeveloped vegetable-bodied

$$\text{bios - set} = \frac{\text{common gross veg. bidied bios - set}}{\text{innumerate universe}} \times \frac{\text{innumerate universe - 1}}{1}$$

or $\begin{matrix} ९३ \equiv ६ \\ ९ \quad ७ \end{matrix}$.

or $\frac{J - J_{e^*}}{.9} \cdot L^3 \frac{6}{7}$.

Further,

common fine vegetable-bodied developed bios-set :

$$= \frac{\text{common five veg. bodied bios-set}}{\text{numerate}} \times \frac{\text{numerate - 1}}{1}$$

or $\begin{matrix} ९३ \equiv ८ \quad ४ \\ ९ \quad ५ \end{matrix}$

or $J - J_{e^*} L^3 \frac{8}{9} \times \frac{4}{5}$.

And common fine vegetable-bodied underdeveloped bios-set

$$= \frac{\text{common fine vegetable bidied bios set}}{\text{numerate}}$$

or $\begin{matrix} ९३ \equiv ८ \quad ९ \\ ९ \quad ५ \end{matrix}$

or $J - J_{e^*} L^3 \frac{8}{9} \times \frac{1}{5}$.

Now, the individual vegetable bodied bios set is obtained when common vegetable bodied bios set is subtracted from common vegetable bodied bios set.

This amount has been given as $\equiv \bar{a} \equiv \bar{a}$ or

$L^3 \bar{a} \left(L^3 \bar{a} + 1\right)$. This is innumerate universe.

Further non-established individual body vegetable-bodied bios set is also innumerate universe or $\equiv a$,

or L^3 ಕ.

The established individual vegetable bios set :

= innumerate universe × (non-established individual vegetable-bodied bios set)

or $\equiv a \equiv a$

or L^3 ಕ · L^3 ಕ.

Both of these sets are of two types again, the developed and underdeveloped. Again when the earlier mentioned gross earth-bodied developed bios set is divided by innumerate part of āvalī (trail), the measure of gross-nigoda-established developed bios-set is obtained.

EXAMPLE :

Gross-nigoda-established individual body vegetable-bodied developed bios-set:

$$= \text{earth-bodied gross developed bios set} \div \frac{\bar{A}valī}{\text{innumerate}}$$

or $\begin{pmatrix} = & ९ & १ \\ ४ & a & ९ \end{pmatrix}$ or $\begin{pmatrix} L^2 & P & 9 & 9 \\ & F^2 & ಕ & 1 \end{pmatrix}$,

where $\frac{\bar{A}valī}{\text{innumerate}}$ has been denominated as symbol $\frac{1}{9}$.

When the above set is divided by innumerate part of Āvalī, the quotient is gross-nigoda non-established developed bios-set.

Thus Gross nigoda-non-established individual body (śarīra) vegetable-bodied developed bios-set :

= gross nigoda established individual body vegetable-bodied developed

bios- set $\div \frac{\bar{A}valī}{\text{innumerate}}$

or $(=\text{ग}\ 9\ 9\ 9\ \text{अ}\ a\ 9\ 9\ 9)(=\text{ग}\ 9\ 9\ 9\ \text{अ}\ a\ 9\ 9)$

or $\begin{pmatrix} L^2 & P & 9 & 9 & 9 \\ & F^2 \text{ की} & 1 & 1 & \end{pmatrix}$.

When the own developed set is subtracted from own common set, the remaining is the own underdeveloped bios-set.

Example

Gross nigoda non-established individual body (śarīra) vegetable-bodied (vanaspati-kāyika) underdeveloped bios-set

= non-established individual body vegetable-bodied bios set

– non-established individual body vegetable-bodied developed bios-set.

This is equal to $(\equiv a)$ रिण $(=\text{ग}\ 9\ 9\ 9\ \text{अ}\ a\ 9\ 9)$

or $L^3 \text{ की} - \left(\frac{L^2P}{F^2} \cdot \frac{9\,9\,9}{\text{की}\ 1\ 1}\right)$

Similarly, Gross nigoda-established individual body vegetable-bodied under developed bios-set

= The established individual body vegetable-bodied bios-set

– the established individual body vegetable bodied developed bios-set

or $(\equiv a \equiv a)$ रिण $(=\text{ग}\ 9\ 9\ \text{अ}\ a)$

or $L^3 \text{की} L^3 \text{की} - \left(\frac{L^2P}{F^2 \text{की}} \cdot 9 \times 9\right)$.

THE METHOD FOR FINDING THE MEASURE OF MOBILE (TRASA) BIOS

The common mobile-bios-set (trasa jīva rāśi) has the measure given by

= ४ २ a or = ४ २ रि

or $\frac{L^2}{F^2 \div \frac{R}{\text{क}}}$,

where L is the universe-line, R is the trail (āvalī), F is the finger (aṅgula) and A is the innumerate.

When this is divided by the innumerate part of the R, (i.e. $\frac{1}{9}$), we get

= ४ २ रि ९ ६ or = ४ २ a ९ ९ or $\frac{L^2}{F^2 \div \frac{R}{\text{क}}} \cdot \frac{1}{9}$

Its major part is = ४ २ a ८ ६.

Now measure of two-sensed bios-set is given as under :

The major part of = ४ २ a ९ ६ is given by dividing again by 9 and subtracting it from this,

thus = ४ २ a ९ ६ रिण ९ ८ ९ or = ८ ४ ४ ८१ २ a or $\frac{L^2}{F^2 \div \frac{R}{\text{क}}} \cdot \frac{8}{81} \cdot \frac{4}{4}$

When this amount is added to one part,

$$\overset{=}{\underset{a}{४ २}}\left[\left(\begin{matrix}८ & १ & ८\,१ & ६\\ ६ & ४ & ८\,१ & ६\end{matrix}\right)\text{ घण }\overset{=}{\underset{a}{४ २}}\left(\begin{matrix}८\\ ८\,१\end{matrix}\,\middle|\,\begin{matrix}४\\ ४\end{matrix}\,\middle|\,\begin{matrix}८\,१\\ ८\,१\end{matrix}\right)\right]$$

or $\overset{=}{\underset{a}{४ २}}\ \overset{१}{४}\left[\left(\begin{matrix}८ & ८\,१ & ६\\ ६ & ८\,१ & ६\end{matrix}\right)\text{ घण }\left(\begin{matrix}८\\ ८\,१\end{matrix}\,\middle|\,\begin{matrix}४\\ १\end{matrix}\,\middle|\,\begin{matrix}८\,१\\ ८\,१\end{matrix}\right)\right]$

or $\overset{=}{\underset{a}{४ २}}\ \overset{१}{४}\left(\begin{matrix}८४२४\\ ६५६१\end{matrix}\right)$ or $\dfrac{L^2}{F^2 \div \frac{R}{\text{ब}}}\cdot\dfrac{1}{4}\begin{pmatrix}8424\\6561\end{pmatrix}$

which is the measure of common two-sensed bios-set.

The measure of three sensed bios-set :

The major part of $\overset{=}{\underset{a}{४ ८१ २}}$ is again taken as $\overset{=}{\underset{a}{४ ८१ २}}$.

Now $\overset{=}{\underset{a}{४ २}}\ \overset{१}{४}\left[\left(\begin{matrix}१ & ८ & ७२६\\ ४ & ६ & ७२६\end{matrix}\right)\text{ घण }\overset{=}{\underset{a}{४ २}}\left(\begin{matrix}८\\ ८\,१\end{matrix}\,\middle|\,\begin{matrix}४\\ ४\end{matrix}\,\middle|\,\begin{matrix}६\\ ८\,१\end{matrix}\right)\right]$

or $\overset{=}{\underset{a}{४ ४ २}}\ \overset{१}{६}\ \overset{१२०}{५६१}$ or $\dfrac{L^2}{F^2 \div \frac{R}{\text{ब}}}\cdot\dfrac{1}{4}\cdot\dfrac{6120}{6561}$

This is the measure of common three-sensed bios-set.

The measure of four-sensed bios-set :

We find it as the following sum :

= ४ १ ८ ७२६ = ४ ८ १ ४
२ ४ ६ ७२६ धण २ ८ १ ८ १ ४
a a

= १ ५८६४ or $\frac{L^2}{F^2 \div \frac{R}{\text{क}}} \cdot \frac{1}{4} \cdot \frac{5864}{6561}$.
or ४ ४ ६५६१
२
a

This is the measure of the four-sensed bioset. Here, is the innumerate which is also symbolized as रि given in the TPP (V), p.159, vol.3.

The measure of the five-sensed bios-set :

We have = ४ १ ८ ७२६ = ४ ८ १ ४
२ ४ ६ ७२६ धण २ ८ १ ८ १ ४
a a

= १ ५८३६ or $\frac{L^2}{F^2 \div \frac{R}{\text{क}}} \cdot \frac{1}{4} \cdot \frac{5836}{6561}$,
or ४ ४ ६५६१
२
a

which is the measure of five-sensed bios-set.

METHOD FOR FINDING OUT THE MEASURE OF DEVELOPED MOBILE-BIOSET

On dividing the universe square by numerate part of finger-square, we get

= ४ or $\frac{L^2}{F^2 \div 5}$.
५

here 5 is the symbol of numerate.

This is the measure of the mobile-bios-set.

Measure of developed three-sensed bios-set :

The above is divided by innumerate part of trail, i.e. $\frac{1}{9}$ getting = १ ४ ९ ५ ,

which is again divided by the same quantity getting $= \frac{१\ १}{४\ ९\ ९}$

which is subtracted from the former getting $\overset{=}{४}\ ५\ \left(\frac{१}{९}\ \text{रिण}\ \frac{१}{८\ १}\right)$ or $\frac{=\ ८\ ४}{४\ ८१\ ४}$.

On addition with the former we get

$$\overset{=}{४}\ ५\ \left[\left(\frac{८}{६}\ |\ \frac{१}{४}\ |\ \frac{६}{६}\ |\ \frac{८\ १}{८\ १}\right)\ \text{धण}\ \overset{=}{४}\ ५\ \left(\frac{८}{८\ १}\ |\ \frac{४}{४}\ |\ \frac{८\ १}{८\ १}\right)\right]$$

or $\frac{=\ १\ ८४२४}{४\ ४\ ६५६१}$ or $\frac{L^2}{F^2 \div 5} \cdot \frac{1}{4} \cdot \frac{8424}{6561}$ where 5 is numerate symbol.

Measure of two-sensed bios-set :

$$\overset{=}{४}\ ५\ \left[\left(\frac{८}{६}\ |\ \frac{१}{४}\ |\ \frac{६}{६}\ |\ \frac{८\ १}{८\ १}\right)\ \text{धण}\ \overset{=}{४}\ ५\ \left(\frac{८}{८\ १}\ |\ \frac{४}{४}\ |\ \frac{६}{८\ १}\right)\right]$$

or $\frac{=\ १\ ६१२०}{४\ ४\ ६५६१}$ or $\frac{L^2}{F^2 \div 5} \cdot \frac{1}{4} \cdot \frac{6120}{6561}$, where 5 is numerate symbol.

Measure of developed four sensed bios-set :

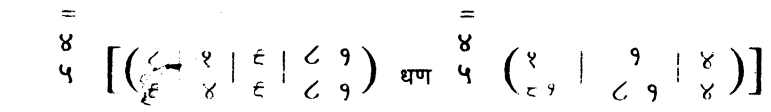
On summing up,

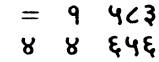
$$\overset{=}{४}\ ५\ \left[\left(\frac{८}{६}\ |\ \frac{१}{४}\ |\ \frac{६}{६}\ |\ \frac{८\ १}{८\ १}\right)\ \text{धण}\ \overset{=}{४}\ ५\ \left(\frac{८}{८\ १}\ |\ \frac{१}{८\ १}\ |\ \frac{४}{४}\right)\right]$$

or $\frac{=\ १\ ५८६४}{४\ ४\ ६५६१}$ or $\frac{L^2}{F^2 \div 5} \cdot \frac{1}{4} \cdot \frac{5864}{6561}$ where, 5 is the symbol for numerate.

Measure for four-sensed bios-set :

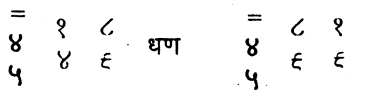
On summing up the following, we get



or  or $\frac{L^2}{F^2 \div 5} \cdot \frac{1}{4} \cdot \frac{5836}{6561}$

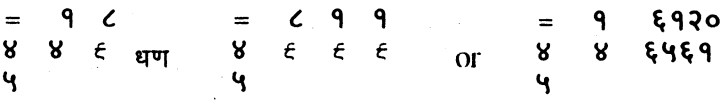
where 5 is the symbol for numerate.

Measure for developed three sensed bios-set :



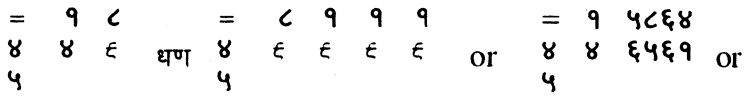
or  or $\frac{L^2}{F^2 \div 5} \cdot \frac{1}{4} \cdot \frac{8424}{6561}$.

Measure for developed two-sensed bios-set :



or $\frac{L^2}{F^2 \div 5} \cdot \frac{1}{4} \cdot \frac{6120}{6561}$

Measure for developed five sensed bios-set :



$$\frac{L^2}{F^2 \div 5} \cdot \frac{1}{4} \cdot \frac{5864}{6561}$$

where 5 is the symbol for the numerate.

Measure for underdeveloped two-sensed bios-set :

= ९ ८४२४ रिण = ९ ६९२० ४ ४ ६५६९ ४ ४ ६५६९ २ ५ a

or $\frac{L^2}{F^2 \div \frac{R}{\text{की}}} \cdot \frac{1}{4} \cdot \frac{8424}{6561} - \frac{L^2}{F^2 \div 5} \cdot \frac{1}{4} \cdot \frac{6120}{6561}$

or (common set) minus (developed two sensed bios-set).

Measure for the under-developed three sensed-bios-set (same formula)

= ९ ६९२० ४ ४ ६५६९ २ a रिण = ९ ८४२४ ४ ४ ६५६९ ५

or $\frac{L^2}{F^2 \div \frac{R}{\text{की}}} \cdot \frac{1}{4} \cdot \frac{6120}{6561} - \frac{L^2}{F^2 \div 5} \cdot \frac{1}{4} \cdot \frac{8424}{6561}$

Measure for the under-developed four sensed bios-set :

= ९ ५८६४ रिण = ९ ५८३६ ४ ४ ६५६९ ४ ४ ६५६९ २ ५ a

or $\frac{L^2}{F^2 \div \frac{R}{\text{की}}} \cdot \frac{1}{4} \cdot \frac{5864}{6561} - \frac{L^2}{F^2 \div 5} \cdot \frac{1}{4} \cdot \frac{5836}{6561}$

Measure for the under-developed five-sensed bios-set :

$$= \begin{matrix} ९ & ५८३६ \\ ४ \; ४ & ६५६९ \\ २ & \\ a & \end{matrix} \qquad \text{रिण} \qquad = \begin{matrix} ९ & ५८६४ \\ ४ \; ४ & ६५६९ \\ ५ & \end{matrix}$$

$$\text{or} \quad \frac{L^2}{F^2 \div \frac{R}{\phi}} \cdot \frac{1}{4} \cdot \frac{5836}{6561} - \frac{L^2}{F^2 \div 5} \cdot \frac{1}{4} \cdot \frac{5864}{6561}$$

The above have been found as the consequence of the following formula,

(common-bios-set) – (developed bios-set) (corresponding to senses).

Here again A is innumerate, R is trail instant set (āvalī samayarāśi), 5 is numerate, L is universe-line and F is linear finger point set.

Measure of sub-human irrational-developed bios-set

This is obtained as follows :

the total five-sensed developed bios-set is $= \begin{matrix} |९| & ५८६४ \\ ४ \; ४ & ६५६९ \\ ५ & \end{matrix}$ ..... (1)

the deity bios set is $\overset{=}{४} \mid ६५५३६$ . ..... (2)

the hellish bios-set is- $-$ २ मू. .....(3)

the developed human bios-set is ९ । ३ मू. .....(4)

The sub-human rational bios-set is $\overset{=}{४} \mid ६५५३६ \mid ७ \mid ७ \mid \overset{९}{५}$ ..... (5)

From the (1), all the remaining bios-set from (2) to (5) are subtracted, getting,

= १ ५८६४ रिणरासि = − २ मू | १ । ३ मू. = १
४ ४ ६५६१· ४ ६५५३६ | ४ ६५५३६ | ७| ७ | ·
५

This may be written as

$$\frac{L^2}{F^2 \div 5}\ \frac{1}{4}\cdot\frac{5864}{6561}-\left[\frac{L^2}{F^2(65536)}+(L)^{(1/2)^2}+\left(\frac{L}{(F)^{1/2}(F)^{(1/2)^3}}-1\right)+\frac{L^2}{F^2(65536)\ (7)\ 5}\right.$$

Here, 7 stands for numerate, so also 5 stands for numerate. ७ is the symbol, for numerate, it could also be number 7. The above contains 65536 which denotes paṇṇaṭṭhi or 2^{2^4}. Similarly 7 does not appear in TPT, p. 615, vol.2. Similarly, the line over १ | ३ | मू . does not appear in the same volume. Thus the expression in this is

= ५८६४ = =
४ |४|६५६१| रिण रा ४|६५५३६| - २ मू . | १ ३मू ४ |६५५३३६| ५ .
५

The symbol रा. here stands for rāśi or set as in the TPT (V). This is therefore

$$\frac{L^2(5864)}{(F^2\div 5)(4)(6561)}-\text{sets}\left[\frac{L^2}{F^2(65536)}+(L)^{(1/2)^2}+\left\{\frac{(F)^{1/2}(F)^{(1/2)^3}}{1}-1\right\}+\frac{L^2}{F^2(65536)(5)}\right]$$

Where, as before, 5 stands for numerate, L for point set universe-line, F for point set linear finger. Further ०— ० means minus one, − २ मू. means second square root of universe line. This expression when compared with those in the p.286, vol.1 of GJK, appears that

०— ० १ ३
१ ३ मू. should be १ ३ मू. which becomes $\frac{L}{(F)^{1/2}(F)^{(1/2)^3}}-1$ in the above as per sanskrit

commentary. The Kaṇṇaḍa commentary mentions some other symbol, with universe line, as १ | ३ for common human bios-set. This also seems to be mistaken, and its correct form would be

१ | ३ मू.

$$\text{or} \quad \frac{L}{(F)^{1/2}(F)^{(1/2)^3}} - 1$$

Further, it is given that

1] The subhuman five-sensed developed bios-set is numerate part of the deity bios-set

$$\bar{\bar{४}}|६५=|७$$

$$\text{or} \quad \frac{L^2}{F^2(65536)7},$$

when ७ or 7 is numerate, and it is given by

$$\bar{\bar{४}}|६५=|७|७$$

$$\text{or} \quad \frac{L^2}{F^2(65536)(7)(7)},$$

where 7 is numerate. When this is divided by 5 and major part thereof is takenup, we get the rational, developed, subhuman five-sensed bios-set

$$\bar{\bar{४}}|६५५३६|७|७|^{४}५$$

$$\text{or} \quad \frac{L^2(4)}{F^2(65536)(7)(7)(5)},$$

where 5 is also numerate.

The comparability is now given about the thirty-four types of sub-human beings :

ANCIENT SYMBOLS WORKING SYMBOLS

(1) Gross fire bodied developed bios are the smallest in number

८ | a | or $\frac{R^3}{\phi}$.

(2) The five-sensed subhuman rational underdeveloped are innumerate times the preceding set

= ४ | ६५५३६ | ५ | ५ or $\frac{L^2}{F^2\left(2^{2^4}\right)\cdot 5\cdot 5}$, where 5 is numerate.

(3) The rational developed bios are numerate times the preceding set

= ४ | ६५५३६ | ५ | ५ (४) or $\frac{L^2\cdot 4}{F^2\left(2^{2^4}\right)\cdot 5\cdot 5}$,

where 5 is numerate and 4 = 5 − 1.

(4) The four sensed developed bios-set is numerate times the preceding :

= ५८३६ / ४ | ४ | ६५६१ / ५ or $\frac{L^2\,(5836)}{F^2\cdot\frac{4}{5}\cdot(6561)}$,

where 5 is the numerate and 4 = 5 − 1.

(5) Specifically greater than the above are the five-sensed sub-human irrational developed-bios :

= ४ ५ ८ ६ ४ / ४ ७ ६ ५ ६ १ रिण रा. = ४ | ६५५३६ − २ मू. $\frac{१}{१\,|\,३\,मू.}$ = ४ | ६५५३६ | ५

$$\text{or} \quad \frac{L^2}{F^2\left(\frac{4}{5}\right)} \cdot \frac{5864}{6561} - \text{sets}\left[\frac{L^2}{F^2(2^{2^4}} + L)^{(1/2)^2} + \{(F)^{1/2}\,(F)^{(1/2)^3} - 1\} + \frac{L^2}{F^2(2^{2^4}}\,.5\right]$$

where 5 is numerate, and $4 = 5 - 1$.

(6) The twc ensed developed bios-set is specifically greater than the preceding

$$= \underset{\text{५}}{\text{४|४|६५६१}}^{\text{६१२०}} \qquad \text{or} \qquad \frac{L^2}{F^2} \cdot \frac{6120}{\frac{4}{5}\cdot(6561)}$$

where 5 is numerate, and $4 = 5 - 1$.

(7) The three-sensed developed bios are specifically greater than the preceding

$$= \underset{\text{५}}{\text{४|४|६५६१}}^{\text{८४२४}} \qquad \text{or} \qquad \frac{L^2}{F^2\cdot\frac{4}{5}} \cdot \frac{8424}{6561}\cdot^{*}$$

(8) The irrational underdeveloped are innumerate times than the preceding :

$$\text{५|}\overset{\text{o}}{\text{५८६४}}\ \text{रिण ।} \quad = \underset{\text{a}}{\text{५८३६|}}\text{a} \qquad = \text{४|६५५३६|५|५}$$
$$\text{४|४|६५६१}$$

where $\overset{\text{o}}{\text{५|५८६४}}$ is to be subrtacted from the amount below

$$\text{or} \qquad \frac{L^2}{F^2} \cdot \frac{5836\ \text{क}}{4\,(6561)} - 5\,(5864)$$

* On adding $\underset{\text{a}}{\text{४|४|६५६१}}^{= \text{५८३२}}$ and $\underset{\text{a}}{\text{४|४|६५६१}}^{= \text{२५९२}}$ we get $\underset{\text{a}}{\text{४|४|६५६१}}^{= \text{८४२४}}$

(9) Four-sensed underdeveloped bios-set is specifically greater

o
५ | ५८३६
= ५८६४ | a |
४ | ४ | ६५६१ |

or $\frac{L^2}{F^2} \cdot \frac{5864}{6561}$ क्ष - 5 (5836)

(10) The three-sensed underdeveloped are specifically greater than the preceding

५ | ८४२४
= ६९२० | a |
४ | ४ | ६५६१ |

or $\frac{L^2}{F^2} \cdot \frac{6120}{4\,(6561)} \cdot a - 5\,(8424)$

(11) The two-sensed underdeveloped are specifically greater than the preceding

o
५ | ६९२०
= ८४२४ | a |
४ | ४ | ६५६१ |

or $\frac{L^2}{F^2} \cdot \frac{8424}{4\,(6561)} \cdot a - 5\,(6120)$

(12) The non-established individual bios-set is innumerate times the preceding set

=
४ | ९ | ९ | ९
५
a

or $\frac{L^2}{\left(F^2 \div \frac{P}{क्ष}\right)(9)(9)(9)}$

where $\frac{1}{9}$ is the innumerate part of the trail R.

(13)The established developed bios-set is innumerate times the preceding set :

=
४ | ९ | ९ |
५
a

or $\frac{L^2}{\left(F^2 \div \frac{P}{क्ष}\right)(9)(9)}$

(14)The earth-bodied gross developed bios-set is innumerate times the preceding

= ४ | १ | प a or $\frac{L^2}{\left(F^2 \div \frac{P}{\text{क}}\right) \cdot (9)}$

(15) The gross water-bodied developed bios-set is innumerate times the preceding

= ४ प a or $\frac{L^2}{\left(F^2 \div \frac{P}{\text{क}}\right)}$

(16)The gross-air-bodied developed bios-set is innumerate times the preceding

≡ २ or $\frac{L^3}{S}$

where २ or S are numerate quantities.

(17) The non-estabsished underdeveloped bios-set is innumerat . times the preceding

≡ a रिण = ४ प a | १ | १ | १ or $L^3A - \frac{L^2}{\left(F^2 \div \frac{P}{\text{क}}\right)9 \cdot 9 \cdot 9}$

where $\frac{1}{9}$ is the innumerate part of trail (āvalī) bios-set.

(18) The established underdeveloped bios-set is innumerate times the preceding

≡ a ≡ a रिण = ४ प a | १ | १ | or $L^3a \cdot L^3a - \frac{L^2}{\left(F^2 \div \frac{P}{\text{क}}\right)(9)(9)}$

where 9 is as metioned before.

(19)The fire-bodied gross underdeveloped bios-set is innumerate times the preceding

≡ a ९ रिण ८ a or $\frac{L^3 क}{9} - \frac{R^3}{क}$,

(20)The earth-bodied gross underdeveloped bios-set is specifically greater than the preceding

≡ a ९ a ९० रिण = ४ प a | ६ | or $\frac{L^3 क\, 10}{(9)(9)} - \frac{L^2(9)}{F^2 \div \frac{P}{क}}$.

(21)The water-bodied gross underdeveloped bios-set is specifically greater than the preceding :

≡ a ९ ९० ९० ९ रिण = ४ प a or $\frac{L^3 क\,(10)(10)}{(9)(9)(9)} - \frac{L^2}{F^2 \div \frac{P}{क}}$.

(22) The air-bodied underdeveloped bios-set is specifically greater than the preceding

≡ a ९ ९० ९० ९० ९ रिण ≡ ३ or $\frac{L^3 क\,(10)(10)(10)}{(9)(9)(9)(9)} - \frac{L^3}{ङ}$.

(23) The fire-bodied fine under-developed bios-set is innumerate times the preceding

≡ a ९ ८ ५ or $\frac{L^3 क}{9} \times \frac{8}{5}$

where ९ or 9 is innumerate-universe, ५ or 5 is numerate,

8 = 9 – 1 or innumerate-universe minus one.

(24) The earth-bodied underdeveloped fine bios-set is specifically greater than the preceding

≡ a ९ ९० ८ ५ or $\frac{L^3 क\,(10)(8)}{(9)(9)(5)}$.

(25) The water-bodied fine underdeveloped bios-set is specifically greater than the preceding

$$\equiv a \;\; ९० \;\; ९० \;\; ८ \;\; \text{or} \;\; \frac{L^3 क (10)(10)(8)}{(9)(9)(9)(5)}.$$
$$\quad ९ \;\; ९ \;\; ९ \;\; ५$$

(26)The air-bodied fineunderdeveloped bios-set is specifically greater than the preceding

$$\equiv a \;\; ९० \;\; ९० \;\; ९० \;\; ८ \;\; \text{or} \;\; \frac{L^3 क (10)(10)(10)(8)}{(9)(9)(9)(9)(5)}.$$
$$\quad ९ \;\; ९ \;\; ९ \;\; ९ \;\; ५$$

(27)The fire-bodied fine developed bios-set is numerate times the preceding :

$$\equiv ? \;\; ८ \;\; ४ \;\; \text{or} \;\; \frac{L^3 क (8)\ (4)}{(9)\ (5)}.$$
$$\quad ९ \;\; ५$$

with the usual 5 ,

meaning, $4 = 5 - 1$.

(28)The earth-bodied fine developed bios-set is specifically greater

$$\equiv a \;\; ९० \;\; ८ \;\; ४ \;\; \text{or} \;\; \frac{L^3 क (10)(8)(4)}{(9)(9)(9)(5)}.$$
$$\quad ९ \;\; ९ \;\; ९ \;\; ५$$

(29)The water-bodied fine developed bios-set is specifically greater

$$\equiv a \;\; ९० \;\; ९० \;\; ८ \;\; ४ \;\; \text{or} \;\; \frac{L^3 क (10)(10)(8)(\;)}{(9)(9)(9)(5)}.$$
$$\quad ९ \;\; ९ \;\; ९ \;\; ५$$

(30)The air-bodied fine developed bios-set is specifically greater

$$\equiv a \;\; ९० \;\; ९० \;\; ९० \;\; ८ \;\; ४ \;\; \text{or} \;\; \frac{L^3 क (10)(10)(10)(8)(4)}{(9)(9)(9)(9)(5)}.$$
$$\quad ९ \;\; ९ \;\; ९ \;\; a \;\; ५ \;\; |$$

(31)The con...ion gross developed bios-set is infinite times the preceding

$$\begin{matrix} ९३ \equiv ९ \\ ९\ ७ \end{matrix} \qquad \text{or} \qquad (J - J_{e^*}) \frac{L^3}{9} \cdot \frac{1}{7}$$

where J is the set of all bios,

J_{e^*} the set of all accomplished bios,

9 the innumerate universe, 7 the innumerate.

(32)The common gross under-developed bios-set is innumerate times the preceding

$$\begin{matrix} ९३ \equiv ६ \\ ९\ ७ \end{matrix} \qquad \text{or} \qquad (J - J_{e^*}) \frac{L^3}{9} \cdot \frac{6}{7}$$

where 6 = 7 − 1. 7 being innumerate.

(33)The common fine under-developed bios-set is innumerate times the preceding :

$$\begin{matrix} ९३ \equiv ८ \\ ९\ ५ \end{matrix} \qquad \text{or} \qquad (J - J_{e^*}) \frac{L^3}{9} \cdot \frac{8}{5}$$

where 8 is 9 −1, and 5 is numerate.

(34)The common fine developed bios-set is innumerate times the preceding

$$\begin{matrix} ९३ \equiv ८\ ४ \\ ९\ ५ \end{matrix} \qquad \text{or} \qquad (J - J_{e^*}) \frac{L^3}{9} \cdot \frac{8}{1} \cdot \frac{4}{5}$$

where 9 is again innumerate universe, 4 is 5 − 1 or numerate minus one.

(v. 5.315)

The statement of the least volume (immersion or avagāhanā) for a bios is given. After the lapse of two instants (samayas), i.e. at the third instant, the least volume among the bios-set is that possessed by a newly born fine-nigoda (vegetative)-attainment-under-developed bios. It is innumerate part of the finger (aṅgula). It is evident that here the finger signify a cubic-finger or ghanāṅgula or F^3 or ६. The innumerate may be A or a. Thus this may be symbolically represented as $F_3 \div A$ or $\frac{६}{a}$.

(v. 5.316)

The maximal volume of body of the one among the bios-set could be one thousand yojanas long, five hundred yojanas broad and two and a half hundred yojanas thick (bahala), while increase is from the minimal through space-points.

(v. 5.317)

The volumes of the lotus (padma), two-three-four-five (vikalendriya)- sensed bios are, respectively, slightly greater than 1000 cubic yojanas, 12 cubic yojanas, $\frac{3}{4}$ cubic yojana, one cubic yojana as reduced by one cubic kośa, and one thousand yojanas.

१ | ३
१००० | १२ | ४ | १ | १०००

or 1000 >, 12, $\frac{3}{4}$ and 1000 cubic yojanas.

(v. 5.318)

The minimal volumes, in order are found among anuddharī (two-sensed), kunthu (three-sensed), ear-fly (four-sensed), sikthaka-fish (five-sensed) developed bios. Out of these, the minimal volume of the anuddharī is numerate part of the cubic-finger (ghanāṅgula) and that of the remaining three is numerate times, successively.

ON THE ABSTRACTION OF VOLUME

At the third instant of generation of (birth of) fine-nigoda (v. ge ative)- attainment under-developed bios, situated in that life-birth, the minimal among all volumes is one utsedha finger-cube (utsedha-ghanāṅgula) as divided by innumerate part of the palyopama. Above this, there is choice (vikalpa) of intermediate volume of the fine-nigoda-attainment, underdeveloped at an increaseof one space-point.

This is thus $\left(F^3 + \frac{P}{\phi_0}\right) + n$,

where n = 1, 2, 3, ----------. ..... (5.187)

This further in this manner increase to

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + \left(F^3 \div \frac{P}{\text{ക}}\right).\left(\frac{R}{\text{ക}} - 1\right), \qquad \text{..... (5.188)}$$

where, F is finger, P is palya, A is innumerateand R is trail or Āvalī. This appears as the minimal volume of the fine air-bodied-attainment-under-developed, among all. This is also the choice of the intermediate volume of the fine nigodiyā (vegetative)- attainment underdeveloped bios.

Afterwards, the volume goes on being increased further through space-points posting gradually till we get

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + \left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + \left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) \qquad \text{.....(5.189)}$$

This gives the minimal of all volumes corresponding to fine air bodied attainment under developed bios station. This is also the choice (abstraction) of the intermediate volume of the two bios mentioned above.

Again, on the further increase in post space-point succession, the volume furthter increases as

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 3\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right). \qquad \text{..... (5.190)}$$

This gives the all-minimal volume of the fine water bodied attainment under-developed bios. This is the choice of the intermediate volume of earlier mentioned three bios.

Then, in the same post space-point succession, the intermediate volume of four bios continues, till this volume attains the mutiple increase as multiplied by $\left(\frac{R}{\text{ക}} - 1\right)$. This is

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) \qquad \text{..... (5.191)}$$

This gives the fine-earth-bodied-attainment under-developed bios's all-minimal volume. From here the intermediate volume of the fine bios continues to increase in the

sequence of space-point succession till the volume increase by the product of $\frac{P}{\text{क}}$, as follows

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + \left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right). \quad \text{..... (5.192)}$$

This appears as the all-minimal volume of the gross air-bodied attainment-under-developed bios. Above this the choice succession of the intermediate volume of six bios continues in sequence of space-point increase, till the increase by $\left(\frac{P}{\text{क}} - 1\right)$ multiple again, giving

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 2\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right). \quad \text{.....(5.193)}$$

Here appears the all-minimal volume of the gross fire-bodied-under-developed bios.

We now summarise, mathematically, through expressions further results of such a process of increase of volume, senquentially, through space-points one by one:

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 3\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right), \quad \text{..... (5.194)}$$

which is the minimal volume of gross water-bodied-attainment-underdeveloped bios.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right), \quad \text{..... (5.195)}$$

which is the minimal volume of gross earth-bodied, attainmect, underdeveloped bios.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 5\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right). \quad \text{..... (5.196)}$$

which is the all-minimal volume of gross nigoda (vegetative)- attainment-under developed bios.

$$\left(F^3 \div \frac{P}{\text{ঀ}}\right) + 4\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{R}{\text{ঀ}} - 1\right) + 6\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{P}{\text{ঀ}} - 1\right) \quad \text{..... (5.197)}$$

which is minimal volume of nigoda (vegetative) established attainment under-developed bios.

$$\left(F^3 \div \frac{P}{\text{ঀ}}\right) + 4\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{R}{\text{ঀ}} - 1\right) + 7\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{P}{\text{ঀ}} - 1\right), \quad \text{..... (5.198)}$$

which is the minimal volume of gross vegetable-bodied individual body attainment underdeveloped bios.

$$\left(F^3 \div \frac{P}{\text{ঀ}}\right) + 4\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{R}{\text{ঀ}} - 1\right) + 8\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{P}{\text{ঀ}} - 1\right), \quad \text{..... (5.199)}$$

which is the all-minimal volume of two-sensed attainment-under-developed bios.

$$\left(F^3 \div \frac{P}{\text{ঀ}}\right) + 4\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{R}{\text{ঀ}} - 1\right) + 9\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{P}{\text{ঀ}} - 1\right), \quad \text{..... (5.199)}$$

which is the all-minimal volume of three-sensed attainment-under-developed bios.

$$\left(F^3 \div \frac{P}{\text{ঀ}}\right) + 4\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{R}{\text{ঀ}} - 1\right) + 10\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{P}{\text{ঀ}} - 1\right), \quad \text{..... (5.200)}$$

which is the all-minimal volume of four-sensed attainmet-underdeveloped bios.

$$\left(F^3 \div \frac{P}{\text{ঀ}}\right) + 4\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{R}{\text{ঀ}} - 1\right) + 11\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{P}{\text{ঀ}} - 1\right), \quad \text{..... (5.201)}$$

which is the minimal volume of five-sensed attainment-underdeveloped bios.

$$\left(F^3 \div \frac{P}{\text{ঀ}}\right) + 4\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{R}{\text{ঀ}} - 1\right) + 11\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{P}{\text{ঀ}} - 1\right) + A_1, \quad \text{..... (5.202)}$$

where A_1 is the appropriate innumerete giving the all-minimal volume of fine nigoda (vegetative)-formation-under-developed (nirvṛtti-aparyāptaka) bios.

$$\left(F^3 \div \frac{P}{\text{ঀ}}\right) + 4\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{R}{\text{ঀ}} - 1\right) + 11\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{P}{\text{ঀ}} - 1\right) + A_1 + A_2, \quad \text{.....(5.203)}$$

which is the maximal volume of fine nigoda attainment-under-developed bios, whose volume's further abstraction is not-available, as it is maximal, the equation (5.201). Initiating with fine air-bodied attainment under-developed bios, increase is continuosly and similarly made for the multiple $\left(\frac{R}{\text{ঀ}} - 1\right)$, giving

$$\left(F^3 \div \frac{P}{\text{ঀ}}\right) + 5\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{R}{\text{ঀ}} - 1\right) + 11\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{P}{\text{ঀ}} - 1\right), \quad \text{..... (5.204)}$$

which is fine, nigoda-formation under-developed bios's minimal volume.

$$\left(F^3 \div \frac{P}{\text{ঀ}}\right) + 5\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{R}{\text{ঀ}} - 1\right) + 11\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{P}{\text{ঀ}} - 1\right) + 2\left\{\left(F^3 \div \frac{P}{\text{ঀ}}\right) \div \frac{R}{\text{ঀ}}\right\}. \quad \text{.....(5.205)}$$

This gives the maximal volume of fine-nigoda-formaion-developed bios. Ahead of this, there is no abstraction of it and this belongs to bios which gets developed in infinite time.

$$\left(F^3 \div \frac{P}{\text{ঀ}}\right) + 4\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{R}{\text{ঀ}} - 1\right) + 11\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{P}{\text{ঀ}} - 1\right) + 2\left\{\left(F^3 \div \frac{\blacktriangle}{\text{ঀ}}\right) \div \frac{R}{\text{ঀ}}\right\}. \quad \text{...(5.206)}$$

Here, the above choice of the bios gets postpones as it reaches the greatest volume.

The expression (5.200) is now increased by A_3 (appropriate innumerate space-points), appearing as the all minimal volume of fine air-bodied-formation-developed bios, stopping further as it being the greatest choice.

$$\left(F^3 \div \frac{P}{\text{ঀ}}\right) + 4\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{R}{\text{ঀ}} - 1\right) + 10\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{P}{\text{ঀ}} - 1\right) + A_3, \quad \text{..... (5.207)}$$

and further,

$$\left(F^3 \div \frac{P}{\text{ঀ}}\right) + 4\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{R}{\text{ঀ}} - 1\right) + 11\left(F^3 \div \frac{P}{\text{ঀ}}\right)\left(\frac{P}{\text{ঀ}} - 1\right) + A_4. \quad \text{..... (5.208)}$$

giving the greatest form of the fine-air-bodied-attainment-developed bios, postponing further choice.

$$\left(F^3 \div \frac{P}{\text{ }}\right) + 4\left(F^3 \div \frac{P}{\text{ }}\right)\left(\frac{R}{\text{ }} - 1\right) + 10\left(F^3 \div \frac{P}{\text{ }}\right)\left(\frac{P}{\text{ }} - 1\right)$$

$$+ \text{(expression 5.205)}\left(\frac{R}{\text{ }} - 1\right) - A_5, \qquad \text{..... (5.209)}$$

which appears as fine-air-bodied formation developed bios's minimal volume.

$$\left(F^3 \div \frac{P}{\text{ }}\right) + 4\left(F^3 \div \frac{P}{\text{ }}\right)\left(\frac{R}{\text{ }} - 1\right) + 10\left(F^3 \div \frac{P}{\text{ }}\right)\left(\frac{P}{\text{ }} - 1\right)$$

$$+ \text{(expression 5.205)}\left(\frac{R}{\text{ }} - 1\right) - A_5 + \left(F^3 \div \frac{P}{\text{ }}\right) \div \frac{R}{\text{ }}, \qquad \text{..... (5.210)}$$

Which appears as maximal volume of fine-air-bodied formation-underdeveloped bios.

Then,

$$\left(F^3 \div \frac{P}{\text{ }}\right) + 4\left(F^3 \div \frac{P}{\text{ }}\right)\left(\frac{R}{\text{ }} - 1\right) + 10\left(F^3 \div \frac{P}{\text{ }}\right)\left(\frac{P}{\text{ }} - 1\right)$$

$$+ \left(F^3 \div \frac{P}{\text{ }}\right) \div \frac{R}{\text{ }}, \qquad \text{.....(5.211)}$$

which is the fine air-bodied-formation-developed maximal volume.

$$\left(F^3 \div \frac{P}{\text{ }}\right) + 4\left(F^3 \div \frac{P}{\text{ }}\right)\left(\frac{R}{\text{ }} - 1\right) + 9\left(F^3 \div \frac{P}{\text{ }}\right)\left(\frac{P}{\text{ }} - 1\right) + A_6, \qquad \text{..... (5.212)}$$

where A_6 is the suitable innumerate number of space-points giving the minimal volume of fine fire-bodied-formation-under-developed bios.

$$\left(F^3 \div \frac{P}{\text{ }}\right) + 4\left(F^3 \div \frac{P}{\text{ }}\right)\left(\frac{R}{\text{ }} - 1\right) + 10\left(F^3 \div \frac{P}{\text{ }}\right)\left(\frac{P}{\text{ }} - 1\right) + A_7, \qquad \text{..... (5.213)}$$

where A_7 is the suitable innumerate number of space-points giving the minimal volume of the fine fire-bodied attainment-underdeveloped bios, and stops as it is maximal.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 9\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right)$$

$$+ (\text{expression } 5.212)\left(\frac{R}{\text{क}} - 1\right) - A_8, \qquad \ldots\ldots (5.214)$$

which is fine fire bodied formation-developed bios's minimal volume.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 5\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 10\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right)$$

$$+ (\text{expression } 5.212)\left(\frac{R}{\text{क}} - 1\right) - A_8, + \left(F^3 \div \frac{P}{\text{क}}\right) \div \frac{R}{\text{क}}, \qquad \ldots\ldots (5.215)$$

which is fine fire-bodied-formation underdeveloped bios's maximal volume.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 9\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right) + \left(F^3 \div \frac{P}{\text{क}}\right) \div \frac{R}{\text{क}},$$

$\ldots\ldots (5.216)$

which is ith maximal volume of fine fire-bodied formation developed bios and upto this much alone.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 8\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right) + A_9, \qquad \ldots\ldots (5.217)$$

which is the minimal volume of fine water-bodied-formation-underdeveloped bios.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 9\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right) + A_{10}, \qquad \ldots\ldots (5.218)$$

where this appears as the maximal volume of fine water-bodied-attainment underdeveloped bios.

$$\left(F^3 \div \frac{P}{\text{ಕ}}\right) + 4\left(F^3 \div \frac{P}{\text{ಕ}}\right)\left(\frac{R}{\text{ಕ}} - 1\right) + 8\left(F^3 \div \frac{P}{\text{ಕ}}\right)\left(\frac{P}{\text{ಕ}} - 1\right)$$

$$+ (\text{expression } 5.216) \times \left(\frac{R}{\text{ಕ}} - 1\right) - A_{11}, \quad \ldots\ldots\ldots (5.219)$$

which is fine-water-bodied-formation underdeveloped bios's minimal volume.

$$\left(F^3 \div \frac{P}{\text{ಕ}}\right) + 4\left(F^3 \div \frac{P}{\text{ಕ}}\right)\left(\frac{R}{\text{ಕ}} - 1\right) + 9\left(F^3 \div \frac{P}{\text{ಕ}}\right)\left(\frac{P}{\text{ಕ}} - 1\right) + 2\left(F^3 \div \frac{P}{\text{ಕ}}\right) \div \frac{R}{\text{ಕ}},$$

$\ldots\ldots\ldots$ (5.220)

which is fine water-bodied-formation-developed bios's maximal volume.

$$\left(F^3 \div \frac{P}{\text{ಕ}}\right) + 4\left(F^3 \div \frac{P}{\text{ಕ}}\right)\left(\frac{R}{\text{ಕ}} - 1\right) + 8\left(F^3 \div \frac{P}{\text{ಕ}}\right)\left(\frac{P}{\text{ಕ}} - 1\right) + \left(F^3 \div \frac{P}{\text{ಕ}}\right) \div \frac{R}{\text{ಕ}},$$

$\ldots\ldots\ldots$ (5.221)

which is fine water-bodied-formation-developed bios's maximas volume. The same number of choices (vikalpa) is that of the water-bodied bios's volume, because the supremum volume has been attained.

$$\left(F^3 \div \frac{P}{\text{ಕ}}\right) + \cdot \left(F^3 \div \frac{P}{\text{ಕ}}\right)\left(\frac{R}{\text{ಕ}} - 1\right) + 7\left(F^3 \div \frac{P}{\text{ಕ}}\right)\left(\frac{P}{\text{ಕ}} - 1\right) + A_{12}, \quad \ldots\ldots (5.222)$$

The above gives the minimal volume of fine earth bodied formation-underdeveloped bios.

$$\left(F^3 \div \frac{P}{\text{ಕ}}\right) + 4\left(F^3 \div \frac{P}{\text{ಕ}}\right)\left(\frac{R}{\text{ಕ}} - 1\right) + 8\left(F^3 \div \frac{P}{\text{ಕ}}\right)\left(\frac{P}{\text{ಕ}} - 1\right) + A_{13}, \quad \ldots\ldots (5.223)$$

which is the maximal volume of fine-eareh-bodied-attainment-developed bios.

$$\left(F^3 \div \frac{P}{\text{ಕ}}\right) + 4\left(F^3 \div \frac{P}{\text{ಕ}}\right)\left(\frac{R}{\text{ಕ}} - 1\right) + 7\left(F^3 \div \frac{P}{\text{ಕ}}\right)\left(\frac{P}{\text{ಕ}} - 1\right)$$

$$+ \text{(expression 5.221)} \left(\frac{R}{\text{क}} - 1\right) - A_{14}, \qquad \text{..... (5.224)}$$

which is fine earth-bodied formation developed bios's minimal volume.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 8\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right) + 2\left(F^3 \div \frac{P}{\text{क}}\right) \div \frac{R}{\text{क}},$$

..... (5.225)

which is fine earth-bodied formation under-developed bios's maximal volume.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + \left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 7\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right) + \left(F^3 \div \frac{P}{\text{क}}\right) \div \frac{R}{\text{क}},$$

..... (5.226)

which is maximal volume of fine earth bodied formation developed bios, with no choice anymore.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 6\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right) + A_{15}, \qquad \text{..... (5.227)}$$

which gives gross air-bodied formation under-developed bios's minimal volume.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + \left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 7\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right) + A_{16}, \qquad \text{..... (5.228)}$$

which gives gross air-bodied attainment under-developed bios's maximal volume.

Then,

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 6\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right)$$

$$+ \text{(expression 5.226)} \times \left(\frac{P}{\text{क}} - 1\right) - A_{17}, \qquad \text{..... (5.229)}$$

which gives gross air-bodied formation developed bios's minimal volume.

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + 7\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{P}{\text{ക}} - 1\right) + 2\left(F^3 \div \frac{P}{\text{ക}}\right) \div \frac{R}{\text{ക}},$$

..... (5.230)

as appears the maximal volume of gross air-bodied formation under-developed bios.

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + 6\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{P}{\text{ക}} - 1\right) + \left(F^3 \div \frac{P}{\text{ക}}\right) \div \frac{R}{\text{ക}},$$

..... (5.231)

which gives the maximal volume of gross air-bodied formation developed bios. There is no choice ahead, as it is the supremum (Sarvotkṛṣṭa).

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + 5\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{P}{\text{ക}} - 1\right) + A_{18},$$

..... (5.232)

which is the minimal volume of gross fire-bodied formation under developed bios.

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + 6\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{P}{\text{ക}} - 1\right) + A_{19},$$

..... (5.233)

which is the gross fire-bodied attainment under-developed bios's maximal volume.

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + 5\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{P}{\text{ക}} - 1\right)$$

$$+ (\text{expression } 5.231) \times \left(\frac{P}{\text{ക}} - 1\right) - A_{20}, \qquad \text{..... (5.234)}$$

which appears as the minimal volume of gross fire-bodied formation developed bios.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 6\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right) + 2\left(F^3 \div \frac{P}{\text{क}}\right) \div \frac{R}{\text{क}},$$

..... (5.235)

which gives gross fire-bodied formation under-developed bios's maximal volume.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 5\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right) + \left(F^3 \div \frac{P}{\text{क}}\right) \div \frac{R}{\text{क}},$$

..... (5.236)

which appears as maximal volume of gross fire-bodied formation developed bios, with no choice any more.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right) + A_{21}, \quad \text{..... (5.237)}$$

which appears as minimal volume of gross water-bodied formation under-developed bios.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 5\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right) + A_{22}, \quad \text{..... (5.238)}$$

appears as gross water-bodied attainment under-developed bios's maximal volume.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right)$$

$$+ (\text{expression } 5.231) \times \left(\frac{P}{\text{क}} - 1\right) - A_{23}, \quad \text{..... (5.239)}$$

minimal volume of gross water-bodied formation developed bios.

$$\left(F^3 \div \frac{P}{\text{क}}\right) + 4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}} - 1\right) + 5\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}} - 1\right) + 2\left(F^3 \div \frac{P}{\text{क}}\right) \div \frac{R}{\text{क}}, \quad \text{..... (5.240)}$$

which appears as gross water-bodied formation under-developed bios's maximal volume.

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + \left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{P}{\text{ക}} - 1\right) + \left(F^3 \div \frac{P}{\text{ക}}\right) \div \frac{R}{\text{ക}} \quad \text{..... (5.241)}$$

which appears as gross water-bodied formation developed bios's maximal volume, after which there is no choice any more.

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + 3\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{P}{\text{ക}} - 1\right) + A_{24}, \quad \text{..... (5.242)}$$

which appears as gross earth bodied formation developed bios's minimal volume.

Then,

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + \left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{P}{\text{ക}} - 1\right) + A_{25}, \quad \text{..... (5.243)}$$

which appears as gross earth-bodied attainment developed bios's maximal volume.

Then,

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + 3\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{P}{\text{ക}} - 1\right)$$

$$+ (\text{expression } 5.241) \times \left(\frac{P}{\text{ക}} - 1\right) - A_{26} \quad \text{..... (5.244)}$$

appears as gross earth-bodied formation developed bios's minimal volume.

Then,

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{P}{\text{ക}} - 1\right) + 2\left(F^3 \div \frac{P}{\text{ക}}\right) \div \frac{R}{\text{ക}}, \quad \text{..... (5.245)}$$

which appears as gross earth-bodied formation underdeveloped bios's maximal volume.

$$\left(F^3 \div \frac{P}{\text{ಹಿ}}\right) + 4\left(F^3 \div \frac{P}{\text{ಹಿ}}\right)\left(\frac{R}{\text{ಹಿ}} - 1\right) + 3\left(F^3 \div \frac{P}{\text{ಹಿ}}\right)\left(\frac{P}{\text{ಹಿ}} - 1\right) + \left(F^3 \div \frac{P}{\text{ಹಿ}}\right) \div \frac{R}{\text{ಹಿ}}, \quad \text{..... (5.246)}$$

which is the maximal volume of gross earth-bodied formation developed bios.

$$\left(F^3 \div \frac{P}{\text{ಹಿ}}\right) + 4\left(F^3 \div \frac{P}{\text{ಹಿ}}\right)\left(\frac{R}{\text{ಹಿ}} - 1\right) + 2\left(F^3 \div \frac{P}{\text{ಹಿ}}\right)\left(\frac{P}{\text{ಹಿ}} - 1\right) + A_{27}, \quad \text{..... (5.247)}$$

appears as minimum volume of gross nigoda formation underdeveloped bios.

$$\left(F^3 \div \frac{P}{\text{ಹಿ}}\right) + 4\left(F^3 \div \frac{P}{\text{ಹಿ}}\right)\left(\frac{R}{\text{ಹಿ}} - 1\right) + 3\left(F^3 \div \frac{P}{\text{ಹಿ}}\right)\left(\frac{P}{\text{ಹಿ}} - 1\right) + A_{28}, \quad \text{..... (5.248)}$$

appears as maximal volume of gross nigoda attainmint developed bios.

Then,

$$\left(F^3 \div \frac{P}{\text{ಹಿ}}\right) + 4\left(F^3 \div \frac{P}{\text{ಹಿ}}\right)\left(\frac{R}{\text{ಹಿ}} - 1\right) + 2\left(F^3 \div \frac{P}{\text{ಹಿ}}\right)\left(\frac{P}{\text{ಹಿ}} - 1\right)$$

$$+ (\text{expression } 5.246)\left(\frac{P}{\text{ಹಿ}} - 1\right) - A_{29}, \quad \text{..... (5.249)}$$

appears as gross nigoda formation developed bios's minimal volume.

$$\left(F^3 \div \frac{P}{\text{ಹಿ}}\right) + 4\left(F^3 \div \frac{P}{\text{ಹಿ}}\right)\left(\frac{R}{\text{ಹಿ}} - 1\right) + 3\left(F^3 \div \frac{P}{\text{ಹಿ}}\right)\left(\frac{P}{\text{ಹಿ}} - 1\right) + 2\left(F^3 \div \frac{P}{\text{ಹಿ}}\right) \div \frac{R}{\text{ಹಿ}}, \quad \text{..... (5.250)}$$

appears as gross nigoda formation underdeveloped bios's maximal volume.

$$\left(F^3 \div \frac{P}{\text{ಹಿ}}\right) + 4\left(F^3 \div \frac{P}{\text{ಹಿ}}\right)\left(\frac{R}{\text{ಹಿ}} - 1\right) + 2\left(F^3 \div \frac{P}{\text{ಹಿ}}\right)\left(\frac{P}{\text{ಹಿ}} - 1\right) + \left(F^3 \div \frac{P}{\text{ಹಿ}}\right) \div \frac{R}{\text{ಹಿ}}, \quad \text{..... (5.251)}$$

appears as maximal volume of gross nigoda formation developed bios.

$$\left(F^3 \div \frac{P}{\text{ಹಿ}}\right) + 4\left(F^3 \div \frac{P}{\text{ಹಿ}}\right)\left(\frac{R}{\text{ಹಿ}} - 1\right) + \left(F^3 \div \frac{P}{\text{ಹಿ}}\right)\left(\frac{P}{\text{ಹಿ}} - 1\right) + A_{30}, \quad \text{..... (5.252)}$$

appears as minimal volume ofgross nigoda established formation developed bios.

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + 2\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{P}{\text{ക}} - 1\right) + A_{31}, \quad \text{..... (5.253)}$$

appears as maximal volume of gross nigoda established attainment underdeveloped bios. Then.

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + \left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{P}{\text{ക}} - 1\right)$$

$$+ (\text{expression } 5.250)\left(\frac{P}{\text{ക}} - 1\right) - A_{32}, \quad \text{..... (5.254)}$$

appears as gross nigods established formation developed bios's minimal volume

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + 2\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{P}{\text{ക}} - 1\right) + 2\left(F^3 \div \frac{P}{\text{ക}}\right) \div \frac{R}{\text{ക}}, \quad \text{.....(5.255)}$$

appears as gross nigoda established formation underdeveloped bios's maximal volume.

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + \left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{P}{\text{ക}} - 1\right) + \left(F^3 \div \frac{P}{\text{ക}}\right) \div \frac{R}{\text{ക}}, \quad \text{..... (5.256)}$$

appears as maximal volume of gross nigoda etablished formation developed bios.

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + A_{33}, \quad \text{..... (5.257)}$$

appears as minimal volume of gross vegetable-bodied individual body formation under-developed bios.

Then.

$$\left(F^3 \div \frac{P}{\text{ക}}\right) + 4\left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{R}{\text{ക}} - 1\right) + \left(F^3 \div \frac{P}{\text{ക}}\right)\left(\frac{P}{\text{ക}} - 1\right) + A_{34} \quad \text{..... (5.258)}$$

appears as maximal volume of gross vegetable bodied individual body attainment under developed bios.

Then,

$$\left(F^3 \div \frac{P}{\text{ঐ}}\right) + 4\left(F^3 \div \frac{P}{\text{ঐ}}\right)\left(\frac{R}{\text{ঐ}} - 1\right) + A_{35}, \qquad \text{..... (5.259)}$$

appears as minimal volume of gross vegetable bodied individual body formation developed bios.

$$\left(F^3 \div \frac{P}{\text{ঐ}}\right) + 4\left(F^3 \div \frac{P}{\text{ঐ}}\right)\left(\frac{R}{\text{ঐ}} - 1\right) + \left(F^3 \div \frac{P}{\text{ঐ}}\right)\left(\frac{P}{\text{ঐ}} - 1\right) + A_{36}, \qquad \text{..... (5.260)}$$

appears as gross vegetable bodies individual body formation under-developed bios's maximal volume.

Then,

$$\left(F^3 \div \frac{P}{\text{ঐ}}\right) + 4\left(F^3 \div \frac{P}{\text{ঐ}}\right)\left(\frac{R}{\text{ঐ}} - 1\right) + A_{37}, \qquad \text{..... (5.261)}$$

appear as the maximal volume of two sensed attainment developed bios.

$$\left(F^3 \div \frac{P}{\text{ঐ}}\right) + 4\left(F^3 \div \frac{P}{\text{ঐ}}\right)\left(\frac{R}{\text{ঐ}} - 1\right) + A_{38}, \qquad \text{..... (5.262)}$$

appears as maximal volume of three-sensed attainment under-developed bios.

$$\left(F^3 \div \frac{P}{\text{ঐ}}\right) + 3\left(F^3 \div \frac{P}{\text{ঐ}}\right)\left(\frac{R}{\text{ঐ}} - 1\right) + A_{39}, \qquad \text{..... (5.263)}$$

appears as maximal volume of four-sensed attainment under-developed bios.

$$\left(F^3 \div \frac{P}{\text{ঐ}}\right) + 2\left(F^3 \div \frac{P}{\text{ঐ}}\right)\left(\frac{R}{\text{ঐ}} - 1\right) + A_{40}, \qquad \text{..... (5.264)}$$

appears as maximal volume of five-sensed attainment developed bios.

This is also $\frac{F^3}{\text{A}}$. Ahead of this, volume is $\frac{F^3}{S}$,

where S is numerate, F^3, and somewhere is should be counted as numerate cubic-finder of SF^3.

Then,

$$\left(F^3 \div \frac{P}{\text{A}}\right) + \left(F^3 \div \frac{P}{\text{A}}\right)\left(\frac{R}{\text{A}} - 1\right) + A_{41}, \qquad \text{..... (5.265)}$$

appears as minimal volume of three sensed formation underdeveloped bios.

Then,

$$\left(F^3 \div \frac{P}{\text{A}}\right) + 2\left(F^3 \div \frac{P}{\text{A}}\right)\left(\frac{R}{\text{A}} - 1\right) + A_{42}, \qquad \text{..... (5.266)}$$

appears as minimal volume of four sensed formation underdeveloped bios.

Then,

$$\left(F^3 \div \frac{P}{\text{A}}\right) + 3\left(F^3 \div \frac{P}{\text{A}}\right)\left(\frac{R}{\text{A}} - 1\right) + A_{43}, \qquad \text{..... (5.267)}$$

appears as minimal volume of two-sensed formation under-developed bios.

Then,

$$\left(F^3 \div \frac{P}{\text{A}}\right) + 4\left(F^3 \div \frac{P}{\text{A}}\right)\left(\frac{R}{\text{A}} - 1\right) + A_{44}, \qquad \text{..... (5.268)}$$

appears as minimal volume of five-sensed formation under-developed bios.

at the end

$$\left(F^3 \div \frac{P}{\text{A}}\right) + 4\left(F^3 \div \frac{P}{\text{A}}\right)\left(\frac{R}{\text{A}} - 1\right) + \left(F^3 \div \frac{P}{\text{A}}\right)\left(\frac{P}{\text{A}} - 1\right) + A_{45}, \qquad \text{..... (5.269)}$$

appears as minimal volume of two-sensed formation developed bios.

Reasoning For their multiplier number :

1. From the minimal volume of gross vegetable bodied individual body formation underdeveloped bios upto the minimal volume of two-sensed formation developed bios, or summing up all in this interval, when the question is "how many" the reply should be the product of minimal volume of gross vegetable bodied individual body formation developed bios with $\left(\frac{P}{\text{क}}-1\right)$.

2. Then the choice of intermediate volume of seven bios in sequence of space points continues till the next volume becomes a proper multiple of nimerate (S_1). Then the all minimal volume of three-sensed formation developed bios.

$$\left[\left(F^3-\frac{P}{\text{क}}\right)+4\left(F^3-\frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}}-1\right)+2\left(F^3-\frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}}-1\right)\right]\text{ङ}_1. \qquad \text{..... (5.270)}$$

Afterwards,

$$\left[\left(F^3\div\frac{P}{\text{क}}\right)+4\left(F^3\div\frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}}-1\right)+3\left(F^3\div\frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}}-1\right)\right]\text{ङ}_2, \qquad \text{..... (5.271)}$$

appears as minimal volume of four sensed formation develope bios.

Then,

$$\left[\left(F^3\div\frac{P}{\text{क}}\right)+4\left(F^3\div\frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}}-1\right)+4\left(F^3\div\frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}}-1\right)\right]\text{ङ}_3 \qquad \text{..... (5.272)}$$

appears as minimal voluma of five-sensed formation developed bios.

Then,

$$\left[\left(F^3\div\frac{P}{\text{क}}\right)+4\left(F^3\div\frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}}-1\right)+5\left(F^3\div\frac{P}{\text{क}}\right)\left(\frac{P}{\text{क}}-1\right)\right]\text{ङ}_4 \qquad \text{..... (5.273)}$$

appears as maximal volume of three sensed formation under-developed bios.

Afterwards,

$$\left[\left(F^3 \div \frac{P}{\text{ಅ}}\right)+4\left(F^3 \div \frac{P}{\text{ಅ}}\right)\left(\frac{R}{\text{ಅ}}-1\right)+4\left(F^3 \div \frac{P}{\text{ಅ}}\right)\left(\frac{P}{\text{ಅ}}-1\right)\right]\text{ಱ}_5, \qquad \text{..... (5.274)}$$

appears as maximal volume of four-sensed formation under-developed bios.

Then,

$$\left[\left(F^3 \div \frac{P}{\text{ಅ}}\right)+4\left(F^3 \div \frac{P}{\text{ಅ}}\right)\left(\frac{R}{\text{ಅ}}-1\right)+3\left(F^3 \div \frac{P}{\text{ಅ}}\right)\left(\frac{P}{\text{ಅ}}-1\right)\right]\text{ಱ}_6, \qquad \text{..... (5.275)}$$

appears as maximal volume of two-senssed formation under-developed bios.

Then,

$$\left[\left(F^3 \div \frac{P}{\text{ಅ}}\right)+4\left(F^3 \div \frac{P}{\text{ಅ}}\right)\left(\frac{R}{\text{ಅ}}-1\right)+2\left(F^3 \div \frac{P}{\text{ಅ}}\right)\left(\frac{P}{\text{ಅ}}-1\right)\right]\text{ಱ}_7, \qquad \text{..... (5.276)}$$

appears as maximal volume of gross vegetable-bodied indinidual body formation under-developed bios.

Then,

$$\left[\left(F^3 \div \frac{P}{\text{ಅ}}\right)+4\left(F^3 \div \frac{P}{\text{ಅ}}\right)\left(\frac{R}{\text{ಅ}}-1\right)+\left(F^3 \div \frac{P}{\text{ಅ}}\right)\left(\frac{P}{\text{ಅ}}-1\right)\right]\text{ಱ}_8, \qquad \text{..... (5.277)}$$

appears as maximal volume of five-sensed formation under-developed.

Then,

$$\left[\left(F^3 \div \frac{P}{\text{ಅ}}\right)+4\left(F^3 \div \frac{P}{\text{ಅ}}\right)\left(\frac{R}{\text{ಅ}}-1\right)\right]\text{ಱ}_9, \qquad \text{..... (5.278)}$$

appears as maximal volume of three-sensed formation developed bio. When it is asked as to whom this volume belongs ? The reply is that this maximal volume belongs to certain gohmi (lair), born in the outer part of Svayaṁprabhācala. The measure of this is given by the product of its length, breadth and height, or $\frac{3}{4}, \frac{3}{32}$ and $\frac{3}{36}$ yojanas respectively, or the volume is

$\frac{3}{4}\times\frac{3}{32}\times\frac{3}{36}$ cubic yojana or $\frac{27}{8192}$ cubic yojana

or,

$$\frac{27}{8192}\times 3623878656 = 11943936 \text{ cubic fingers.} \qquad \text{..... (5.279)}$$

Further.

$$\left[\left(F^3\div\frac{P}{\text{ह}}\right)+4\left(F^3\div\frac{P}{\text{ह}}\right)\left(\frac{R}{\text{ह}}-1\right)\right]\text{ऽ}_{10}, \qquad \text{..... (5.281)}$$

appearsas maximal volume of four-sensed formation developed bios. This happens to be the maximal volumeof some bhramara (honey-bee) born in outer-part of Svayaṁprabhācala. It is given by 1 utsedha yojana length, $\frac{1}{2}$ yojana height and $1\frac{1}{2}$ yojanas circumference (as breadth is $\frac{1}{2}$ yojana, giving $3\times\frac{1}{2}$ or $\pi\times\frac{1}{2}$ as circumference).

This appears to be half a cylinder, cut by a vertical plane through the volume of full cylinder is $\pi r^2 h$, and that of half cylinder is $\frac{1}{2}\pi r^2 h$, or $\frac{1}{2}\times 3\times\frac{1}{2}\times\frac{1}{2}\times 1$.

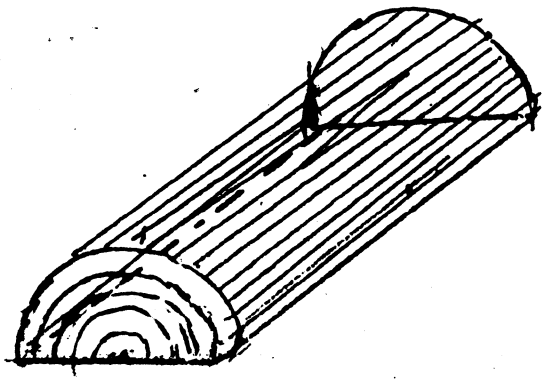


figure 5.5.1

or $\frac{3}{8}$ cubic yojanas.

On converting this into cublic fingers, the volume of half cylinder

$= \frac{3}{8}\times 3623878656$

= 1358954496 cubic fingers (ghanāṅgulas).

Afterwards,

$$\left[\left(F^3-\frac{P}{\text{ಕ}}\right)+2\left(F^3-\frac{P}{\text{ಕ}}\right)\left(\frac{R}{\text{ಕ}}-1\right)\right]\text{ಶ}_{11}, \qquad \text{..... (5.281)}$$

appears as maximal volume of two-sensed formation developed bios. This appears to be the conch born in the exterior part of Svayaṁprabhācala. Its measure is 12 yojanas long, 4 yojanas mouth, these are manipulated to give the calculation of the area of the conch.

(v.5.319)

The width is multiplied by width, the product so obtained is reduced by half of the mouth (top) measure, and the square of half of the mouth (top) is added to the remainder, the sum is then doubled and divided by four. This gives the area of the conch as 73 square utsedha yojanas. (This has been worked out in details in the TLS as well as in TPT (V), verse 321.

Area of conch =

$$= \frac{2\times[(\text{length}\times\text{length})-(\frac{\text{top diameter}}{2})+(\text{half of diameter at top})^2}{4}$$

=73 square yojanas, ... (5.282)

The thickness (bāhalya) of the conch

$$= \frac{(\text{length}-\text{mouth})+\text{length}}{\text{mouth}} = \frac{(12-4)+12}{4} = 5 \text{ yojana} \qquad \text{..... (5.283)}$$

When the area is multiplied by thickness of conch, we get the volume of the conch as $73 \times 5 = 365$ cubic yojanas.

The thichkess has been called bāhalya, and the combination of these two formulae for finding out the volume is very complicated as will appear from the following details. This result can be converted into cubic aṅgulas as

$365 \times 3623878656 = 1322715709440$ cubic aṅgulas.

The conch has not been regarded as fully muraja shaped, hence out of it the portion

$\begin{pmatrix} 5 \\ \overline{4} \\ 1 \end{pmatrix}^2$ is to be reduced. ..... (5.284)

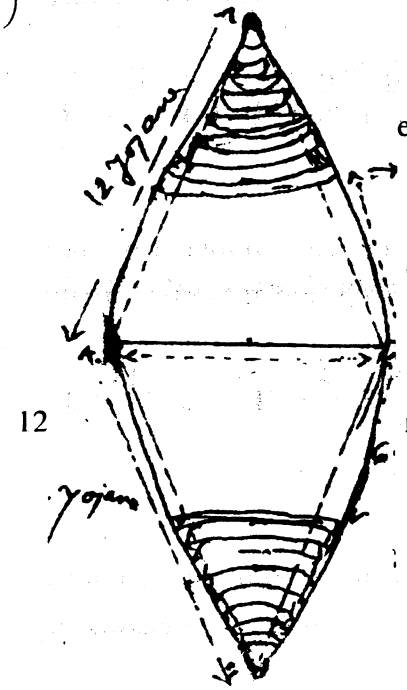


figure : 5.5.3

The figure has two symmetrical parts, out of which only one is taken up for calculation and to be doubled afterwards. The above reduced portion is therefore

also halved, becoming $\frac{\left(\frac{5}{4}\right)^2}{2}$.

.....(5.285)

then,

circumference of top $= 4 \times \sqrt{10} = 4\left[3 + \frac{1}{6}\right]$

$= 4 \times \frac{19}{6} = 12\frac{2}{3}$ yojanas $= 12\frac{16}{24}$ yojana.

..... (5.286)

Further,

Cirumference bottom $= 8 \times \sqrt{10} = 24\frac{64}{48}$

$= 24\frac{4}{3}$ yojana. ..... (5.287)

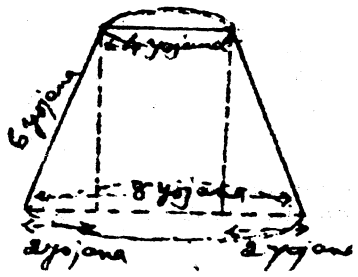


figure 5.5.4

Note: In Jaina texts $\sqrt{10}$ has been often taken to be $\left(3+\frac{1}{6}\right)$ or $\frac{19}{6}$,

or $\sqrt{10}=\sqrt{9}+\frac{1}{2\times\sqrt{9}}=3\frac{1}{6}=\frac{19}{6}$ by binomial theorem.

or $\sqrt{10}=\sqrt{9+1}=3\sqrt{1+\frac{1}{9}}=3\left(1+\frac{1}{9}\right)^{1/2}=3\left(1+\frac{1}{18}\right)=3\times\frac{19}{18}=\frac{19}{6}$.

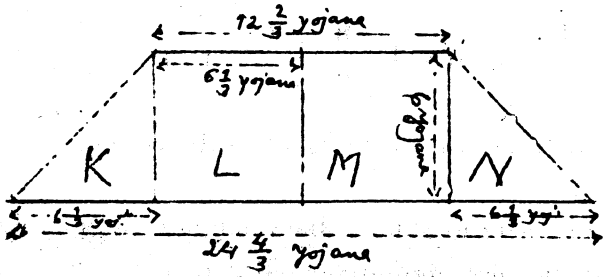


figure 5.6

Here, there are 4 figures incide fig.5.6, given by K, L, M, N, out of which K = N and L = M. Here, K and N may be combined to form a rectangle, equal to L or M. Out of these, the bands with $\frac{1}{3}$ yojana breadth and bands with 12 yojana may be separated, as well as the band with 6 yojanas measure.

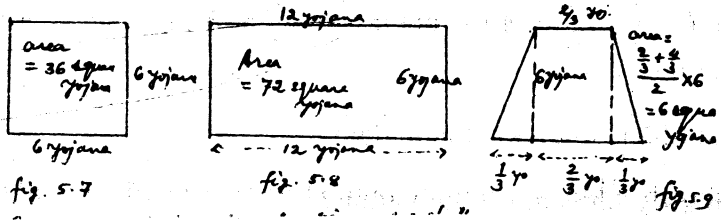


figure 5.7 figure 5.8 figure 5.9

On expanding the upper portion, we shall get

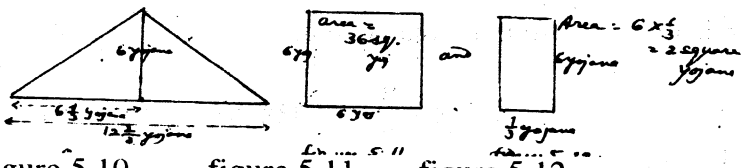


figure 5.10 figure 5.11 figure 5.12

In this way, here first of all, attention has been given to 36 + 72 + 36 =144 square yojanas. Separating 6 square yojana, only 2 square yojanas have been taken into calculation, getting 146 + 2 =142 square yojanas as its area.

Similarly, the remaining half part will also have the area as 146 square yojanas.

Total area = $146 \times 2 = 292$ square yojanas. ..... (5.289)

Regarding the thickness or vedha of every part as $\frac{5}{4}$ yojana, the volume to becomes

$212 \times \frac{4}{5} = 73 \times 5 = 365$ cubic yojanas. .....(5.390)

where $\frac{4}{5}$ yojanas appeares to be the thickness of the layer of the conch.

For details in the TLS, v.73 may be referred for mādhavacandra explanation of the rationale.

Further,

$$\left[\left(F^3 \div \frac{P}{\phi}\right) + 4\left(F^3 \div \frac{P}{\phi}\right)\left(\frac{R}{\phi} - 1\right)\right] S_{12} \qquad \text{..... (5.291)}$$

appears as maximal volumeof gross vegetable bodied at the exterior of Svayaṁprabhācala individual body-formation developed bios. Such a volume appears in a cylindrical lotus, whose height is one thousand yojanas and one kośa, thickness is one yojana. Its volume is given by the formula

vāso tiguno parihi vāsa cautthāhado du khetta phalaṁ /

khetta phalaṁ vehaguṇaṁ khātaphalaṁ hoi savvatthā //

According to this formula,

circumferance is $1 \times 3 = 3, 3 \times \frac{1}{4} = \frac{3}{4}$ square yojana area.

And $\frac{3}{4} \times 1000\frac{1}{4} = 750\frac{1}{4}$ cubic yojanas volume. (utsedha unit)

or $750\frac{1}{4} \times$,23878656 = 2718588469248 cubic pramāṇa aṅgula. .....(5.292)

Afterwards,

$$\left[\left(F^3 \div \frac{P}{\text{क}}\right)+4\left(F^3 \div \frac{P}{\text{क}}\right)\left(\frac{R}{\text{क}}-1\right)\right]\text{ङ}_{13} \quad \text{..... (5.293)}$$

appears as maximal volume of five sensed formation developed bios. Such a volume is obtained in the subconscious (sammūrchana) great fish situated in the exterior of Svayamprābhacala. Its length is one thousand utsedha yojanas; five hundred utsedha yojanas is its breadth and half of this or 250 utsedha yojanas is its height.

Thus its volume is

$= 1000 \times 500 \times 250 = 125000000$ cubic utsedha yojanas ..... (5.294)

In pramāṇa angula, it is given by

$125000000 \times 3623878656$

= 452984832000000000 pramāṇa cubic aṅgula.

Note :

The formula for finding out the area and volume for a conch area or region has already been given, in verses 5.319 and 5.320. The former in sanskrit and the latter in prakrit as:

vyāsaṁ tāvat kṛtvā vadana daloṇaṁ mukhārdha-varga yutaṁ /

dviguṇaṁ caturvibhaktaṁ sa nābhikassmin gaṇitamahuḥ //5.31 ,//

And

āyāma muha sohiya puṇaravi āyāma sahida muha bhajiyaṁ /

bāhallaṁ ṇāyavvaṁ saṁkhāyāraṭṭhie khette //5.320//

The details given by Mādhavacandra Traividya will be dealt with in the Trilokasāra itself.

The geometrical figure for lotus is



figure 5.13

The figure for the great fish is

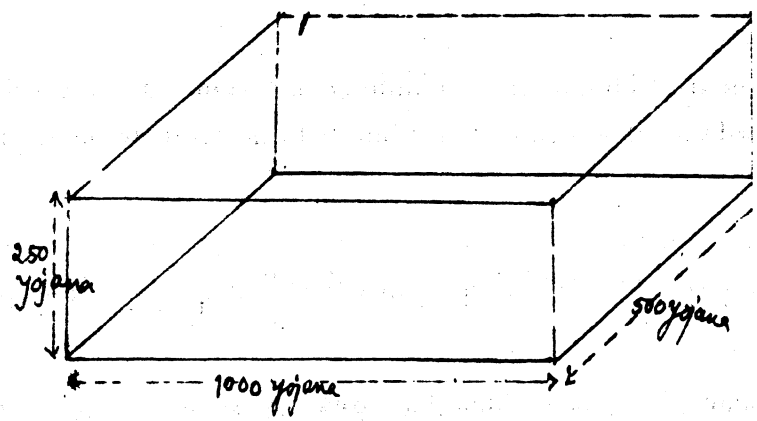


figure 5.14

✡ ✡ ✡

SIXTH CHAPTER

(CHAṬṬHO MAHĀDHIYĀRO)

(v.6.5)

There are three types of cities of the Vyantara deities in the region obtained as product of a square of rāju and one lac ninety-nine thousand yojanas.

$\overline{\overline{४९}}\,|\,१९९०००|$ or $\frac{L^2}{49}\times 199000$ yojanas ..... (6.1)

The area has been expressed as square of rajju seperate and the yojana as separate, giving the product of both as a volume.

(v.6.83)

The maximum age of the Vyantara deties is one palya, intermediate is innumerate years, and minimal is ten thousand years.

1P|ओ|10000 years or प १ । a । १०००० ..... (6.2)

(vv.6.85-86)

The ages, as described in the text are

१०००० | २०००० | ३०००० | ४००० | ५००० | ६००० ० | ७०००० ८०००० ८४००० $\frac{प}{८}\ \frac{प}{४}\ \frac{प}{२}$

or

10000 |20000 |30000 |40000 |50000 |60000 | 70000 |80000 |84000 | $\frac{P}{8}$ | $\frac{P}{4}$ | $\frac{P}{2}$ | ..... (6.3)

The measures are placed in decimal notation, and the simile measure of palya.

(v.6.99)

The number of Vyantara deties is given on dividing the square of universe-line by

square of twenty-three crore four lac linear-finger (or square of thre hundred yojanas).

$$\overline{\overline{४}}\,|\,(५३०८४९६०००००००००) \quad \text{or} \quad \frac{L^{2}\cdot\cdot}{F^{2}\,(53084160000000000)} \qquad \ldots\ldots\ldots (6.4)$$

(v.6.102)

This is similar to the above measure.



SEVENTH CHAPTER

(SATTAMO MAHĀDHIYĀRO)

INTRODUCTION

This chapter is about the regions of the astral bodies (Jyotiṣkas). This is also called the astral universe, (Jyotirloka).

There is defined the region passageable for the astral bodies as well as that which is inaccessible. That inaccessible region is also situated at the very centre of the Jambū island. This is given to be 13032925015 yojanas.

Five types of astral bodies are the sun, the moon, the planets, and the scattered stars, the moon being the head of the family, touching the dense-water-air-envelop at the ridge and end of the universe, and not in directions east, west, south and north, due to intervals.

The total number of astral bodies is given alongwith that of [illegible]oons and the suns which are equal in number.

The names of eighty-eight planets are given, which include the present nine planets, starting with mercury.

It may be noted that astrological planets are the illuminated and unilluminated, perhaps a later development.

The above number of planets is perhaps meant for the Jambū island, because the total number of planets of the universe is given in terms of the universe square points.

The names of the constellations are given including abhijit (abhijī), twenty-eight in total, meant for the Jambū island alone. The total number of the constellations in the whole universe is also given in terms of the universe line square.

The family of every moon contain's stars given by 66975 $(10)^{12}$. The names of the stars have been lost in course of time. The total number of stars is also given in terms of the points contained in the universe line square. This is all combined with decimal place value notation as well as the finger-squared points (pratarāṅgula).

The distances of the planets are given high above the Citrā earth, the highest being the moon, at a distance of eight hundred eighty yojanas. Here is the concept of aṅgular distance as will be seen later.

The motion of the moon in diffferent orbits, and the motion of the sun in different orbits are discribed giving intervals of circular orbits, in spiro-elliptic orbit It is given that the moon and the sun while coming to the outer orbits have greater speeds and while coming to inner orbits have smaller speeds, hence in equal times (periods) they describe unequal circumferences. (v. 179, ch. VII). This is the same as the Kepler's second law involving time, that the radius vector joining the earth and the sun, sweeps out equal area in equal times. Just an analogy appears in the laws of the ancient and the medieval periods.The phases of the moon have been explained through the black planet, day-rahu, moving below the moon and covering its parts, totally in a fortnight. Similarly, the parva rahu, in six months, each, on the end of the full moon, cover separately as per rule, causing perhaps the eclipses.(ch.VII, v. 216). Two moons and two suns move in the Jambū island, out of which only one, the other being the counter, can describe the whole calender, both being completely symmetric to each other.

There are 184 orbits of the sun, at equal intervals, each of whose distance from the meru (perhaps the celestial axis) is given. Some cities are described which lie in the boundaries of these orbits, startng with Kṣema, Ayodhyā to Vijayapurī and Puṇḍarīkiṇī.

The lengths of days and night, ranging from 18 to 12 muhūrtas and vice versa, the year round are described. Then the sun shine areas and the dark areas are also described. The eighty-eight planets have the same orbital movement region, where in every orbit, there are suitable orbits and circumferences in which they move, but their description as detailed for the sun and moon have been lost in course of time (v. 458, ch. VII).

The shapes of the twenty-eighta zodiac constellations have been given.(v.465-467, ch.VII) Their extension have been given, and classified into three types, the least extended, the intermediate extended, and the maximal extended. But the Abhijit has only 630 sky parts (gagana khaṇḍa). Thus the extensions are 1005, 2010 and 3015 sky parts. The total coverage is 54900 sky parts. The counter part being the same amount, the total thus being twice this, or 109800 sky parts.

This gives the motion of the constellations, as regular, being 1835 sky parts per muhūrta. Similarly, the average velocities of the sun and the moon are given and the relative velocities give various types of conjunctions, tithis, seasons, etc. The constellations move in different directions the heliacal rising, as detailed in Jaina astronomy by S.S. Lishk.

The description of the various solstices and their frequency in a yuga of five years, starting with the culmination of the Abhijit is described. The equnoxes are also described.

As the cosmological display of the moons and the suns etc. has been quite extensive, consisting of various numbers in the successive islands, the descriptions are complicated and also worthy of attention for the structures they suggest.

A method has been described for fiding out the moons alongwith their family. This is also connected with cosmological details. The life-time of the astral bodies have also been given.

SYMBOLISM

(v.7.5) The rāju is denoted by $\bar{7}$ and its square is denoted by $\bar{\bar{49}}$. Product of this and 110 yojanas is denoted as $\bar{\bar{49}} \mid 110 \mid$

(v.7.6) The number 13032925015 is denoted in place-value notation, right to left, naming every digit.

v.7.9 Minus is denoted by the word रिण (riṇa) , innumerate is a.

Thus $1072 - \frac{1}{\text{innumerate}}$ is written as १०७२ | रिण $\overset{१}{a}$ |

(v.7.10) Yojanas is abbreviated as जो or jo. 3 rāju is written as $\bar{7}^{3}$

(v.7.13) The number of moons is given in the notation

$\overset{=}{4}$ । श । 438389273600000000007733248 ।

The big number is given in decimal place value, right to left. श denotes a finite or numerate quantity $\overset{=}{4}$. denotes that the square of universe line as set of points, divided by the square of the finger-width as set of points in space. Thus a universe line point-set is denoted as $\bar{7}$. Its square is $\overset{=}{4}$ or $\overset{=}{\cdot 8}$ in original notation.

Similar notation occur in vv. 14, 25, 30 and 35.

(v.7.31) The koḍākoḍi is crore × crore or $(10)^7 \times (10)^7$

(v.7.39) Fraction is denoted as usual, say for $\frac{56}{61}$, the notation is $\left|\begin{smallmatrix}५६\\६१\end{smallmatrix}\right|$

(v. 7.91) kośa is denoted by ko, or को

(v.7.126) The number $\frac{854}{61}$ or $35\frac{428}{854}$ is denoted as $\begin{smallmatrix}२\ १\ ४\\४\ २\ ७\end{smallmatrix}$ ३५

(v.7.516) Ahorātra is abbreviated as अ. रा. or a., rā, Muhūrta is abbreviated as मु or mu. In v.519, ahorātra is abbreviated as a or अ.

(v.7.548) The number of southern solstices in a yuga ruled gre... period utsarpiṆṬ (hyperserpentine) is abbreviated as nfD[k $\begin{smallmatrix}प\\a\end{smallmatrix}$] dakkhi $\begin{smallmatrix}p\\a\end{smallmatrix}$, where P is palya and a is innumerate. dakkhi means southern solstices. Similarly, mũk (utta) means northern solstices. mlqi or usupa means equinoxes, whose number is twice as above.

(vv.7.612 etc., p. 761, p.762 and p.763)

$\underset{1400000}{-}$ रि 23 Here – denotes the universe line point set. रि or ri denotes minus. 1400000 divides the set. Similarly, $\underset{2800000}{-\ 9}\left|\begin{smallmatrix}27\\4\end{smallmatrix}\right.$ denote $\frac{\text{universe line} \times 9}{2800000} + \frac{27}{4}$

Here + is not shown, it ought to have been placed. The quantity $33331\frac{\cdot\cdot 5}{183} + \overset{=}{\underset{a}{1}}$ *is denoted* as follows:

३३३३१ | भा $\frac{११५}{१८३}$ |

The quantity $46152\frac{112}{793}$ is written as

४६१५२ धण अंसा $\frac{११२}{७९३}$

Here aṁsā means part and धण dhaṇa means plus.

(v.7.615) प १ व १००००० means one palya and 100000 years.

IMPORTANT TERMS

(v.7.5) rajju, kadi, joyaṇa, agammadesa, sodhiya, guṇida, sayadasu,

(v.7.6) khetta, samavaṭṭa,

(v.7.7) candā, divāyara, gaha, ṇakkhatta, tārā, jodigaṇā, toyanta, ghaṇovahi, puṭṭhā,

(v.7.8) puvva, avara, dakkhiṇa, uttara, vāū,

(v.7.9) viccāla, asaṁkhā, bhāga, parihīṇa, riṇa,

(v.7.10) rajju

(v.7.11) bhāiida, seḍhi, vagga, aṅgula, laddha, rāsī,

(v.7.12) suṇṇa, aṅkakamā, ṇava, cau, du, ti, satta, ṭhāṇa, aṭṭha, cha,

(v.7.13) saṁkhejja, rūva, padara, aṅgula,

(v.7.15) buha, sukka, bihappa, maṅgala, saṇi, dhūmakedū, kālakakedū, kedu, jalakedu,

Note that rahu is not mentioned.

(v.7.24) parisaṁkhā,

(v.7.26-28) The names of the zodiac constellations are as usual, including abhijī, rest being in aurasenī dialect of Prakrit language.

(v.7.31) kodā koḍi

(v.7.32) paramāmāṇa (pramāṇa)

(v.7.36) maṇḍala (gayaṇa)

(v.7.37) uttāṇa, gola, addha, sahassa, manda kiraṇa,

(v.7.38) ujjova kamma udaya, phuranta, jamhā, tamhā

(v.7.39) bhāgakade, uparimatala, runda, dalidaddha, bahala

(v.7.40) parihi, adirake, aṇāiṇihaṇa

(v.7.65) cittovarimatala

(v.7.70) majjhe

(v.7.85) runda, addha, divaḍḍha,

(v.7.91)vikkhambha, kosa, pamāṇa

(v.7.112) tericcha antarāla , sattaṁsa, ukkassa

(v.7.116) cāramahī doṇṇi ekkaṁ

(v.7.117) bimba, paṁca saya dasuttarāi

(v.7.119) cārakhetta, vīthīo paṇṇa rasa, sasaharāṇa bīthī

(v.7.121) savvabbhantara vīhī vīsuttara aḍasaya

(v.7.122) dhuvarāsī ekkasaṭṭhīe dasajuttā, aḍadāla

(v.7.127) gamaṇakāla, biccāla, melijja, padi, magga

(v.7.128) m..u, caudāla, chapuṇṇa, uṇasīdi , sadaṁsā

(v.7.130) paha, vicca, sumeru, caudāla, unatīsa.

(v.7.143) ābāhaṁ, saṭṭhi judaṁ

(v.7.145) vaḍḍhī, yābādhā, laddha, paḍi

(v.7.147) kalā, ṇavaṇaudi, aṭṭha sayā, aḍavaṇṇa

(v.7.150) lakkha, bāsīdi, cauabbhahiya

(v.7.151) sattattari, terasa, doṇha

(v.7.152) uṇavaṇṇa, saya, tiṇṇi, aṭṭha

(v.7.153) bāvīsa, biya, do uttara, tisaya, ṇava

(v.7.154) paṇaṇaudi, besaya, tettīsa.

(v.7.156) igidāla, paṇṇaṇaudi, bārasa, causa

(v.7.158) chāsīdī. causīdī. coddasa

(v.7.159) uṇasaṭṭhī

(v.7.160) ādima. paḍhama. bāhira

(v.7.162) ṇimitta

(v.7.163) vaggīda. parihikkheo. duguṇa dasaguṇida

(v.7.164) tedāla jutta saya maṁsa. cattāri sayā. sattāvīsa. abb' ·hiva

(v.7.165) uṇavīsa. tedāla judasadaṁsā

(v.7.168) solasa. paṇadāla. dah uttarā

(v.7.170) ekattari

(v.7.176) tevaṇṇu. aḍasaya sattarasa

(v.7.179) sigghagadī. ṇiggacchaṁtā.maṇḍagadī. ya samāṇā. sarisakāleṇa

(v.7.180) gayaṇakhaṇḍa

(v.7.181) muhutta. ṇabhakhaṇḍa.

(v 7.185) sammeliya. icchiya. avhauda. gadimāṇa

(v.7.189) culasīdī

(v.7.202) rāhu. kiñcūṇa.

(v.7.203) kodaṇḍa. loyaviṇicchaya. paṇṇāsādhiya. paṇṇāsādhiya

(v.7.205) diṇa. pavva. gadi. saricchā. viyappa

(v.7.206) puṇṇimakkho.

(v.7.207) hudāsa (āgneya). māruda (vāyavya) disā.

(v.7.212) amavāso. magga. dissa. āvarida

(v.7.213) tevīsaṁsā. hāro. causayabādāla

(v.7.214) p: 'i vāe. muṁcadi

(v.7.215) sahāveṇa. kasaṇābhaṁ. sukilābhaṁ pariṇamadi

(v.7.223) avasesa

(v.7.227) iṭṭha. pahasūci. ādima

(v.7.231) paṁcattāla, paṇahattari दुचरिममग्गंत

(v.7.237) rūūṇa maggasūi vaḍḍhī

(v.7.239) kamala baṁdhū, majjhima, adirega, sahiya

(v.7.243) saṁguṇḍa tiyasīdī, sayala, tajjudaṁ, cae (caya)

(v.7.245) mandara giri, pariraya, rāsi, parimāṇa

(v.7.246) ṇabha (zero), hida, paṇidhi, paridhi

(v.7.256) mūla, sūi vaḍḍhi, parihi

(v.7.257) aṁsa, hāra, aṭṭhatīsa, sattarasa, ekkasaṭṭhī

(v.7.272) pamāṇa aṅgula

(v.7.277) aṭṭhrasa muhutta divasa, bārasa, ṇisā

(v.7.279) bhūmiya, muha, sodhiya, vaddhī

(v.7.292) ādava, tama, khetta, saṅkaṭauddhi

(v.7.293) ādava timira, āyāma

(v.7.296) tāvakhidī, tiyaṁsā, aḍavīsa, tisaya, tevaṇṇa

(v.7.465-46) viyaṇaya, sayala uḍḍhī, kuraṅga sira, dīva, toraṇa, ādavavāraṇa, वम्मिय

gomutta, sarajuga, hattha, uppala, dīva, adhiyaraṇa, hāra, vīṇā, siṁgā, vicchu, dukkayavāvī, kesari gayasīsa, muraya, paṭaṁtapakkhī, seṇā, gaya puvva avara gatta, ṇāvā, hayasira, cullī, āyāra

Note: These are the names of zodiac constallations signs, starting with kittiya.(kṛttikā).

They may be compared with those given by the Hindū works, as well as the chinese and the works in the west.

(v.7.493) atthamaṇa samaya, udaya, sesa, majjhaṇhe

(v.7.494) cara, acara, varasaṁkhā

(v.7.498) ayaṇa, gaha, saga, natthi, bhagaṇa, ṇiyama, tārā, (paiṇṇa = prakīrṇaka)

(v.7.511) aṇṇoṇṇa, sohiūṇa, pamāṇa, phala, icchā,

(v.7.526) āuttiya, ekkādi, duuttariyaṁ, avaharida, usupa,

(v.7.527) rikkha, pada, pajjaṁta, doādi,

(v.7.528) bhoga, juda, usuva, usupa, tithi, māṇa, bāra, pavva, sama, visama, kiṇha, sukka

(v.7.530) juganippatti, candajoge, pādīva, pāraṁbha,

(v.7.538) pakkha, ṇakkhatta, aṭṭhārasa

(p.7.762 et seq. following (suttagāhā) v. 612)

vicaya, paḍivalaya, gaccha, cauttara kamera, moṭṭūṇa, savvattha, gaṁtūṇa, sattetala, bhajida, bidiya, ha la, metta, aṁtara, dhaṇa, aṁsā, saparivāra, āṇayaṇa, vihāṇa, ovṭṭiya, laddha, aṇṇoṇṇaṁ pekkhidūṇa, gada, saṁkalaṇāe, māṇa, majjhima, ghaṇa, samikaraṇaṭṭhaṁ, rūva, pakkūṇa, chedaṇa, parihīṇa, rajju, cheda, uppajjadi, jagapadara, bechappaṇṇaṁgula, vagga bhāgahāra, pāogga, saṁkejja, salāgā, karaṇa, pariyamma, virujjhade, pamāṇaparikkhā vihi, paraṁparāṇusāriṇī, suttāṇusāriṇī, jutti baleṇa, sādhaṇa, adiṁdiya, padattha, visaṁvāda, abhāva, heduvādāṇusāriṇī, avuppaṇṇajaṇa, uppāya, ṇaṭṭhaṁ, vihāṇa, viraliya, dādūṇa, aṇṇoṇṇabhattha, jādā, hide, duṭṭhāṇe, raciya, acara rāsi, savva pacaya dhaṇa, guṇagāra, ghāgahāra, bhārabhūda, jagapadara

(vv.614-615) vasādhiya, palla, pāda, jahaṇṇa,

MATHEMATICAL CONTENTS

(v.75) The volume of the space in which the astral bodies and their habitants reside is contained in a cuboied with length of one rāju, breadh of one rāiu and height of 110 yojanas. If L denotes the universe line, rāju is $\frac{L}{7}$, hence volume $= \frac{L}{7} \times \frac{L}{7} \times$ (110 yojanas). inside this volume there is the space which is untraversed by the planets.

(v.75) The excluded space is the region inform of a cylinder with the volume given as follow: TPT (V), p. 243, vol. 2.

The astral bodies move, leaving a distance for the opposite side being the same, the total distance is 1121 × 2 = 2242 yojanas. On the earth the diameter of the Sumeru is 10000 yojanas. Adding both, the linear diameter of the inaccessible is given by

10000 + 2242 =12242 yojanas. The circufernce of such a circular area is given by Π D or $\sqrt{10} \times (12..+2)^2$ or 38713 yojanas, approximatelv. The area of this

circular area is therefore $\Pi D \times \frac{D}{4}$ or Πr^2, any way. it is thus $38713 \times \frac{12242}{4}$, when this is multiplied by the height of 110 yojanas, it become the inaccessible space volume:

$$38713 \times \frac{12242}{4} \times 110 = 13032925015 \text{ cubic yojanas.}$$

(v.7.7)

in TPT(V) some more information is givin about the syambols :

= प $\frac{-}{७}$ $\frac{७}{२}$, फ $\frac{-}{७}$ २ | इ १६०० | ल १०८४

where the use of rule of three has been made.

= is L^2 or universe-line square

प्र or pra is pramāṇa or measecre , which is $3\frac{1}{2}$ rāju.

$\frac{-}{७}$ or $\frac{L}{7}$ is the rāju. $\frac{-}{७}$ $\frac{७}{२}$ means $\frac{L}{7}$, $\frac{7}{2}$ or $\frac{7}{2}$ rāju.

फ or pha is phala or acquisition is $\frac{७}{२}$ २ or $\frac{L}{7}$. 2 = 2 rāju इ or i is (icchā) or requisition is 1900 yojanas. or the Citrā earth is 1000 yojanas in thickness. The maximum height of the astral deities or bodies above the upper surface of Citrā earth is upto 900 yojanas height. hence the requisition is 1000 + 900 =1900 yojanas ल is labdha or la. or result or product is 1084 yojanas. it is doubled as to how 1084 is obtained.

Explanation:

The upper-universe is one rāju wide near the middle universe. It is 5 rāja wide near the brahma loka at the height of 3 rāju. On omiting this channel for the mobile bios (trasa nāli) in one lateral part of the universe (at $3\frac{1}{2}$ rāju). the interval of 2 rāju is obtained. Starting from the middla universe the astral deity or bodies are upto the height of 1900

yojanas, hence when the height is $\frac{7}{2}$ rāju in one lateral part, there is a difference of 2 rāju, then what should be the interval at a height of 1900 yojanas ? This tri-ratio (rule of three) gives $\frac{\text{phala} \times \text{icchā}}{\text{pramāṇa}}$ = labdha, or $\frac{2 \times 1900 \times 2}{7} = \frac{7600}{7}$ yojanas or $1085\frac{5}{7}$ yojana is obtained. This greater than the labdha amount 1084 by $1\frac{5}{7}$ yojanas.

Among all the planets the saturn planet is of the slowest velocity. If its height 3 yojanas is supported (approximation), then upto the height of mars-planet the requisition (icchā) set is 1000 + 790 + 10 + 80 + 4 + 4 + 3 + 3 + 3 = 1897 yojanas, then the resulting set (labdha rāśi) becomes $\frac{2 \times 2 \times 1897}{7}$ = 1084 yojanas.

(v.7.8)

In the verse, it has been noted that the astral bodies touch the dense-water air envelop at the end of the universe, but this is negated in verse 8. The explanation is that the universe is 7 rāju wide south-north, hence in both directions the astral bodies cannot touch the air-envelops. This is being discussed in verse 10, ahead. The question regarding the touch in east west, is that in the middle universe, the width east-west is 1 rāju, there the astral bodies touch the dence water air envelop as in accordance with verse 5, their residence have been stated to be rāju × rāju × 110 cubic yojana rāju, excluding the inaccessible region. But the astral bodies which are over and above from the upper surface of Citrā. They also cannot touch the air envelop in east west direction, as may be shown below.

(v.7.8)

The middle universe is one rāju east west. Here, the average measure of air envelops is 12 yojanas. In the above verse 8, whatever 1084 yojanas result interval has been obtained, out of it, the air envelop 12 yojanas when subtracted, the remainder is 1084 − 12 = 1072 yojanas. This air envelops increases gradully when near Brahmaloka, its width are 7 + 5 + 4, and is 16 yojanas when summed up. Similarly, at height of $3\frac{1}{2}$ rāju, an increase in the the thickness of the air envelops is 16 − 12 = 4 yojanas.

This, at the height of 1900 yojanas, becomes innumerate part of a yojana. Hence the author has subtracted $\frac{1}{a}$ from 1072 yojanas. The symbol for innumerate is रि here in (TPT)(V).

(v.7.10) The universe is 7 rāju broad south-north, and in its central portion lies the channel of mobile bios (trasa-nālī), which 1 rāju broad, 1 rāju in length. Hence in these directions, the astral deities (bodies) donot have touch with air envelops, i.e. the air envelops are 3 rājus distant from the mobile-bios channel. According to earlier verse, the three rājus have been subtracted by12 yojanas and one uppon innumerate part of a yojana. In symble this is $\frac{-}{७}$ or $\frac{L}{7}$ representing a rāju. Further $\frac{१}{रि}$ or $\frac{1}{a}$ one uppon innumerate. Hence the difference is 3 rāju $-\left|12+\frac{1}{a}\right|$, or $\frac{-}{७}$ 3 | रिण जो १२ | $\frac{१}{रि}$ |

(v.7.11)

The total number of astral bodies is given through the similar measure. Here the world line (jaga-śreṇī) is the set of points in a world-line (universe-line), and the finger (aṅgula) denotes the set of points in a finger-width. Let the finger be denoted by F, then this number is given as follows:

$L^2 \div (256)^2 F^2$ or $\frac{=}{४}$ | ६५५३६

(v7.12-13)

The total number of the moons is given by

$\frac{=}{४}$ | ९ | ४ ३ ८ २ ८ ६ २ ७ ३ ६ ० ० ० ० ० ० ७ ७ ३ ३ २ ४ ८ |

or $\frac{L^2}{(\text{numerate } F^2) \times 4389273600000000007733248]}$

(v.7.14)

The total number of suns is the same and hence given by the same number

$L^2 \div |(\text{numerate}) F^2 \times 4389273600000000007733248]$

This is given in ancient symbol as

= ४ | ४ ३ ८ ६ २ ७ ३ ६ ० ० ० ० ० ० ० ० ० ७ ७ ३ ३ २ ४ ८ in TPT (V).

But in TPT it is = ४ | २ | ४ ३ ८ ३ ८ ६ २ ७ ३ ६ ० ० ० ० ० ० ० ० ० ७ ७ ३ ३ २ ४ ८ |

(vv.7.23-24)

The total number of planets is given by

$$\frac{L^2}{(\text{numerate } F^2) \times 54865920000000000966656} \times 11.$$

This is given given as

= ४ | ११ | ५ ४ ८ ६ ५ ६ २ ० ० ० ० ० ० ० ० ० ६ ६ ६ ६ ५ ६ (TPT (V))

But in TPT, it is given as

= ४ | ११ ३ | ५ ४ ८ ६ ५ ६ २ ० ० ० ० ० ० ० ० ० ६ ६ ६ ६ ५ ६ |

(v.7.30)

The total number of constellations is given as

$$\frac{L^2}{S F^2} \quad \frac{(7)}{(10973184000000000001933312)}$$ where S is numerate.

or = ४ | ७ ३ | १ ० ६ ७ ३ १ ८ ४ ० ० ० ० ० ० ० ० ० १ ६ ३ ३ ३ १ २ |

(v.7.31)

The total number of the stars corresponding to among is

$66975(10)^{14}$ or ६ ६ ६ ७ ५ ० ० ० ० ० ० ० ० ० ० ० ० ० ० ०

(vv.7.33-35)

The total number of the stars is

$\frac{L^2}{SF^2} \frac{(498782958984375)}{(267900000000000472)}$, where S is numerate.

= ४ ६ ८ ७ ८ २ ६ ५ ८ ६ ८ ४ ३ ७ ५

or ४ | ३१ २ ६ ७ ६ ० ० ० ० ० ० ० ० ० ० ० ० ४ ७ २ १

In TPT(V) the symbol ९ appears as ७

(v.7.37)

The height of the moon above the Citrā earth has been shown to be 880 yojanas. This has been shown to be an angular measure as shown by S.S.lishk in Jaina Astronomy*:

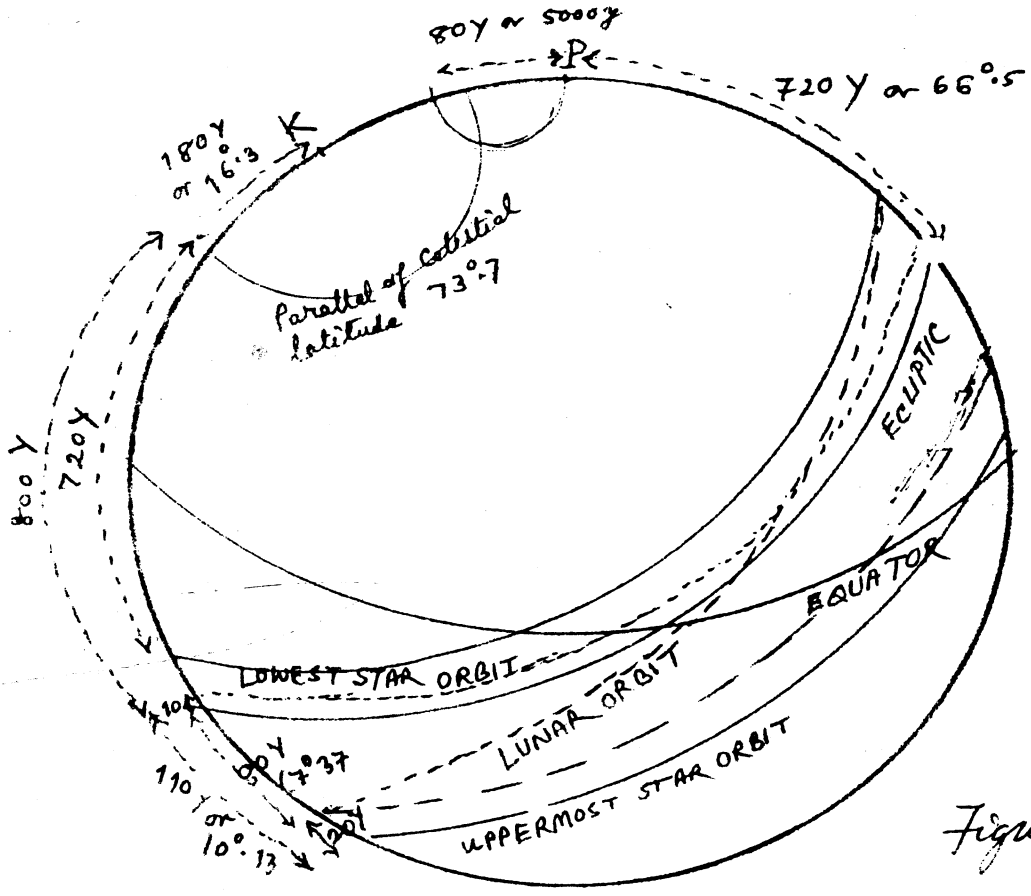


Figure- 7.1

*Op. cit, p. 73.

(v.7.38 et seq.)

The heights of various astral bodies above the Citrā earth are given as under

TABLE - 7.1

Name of asrral body	Height about the Citrā plane
The stars	790 yojanas
The sun	800 yojanas
The moon	880 yojanas
The naksatras	884 yojanas
The Mercury	888 yojanas
The Venus	891 yojanas
The Jupiter	894 yojanas
The mars	897 yojanas
The Saturn	900 yojanas

The measures given above seem to contradict the modern scientific data.The diameters of the sun is $\frac{48}{61}$ yojana and that of moon is $\frac{56}{61}$ yojana. The distance between the innermost orbit and the outermost orbit of the sun is 510 yojanas. Lishk and Sharma propose to regard this as actual distance or roughly 48° of arc 1° being equivalent to 69.9 miles on the surface of the earth.

Thus, 510 yojanas = 48 × 69.9 miles

$\therefore$ 1 yojana = 6.6 miles

Accordingly, the height 800 yojanas of the sun, converted in to digrees as per the same scale becomes $\frac{800 \times 6.7}{69.9} = 77°.5$. Sharma and Lishk regard this as the region of the projected ecliptic round the north pole or meru directed point, also called the plane earth, Citrā*. If this is regarded as the north polar distance of the sun, naturally, the moon at 880

* Cf. Lishk and sharma, Notion of circular flat earth in jaina cosmography, the Jaina Antiquary, vol.xxviii, nos. 1-2, 1976, pp.1-5

yojanas shall mean 80 yojanas towards the south of the sun, or below it in celestial diagram. According to the same scale, as suggested above, the maximum north polar distance of the moon from the sun or ecliptic is proposed to be $\frac{80 \times 6.7}{69.9}$ 7° 7, the modern value being 5° 8' 40" to which may approximate the former if a yojana is taken to be 5 miles.[1]

Similarly, the belt from 790 yojanas to 900 yojanas, or 110 yojanas becomes $\frac{110 \times 6.7}{69.9}$ = 10° 6, a modern value of the lunar zodiac.[2]

One more note has been given by Lishk, that 800 Y = 50000 y where Y is the TPT unit and radius of the Jambū dvīpa is 50000 y. On this basis they derived the obliquity of the ecliptic (23°, 5) in the structure of the mathematical modal of meru.[3]

(vv.7.116 et seq.)

These gives discription about the motion of the moon. The orbital region is $510\frac{48}{61}$ yojanas. The speeds are given in verse 64 as anologicał to those of the lion, bull and horse, for each the power being defined by 4000 deities, entering into sky from eastern and other directions as risings, thus totalling to 16000 appropriate deities.

The moon is a hemispherical body with radius $\frac{28}{61}$ yojana, the diameter of the upper plane being $\frac{56}{61}$ yojana (verse 39). Its circumferences are separately distant by slightly greater than 2 yojanas (verse 40)

It may be noted that,

1. This easy leads to the concept of celestial latitude which are measured north or south of the ecliptic, from 0° to 90°

2. Cf. Neugebauer, pp. 102, 103, 166, 186, and 82, 89, for various civilization. Cf. also Needham and Ling, p. 173.

3. cf. Lishk, S.S., Jaina Astronomy, pp. 73 and 60, respectively.

510 Y = 2 (declination as maximal) = 47°

= 47 × 69°.09 miles (∵ 1° = 6080 feet)

$\therefore$ 1 Y = $\frac{500}{9}$ yojanas on flat earth

$\therefore$ 800 Y = 44000 yojanas on flat earth.

The sun always remains at a distance of 800 Y from the Citrā samatala bhūmi, and as the sun moves on ecliptic, the sun always remains at adistance of 800 Y from the samatala bhūmi, the locus of J the sun, say, for an observer at O. Thus OJ = 800 Y = 73°.7, being the celestial latitude of the sun.

The following table given by Lishk, may be reproduced for the idea of astral bodies (planets), represented by the heights in yojana in TPT.

TABLE- 7.2

Height of the planets over that of the sun, above the Citrā, samatala bhūmi, denoted by a circular area with center at the projection of the pole of ecliptic.*

Sr. No.	Planet	Height over sun (in yojana)	maximum latitude (degrees of arc)	modern value of inclination of orbit to the ecliptic	
				Geocentric (degrees of arc)	Heliocentric (degrees of arc)
1	Moon	80	7° 22'	5° 15'	5°9'
2	Mercury	88	8° 7'	2° 42'	7° 00' 10".37'+ 6'.7T*
3	Venus	91	8° 23'	= from 2° 27' to 7°0'	3° 23' 37" + 3".6T
4	Jupiter	94	8° 40'	1° 18'	1° 18' 31" – 20".5 T
5	Mars	97	8° 56'	1° 51'	1° 51' 1" – 2".4 T
6	Saturn	100	9° 13'	2° 29'	2° 29' 33" – 14".1 T

* T is measured in Julian centuries from 1900 A.D.

Most important note: It seems that the planets should have been kept relative to the moon, and so on, and these values be positive to the moon, to be added to the moons value for certain unknown reasons ? *cf. ibid, p.77

From the above theory of Lishk, it appears from the table that the hights of all the planets donot correspond to their maximum celestial latitudes respectively. The order the planets is not geocentric, and Jupiter and Mars in their inter changed position. However, all the planets are never visible in the order of their maximum latitudes. Lishk has observed the following observational relation in TPT: (The Naive Astronomical Theory of the Jaina school)

1. Mercury was probabely observed at its maximum southern latitude when moon was situated at its maximum northern latitude. Thus Mercury is south wards to moon by $5^0 15'$ plus $2^0 42'$, i.e. $7^0 57'$, which is very near Jaina value of maximum latitude of Mercury, i.e., $8^0 7'$. Consequetly, Mercury was understood to be $8^0 7'$ or 88 yojana height than the moon.

2. There is a great fluctuation in the geocentric latitude of the Venus.

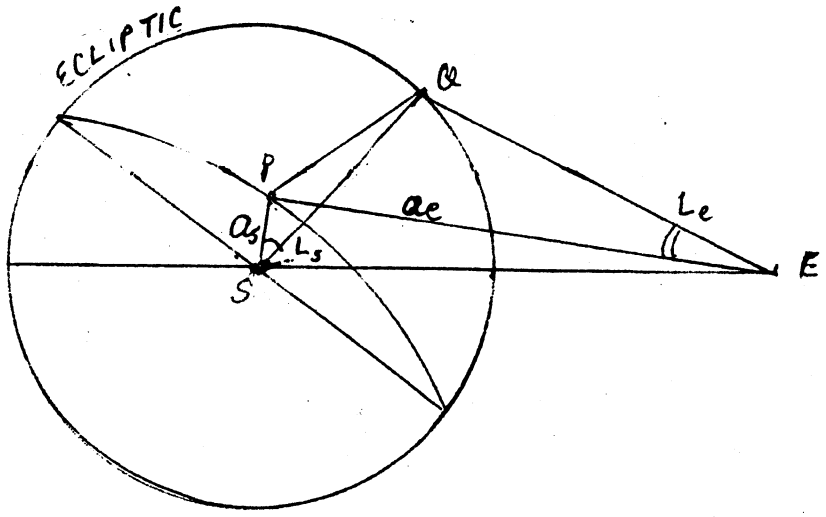


figure 7.2

Diagram showing S the sun; P the planet and E the earh.

Here SP = as = radius vector of the planet, with sun as center

EP = ae = radius vector of the planet, with respect to the earth.

LPSQ = Ls = heliocentric latitude of P

LPEQ = Le = Geocentric latitude of P

Now $Le = \frac{\sin Ls \times ae}{as}$, and for Venus, using Graha Ganita, ...(7.1)

ae ≈ from 1./23 to . 277 A. U.

and as ≈ from .7183 to .7283 A. U., ∴ from {7.1} we have.

I.e ≈ from 2^0 27' to 7^0 0.

Thus, it is quite probable that Mercury might have been observed with respect to Venus such that the latter was 3 yojanas {$0^0$16' . 6}higher than the former.

3. Regarding Jupiter and Mars, their relative heights are justifide to the extent of the error due to approximation of their relative heights. The geocentric maximum latitude of Mars is greater than that of Jupiter by 33' and that of saturn than that of Mars by 38', where as in Jaina values, they are about 16' or 17'.

4. Lishk seems to find a serious error in noting the relative height of Jupiter over that of Venus with respect to samatalabhūmi. In fact the minimum of the value of maximum latitude of Venus is 2^0 27' which is greater than maximum latitude of Jupiter i.e..$1^0$18'. He opines that at that time Jupiter might have been observed at its maximum southern latitude and Venus lower to it, relative to samatalabhūmi.

Lishk further gives the following reasons for the discrepancy in relative observations of the phonetary phenomena:

1. Mercury is seen very rarely. Whenever it was seen, probabely it happened to be at a great distance from the moon the descripancy in the maximum latitude value of mercury is $8^0$7' - $2^0$42' or $5^0$25. This, thus effected the relative values of maximum latitudes of all other plantes.

2. The observations appear to be relative with respect to a suitable planet in proximity

Some more finding is given as follows:

1. The whole model of astral bodies is spread ovrer 900-790 or 110 yojanas, which gives the value $10^0$8' if 800 yojanas of hight is taken to be 73^0.7. As the geocentric latitude of the moon is $5^0$15' ∴ Belt of lunar zodiac = $10^0$30'. The whole model (except saturn which stands upper most), the belt of the lunar zodiac is demarcated by the lowerst and the uppermost stars. thus the concept of celestial latitude seems to be implied in the concept of heights of astral bodies above samatala bhūmi (the earth having a plane surface denoting circular area with centre at the projection of pole of ecliptic, as shown in the figure. similar notion of latitude of moon has been found to be in babylon , according to Neugebauer.*

* Neugebauer, O., The Exact Sciences in Antiquity Providence, 1957.

The naked eye observation might have led to innease of height of planets by three yojanas from Mercury to Venus, and to Jupiter, Mars and Saturn respectively the smallest variation in height of astral bodies is three yojanas (0° 16'.0), rounding off to 3 yojanas, giving again a Babylonian zigzag representative diagram, in a linear set up.

(vv.7.118)

The moon traverses through its orbits. 180 yojanas stretch in the Jambū island and $330\frac{48}{61}$ yojanas in the Lavaṇa sea.

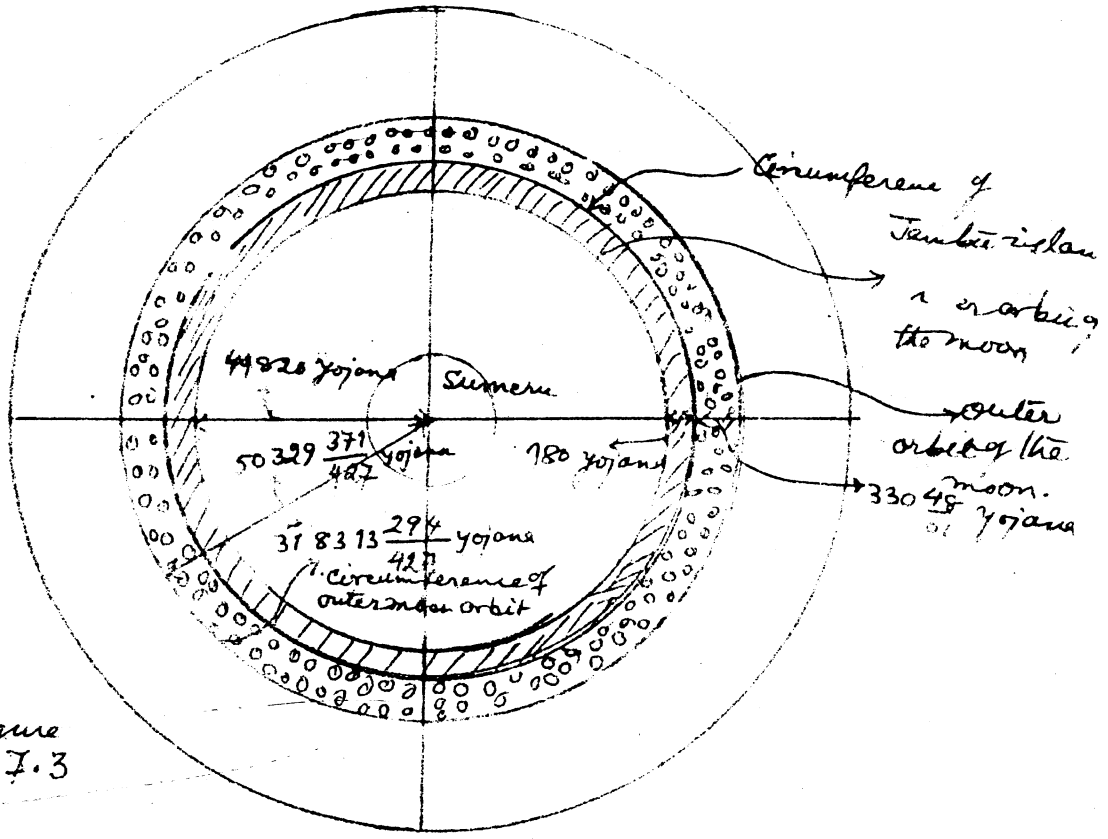


Figure 7.3

The central circumference, shown in red boundary is that of the Jambū island, with a diameter of 100000 yojanas. In center is the Sumeru mountain whose diameter is 100000 yojanas. There are 15 orbits in the region of moon's motion, each of whose width is $\frac{56}{61}$ yojanas because through them alone the moon moves It may be noted that the motion of the moon is also in spiroelliptic orbit. The equation of motion may be given the following form:

$r = \frac{f+q\theta}{h+k\cos\theta}$ where r is the radious vector showing the variable distances of the moon from the Sumeru centre . θ is the sweeping angle by the radius vector from its intial perihetion . f, q, k, h are constants which are to be calculated from various positions of the moon. it may be seen that

$r = \frac{a + b.\ 2\pi x}{1 + c\ \cos\frac{\pi x}{15}}$. where x is such that $o \leq x \leq 30$. where 15 has been taken as an approximately round figure

Here a, b, c are constants determinable from the boundary conditions.

$x = o,\ r = \frac{49820}{2}$: $x = 15,\ r = \frac{50330}{2}$. and $x = 30.$

$r = \frac{49820}{2} + E$. where E is the amount of extra displacement of the moon from original starting point just after a lapse of 30 days approximately. E is the observational datum, whose introduction is essential for developing the eqation of an opening cum closing spiral with the given description from the above a, b, c can be calculated. For E = o b = o, c the eccentricity could be calculated, and the path can to proved to be an ellipse. Restoring E and neglecting c, the path becomes an Archimedean spiral.

The dynamical law could be determined for all such astral bodies whose motion are given in the same pattern of

$r = \frac{f+q\theta}{1+h\cos\theta}$. or $r = \frac{f}{1+h\cos\theta} + \frac{q\theta}{1+h\cos\theta}$.

The first term on the right hand side of the (7.1) gives the elliptic motion for which the force is that under the law of inverse square of the distance, i.e., $P \propto \frac{1}{r^2}$. We have supposed that $E \neq O$ in the previous equation.

Now, there seems to be an additional force-contribution due to the second term on the right hand side of equation (7.1). Denoting the equation as follows:

$$R = \frac{q\theta}{1 + h\cos\theta} \text{ and putting } R = \frac{1}{u}$$

we have, $u = \frac{1 + h\cos\theta}{q\theta}$ .....(7.2)

Thus, $\frac{du}{d\theta} = -\frac{u}{\theta} - \frac{h}{q} \cdot \frac{\sin\theta}{\theta}$ .....(7.3)

where the second term on the right hand side could be neglected due to small value of h.

Hence $\frac{d^2u}{d\theta^2} = \frac{2u}{\theta^2}$ .....(7.4)

where u could be assumed proportional to inverse of θ from (7.2) for small value of h and therefore

$$\frac{d^2u}{d\theta^2} = 2ku^3, \quad \text{.....(7.5)}$$

where k is a constant

The above result (5), for a central force alone, gives

$$P = h_1^2 u^2 \left[\frac{d^2u}{d\theta^2} + u\right],$$

or $P = h_1^2 u^2 [1 + 2u^2 k]$ .....(7.6)

in which h_1 is taken to be $r^2 \frac{d\theta}{dt}$ for neglible eccentrity here.

The equation (7.6) shows that the additional force is that of inverse cube of the distance to a second approximation as also found by Einstein and which could explain the motion of perihelion of planet murcury.* However, the above equation (7.6) proposes an

* cf. Weber, J., General Relatively and Gravitational Waves, New York, 1961, p. 67, cf. also Einstein, A., " The foundation of the general Theory of Relativity," The Principle of Relativity, pp. 109-164, Dover, unabridged republication of 1923 translation.

additional force $p \propto \frac{1}{r^5}$ apart from $p \propto \frac{1}{r^2}$ and $p \propto \frac{1}{r^3}$, and might be helpful someway or other, the transverse force not being considered in this approximation.

SPIRO ELLIPTIC ORBIT

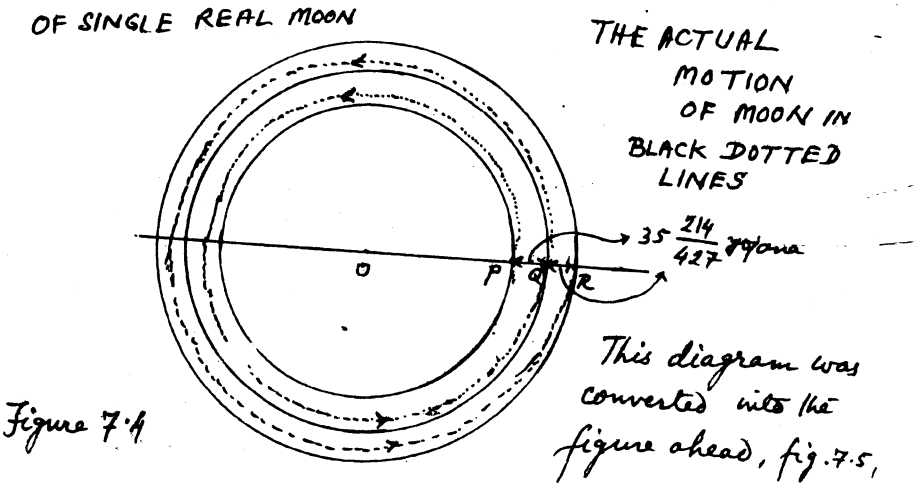


Figure 7.4

in which the moon's motion was projected with a counter moon, the single moon's taking the following shape.

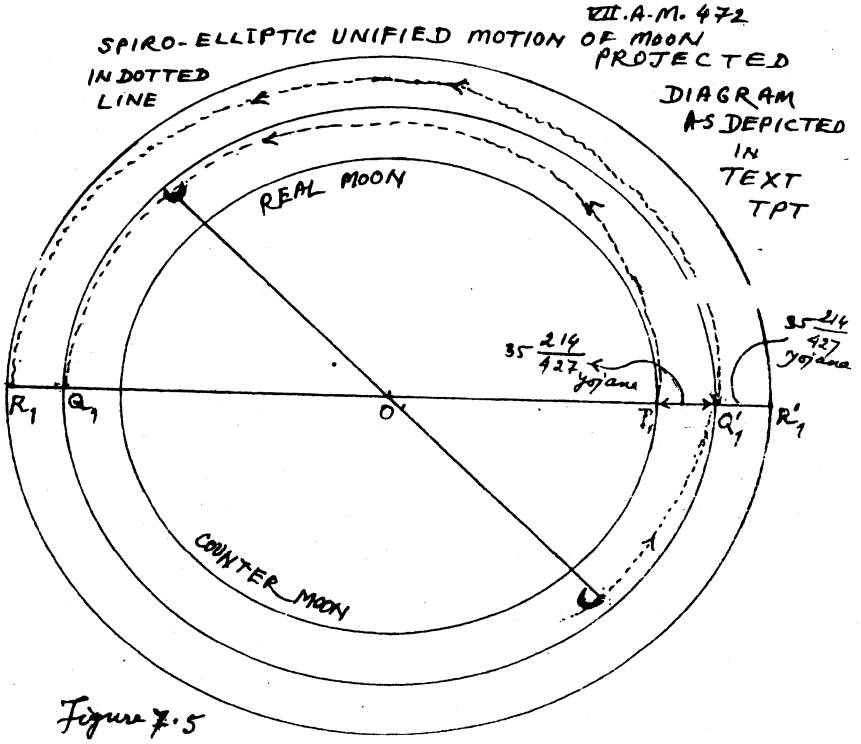


Figure 7.5

The moon which is real moves from P_1 toQ_1 , show through a full circle spiral as PQ in figure 7.4. On alternate day it appears again at Q_1^1 and covers the $Q_1^1 R_1$ expressed as a full circle spiral as QR in figure 7.4. The remaining motion of the counter moon may be similarly explained in this diagram.

(v.7.179)

There is an important principle in this verse. When the radius increases, the orbital path naturally increases, and in order to complete that path, the moon as well as the sun are said to move more amore speedily in order to traverse the increased path in fixed time in order they may trangress unequal circumferences in equal time. Their velocities in the innumerate part of time might be increasing with some uniform acceleration or so. Similarly, while entering into the inner orbits there may be uniform retardation. This geometry shows that the law is similar to the Kepler's law of planetary motion which staes that the radius vector sweeps out equal areas in equal times. It may, however, be noted that here the motion is along a spiral, whereas in case of Kepler, the motion is along an elliptic path. The statement may be properly checked. There is it is the arc, here it is the area which changes. There it is the rate of change of arc, here it is the rate of change of are. There is the one range or mean motion considered, here it is the change every instant.

(v.7.186)

The linear velocity of the moon, on being situated over the internal orbit, is 31508 ÷ $62\frac{23}{221}$ or $5073\frac{7744}{13725}$ yojanas per muhūrta (48minutes).

(v.7.200)

When the moon is on the outer orbit, this is given by 5125 yojanas per muhūrta.

(vv.121 et seq.)

Hereforth, there is the application of the constant set (dhruva rāśi):

The total stretch (north-south) across the lunar orbits (maṇḍala or bīthī) is = 180 + 330 = 510 yojanas. The diameter of the sun's upper hemisphere's plane is $\frac{48}{61}$ yojanas. When this is added to 510 yojanas,

it becomes $510 + \frac{48}{61} = \frac{31158}{61}$ constant set orbital plane. .....(7.7)

There are 15 orbits, hence the total of the moon's diameter is

$\frac{56}{61} \times 15 = \frac{840}{61}$ yojanas.

When this amount is subtracted from the constant set, the total orbital interval is obtained for all paths:

$\frac{31158}{61} - \frac{840}{61} = \frac{30318}{61}$ yojanas. .....(7.9)

When (7.9) expression is divided by 14, the interval for 1 bīthī is obtained. This is greater than 35 yojanas by $\frac{214}{427}$. Thus $\frac{30318}{61} \div 14 = 35\frac{214}{427}$ yojanas. .....(7.10)

When the diameter of the moon, $\frac{56}{61}$ yojana is added to (7.10), we get the total interval including the image of the moon:

$35\frac{606}{427} = 35\frac{214}{427} + \frac{392}{427}$ yojanas. .....(7.11)

The difference interval between the meru and the second orbit

= that of the first orbit + interval of meru.

$= 44820 + 36\frac{179}{427} = 44856\frac{179}{427}$ yojanas.

Proceeding in this way in the fifteenth path this interval becomes

$45293\frac{192}{427} + 36\frac{179}{427} = 45329\frac{371}{427}$ .....(7.12)

Similarly, the interval between two moons, real and counter could be obtained for every orbit.

For one moon the interval is $36\frac{179}{427}$ from meru marks the difference for the real one, hence, for the total of real and counter the workable set is $36\frac{179}{427} \times 2 = 72\frac{358}{427}$.

Thus, in the second path, the interval from one real to the one counter is

$$99640 + 72\frac{358}{427} = 99712\frac{358}{427} \text{ yojana.} \qquad \ldots\ldots (7.12)$$

This for the fifteenth orbit is found to be

$$100586\frac{384}{427} + 72\frac{358}{427} = 100659\frac{315}{427}. \qquad \ldots\ldots (7.13)$$

The reverse process is adopted after this subtracting of the interval.

The circumference of the inner orbit, whose radius is half of diameter is $\frac{99640}{2}$ or diameter is 99640 yojanas. The circumference is 315089, this value has been obtained on multiplying 99640 by $\sqrt{10}$ or $\frac{19}{6}$ approximately. If π or $\sqrt{10}$ is taken 3.162, it is slightly less and when it is multipled by taking $\sqrt{10} = 3.1622$, the amount 315089 is obtained.

The next to innermost orbit has diameter as $99712\frac{51}{61} + (\frac{1}{61} + \frac{1}{7})$ yojanas.

The circumference is slightly more than 315319 yojanas. Similarly, the diameter of the outermost mandala is 100660 yojanas, and the circumference is 318315 yojanas, where $\sqrt{10} = 3.16227$ approximately.

It may be noted that the rate of change of diameter of a lunar mandala

$= 72\frac{51}{61} + (\frac{1}{61} \times \frac{1}{7})$ yojanas per lunar sāvaṇa day which is the time taken by the moon to traverse one lunar mandala.

∴ Rate of change of radius of lunar maṇḍala

$$= \frac{1}{2}\{72\frac{51}{61} \quad (\frac{1}{61}+\frac{1}{7}) \text{ yojanas per lunar sāvana day} \qquad \text{.....(7.14)}$$

Hence in 14 days the radius increases 14 times (corresponding to 14 spaces between extreme lunar maṇḍala) till the moon occupies 15th lunar maṇḍala in its southern journey and viceversa: The total change (either increase or decrease) radii of lunar maṇḍala

$$= 14 \times \frac{1}{2}\{72\frac{51}{61}+(\frac{1}{61}+\frac{1}{7}) \text{ yojanas.}$$

$$= 509\frac{53}{61} \text{ yojanas,} \qquad \text{.....(7.15)}$$

Hence, this is the distance between outer limit of innermost lunar orbit and the outer limit of outermost lunar maṇḍala.

Periphery of the mount meru's cross section (with centre C.)

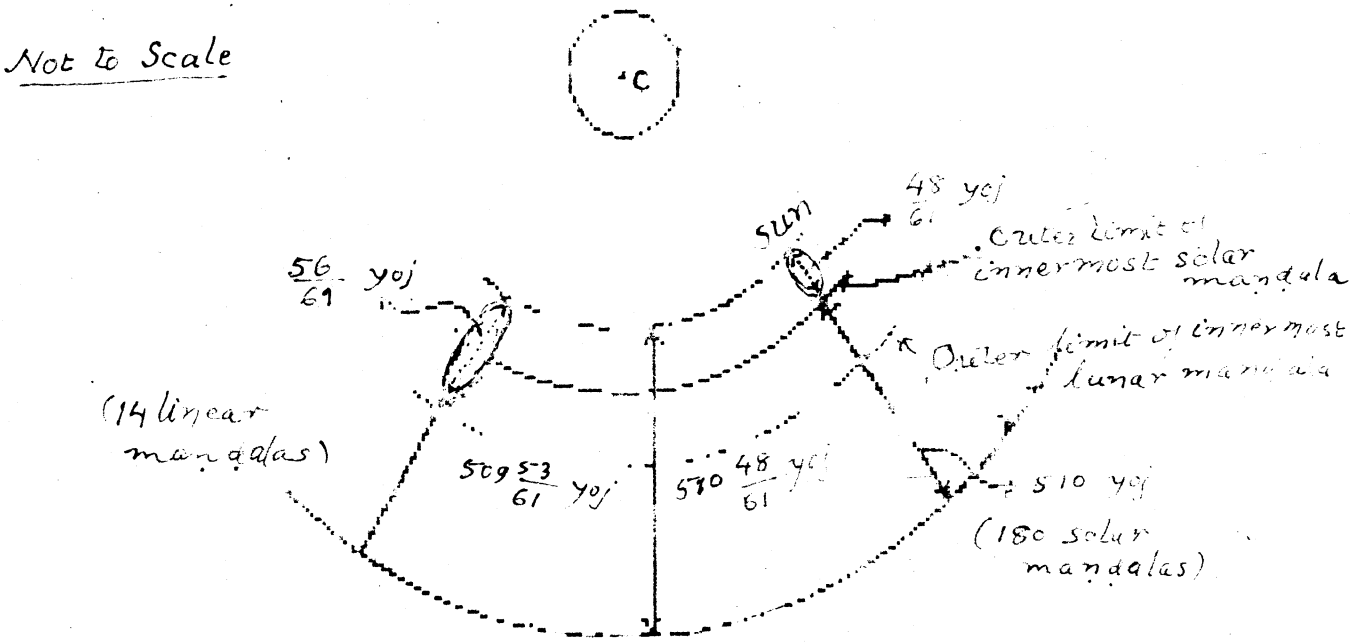


figure 7.6

The above figure shows the north south angular distances (projected over surface of the earth) between extreme solar and lunar mandalas(diurnal circle) respectively as implied in Jaina canonical texts. This exposition relates to a situation prior to the development of motion of celestial latitude of moon. (Lishk, op.cit., p. 139)

Thus, verse (7.161) gives the circumference of the innermost orbit of the moon as 315089 yojanas with the value of $\pi_v = \sqrt{10} = 3.16227$ approximately.

(v.7.163) et seq.)

Here, is a formula for finding out the additive or subtractive amount regarding the circumference of an orbit (paridhi praksepa).

$$\text{Paridhi praksepa} = \sqrt{(2 \times 36 \frac{179}{427})^2 \times 10}$$

$$= \frac{31102}{427} \sqrt{10} = 230.3352688$$

$$= 230 \frac{143}{427}$$

In the second path, the circumference is 315089 and to this is added

$230 \frac{143}{427}$ getting $315319 \frac{143}{427}$.

This is carried upto the 15th or outermost orbit, getting

$318083 \frac{151}{427} + 230 \frac{143}{427} = 318313 \frac{294}{427}$ yojanas of circumference.

(vv.7.180 et seq.)

There has been the angular division of the zodiac, for the real and counter bodies, given by 109800 sky parts (gagana khaṇḍa). Hence, for the real bodies alone, the division is into 54900 sky parts.

An astral body, as the moon here, covers 1768 sky parts in a muhūrta, hence 109800

sky parts are covered in $62\frac{23}{221}$ muhūrtas. Hence, the real moon covers the orbit of its own in $31\frac{23}{221}$ muhūrtas. (54900 sky parts). Similarly, the motion of the moon along the circumference could be determined.

First circumference = 315089 yojanas

Time of traverse = $62\frac{23}{221}$ muhūrtas

Rate of traverse = $315089 \div 62\frac{23}{221} = 5073\frac{7744}{13725}$

= 5073 yojanas and slightly less than 3 kośas.

Similarly, in the outermost circumference the rate of traverse

= 5125 yojanas 2 kośas.

In this way, the inward traverse for every one of the orbital circumference, rate of traverse may be calculated through the same technique. Time being the same for each orbit. The speed or velocity of the moon has been supposed to be increasing gradually, every instant giving an idea of some force, through expressed as power of deities, with aspecific geometry of the paths.

(vv. 7.201 et seq.)

The phases of the moon have been supposed to be due to the motion of the Rāhu, of black colour, 4 pramāṇāṅgula below the celestial plane of the moon, in form of a hemispherical celestial plane with a diameter, slightly less than a yojana. According to another school, the thickness of Rāhu is given as 250 dhanusas.

The Rāhus are of two types, one meant for explanation of phases, called as the day Rāhu (dina Rāhu), the other is meant for explanation of eclipses, called the parva Rāhu. The velocity of day Rāhu is given equal to that of the moon.

The description of the phases starts with the full moon day. Next day the day Rāhu and the moon enter into the orbit from south east (āgneya) and north west (vāyavya) respectively, the opposite directions. Thus, out of the sixteen parts, one part seems to be

covered in this orbit. After having crossed the south direction the moon enters into half the part of the orbit, and due to illusion of the second moon does not traverse the remaining half of the orbit. This goeson and the remaining orbits are traversed by the Rāhu and the moon from the north west and south east directions, causing each phase to be covered, till 15 phases of the moon are covered totally. When only one phase is seen, it is called the amāvasyā or new moon.

Similarly, description is for the uncovering of the moon by the day Rāhu.

Note: Lishk has drawn some inference with regard to distance of the moon from the observer, which seem to have been given from the circumference of the meru upto the innermost orbit of the moon, as also upto the outermost orbit.

1. It seems that the distance might have been calculated as folllows:

[distance of the man from the moon] = (linear velocity of the moon $\times$ half the length of time for which the moon remains actually visible by treading upon innermost lunar mandala (bithi)).

However, because of the length of synodic period of the moon being altogether different from its sidereal period, the period of moon light while the moon treads upon the innermost lunar mandala after every sidereal revolution is variable. The day of the moon's motion upon the innermost lunar mandala (linear diurnal circle corresponding to the moon's maximum north declination) can happen to be any lunar day ranging from the new moon day tothe full moon day. Similar reasoning may be given for the remaining orbits. They, therefore, noted that only the extreme lunar mandala was coincident with corresponding extreme solar mandala. Hence Jainas concluded that the respective distances of man from the moon and the sun were the same when the sun and the moon occupied either of the innermost or the outermost. Hence the other orbital radius vectors were not used.

2. The distance of the moon and the sun under reference, being regarded the same, as in case of celestial diagrams, given in height form or other forms, usually imply the angular distances on a celestial diagram, the increasing distances etc., being stretched as if projected on a celestial diagram in terms of angles. Lishk has maintained it as plausible that such distances from the man and the sun, etc., denote on different days of the year, the celestial angular distances between the rising sun and sun's transit of the observer's meridian in terms of corresponding linear distances projected over surface of the earth.

THE THEORY OF ECLIPSES

This is concerned with the parva Rāhu. Details are not given in the Tiloyapaṇṇatti, but the details are found in the Sūryaprajñpti of the Śvetāmbara Jaina School and Lishk has fairly gone deeper into it, giving a convincing theory of eclpipses as might have been developed in the Jaina School. As the dina Rāhu covers the moon due to its black colour, it is indicative of a dark shadow covering the moon, every lunar day, and removing the dark shadow in the reverse process. Likewise, it may be implied that in Jaina texts, the parva Rāhu denotes the shadow which covers the moon and the sun, causing eclipses on various parvas. In the Sūrya prajñapti (20.6), (quot. no. 8.1.2), nine names of parva Rāhu are given.

1.Singhāḍae, 2.Jaḍilae, 3.Khare, 4.Khetae, 5. Dhaḍḍhare, 6. Magara, 7. Maccha, 8. Kacchapa, 9. Kṛṣṇasarpa.

An account of a nine-fold classification of eclipses is also found. (vide Sūryaprajñapti, 2.9-10, quot. no. 8.1-3). This shows that the Jaina School studied the beginning of an eclipse from its south, south east, south west and north west directions, and the disappearance from the same direction, steadiness of maximum eclipse, narrow escape, reappearance of the lunar or the solar disk after the eclipse is over, annular eclipse, total eclipse. Hence nine types of Rāhu and nine types of eclipses are worthy of research for the parva Rāhu.

Now we come to colours of the eclipses* and the periodicity based on the colours. In India, there existed an eclipse cycle of 20,000 days (675 lunations or 56 lunar years and three months). There has been distinguished the recurrence of eclipses into three different colours as black, red, white, in course of three cycles and the reappearance of an eclipse in its original colour in the fourth cycle. Thus on dividing 56 years and 3 months by 3, we get 18 lunar years and 9 months for one cycle of eclipses.

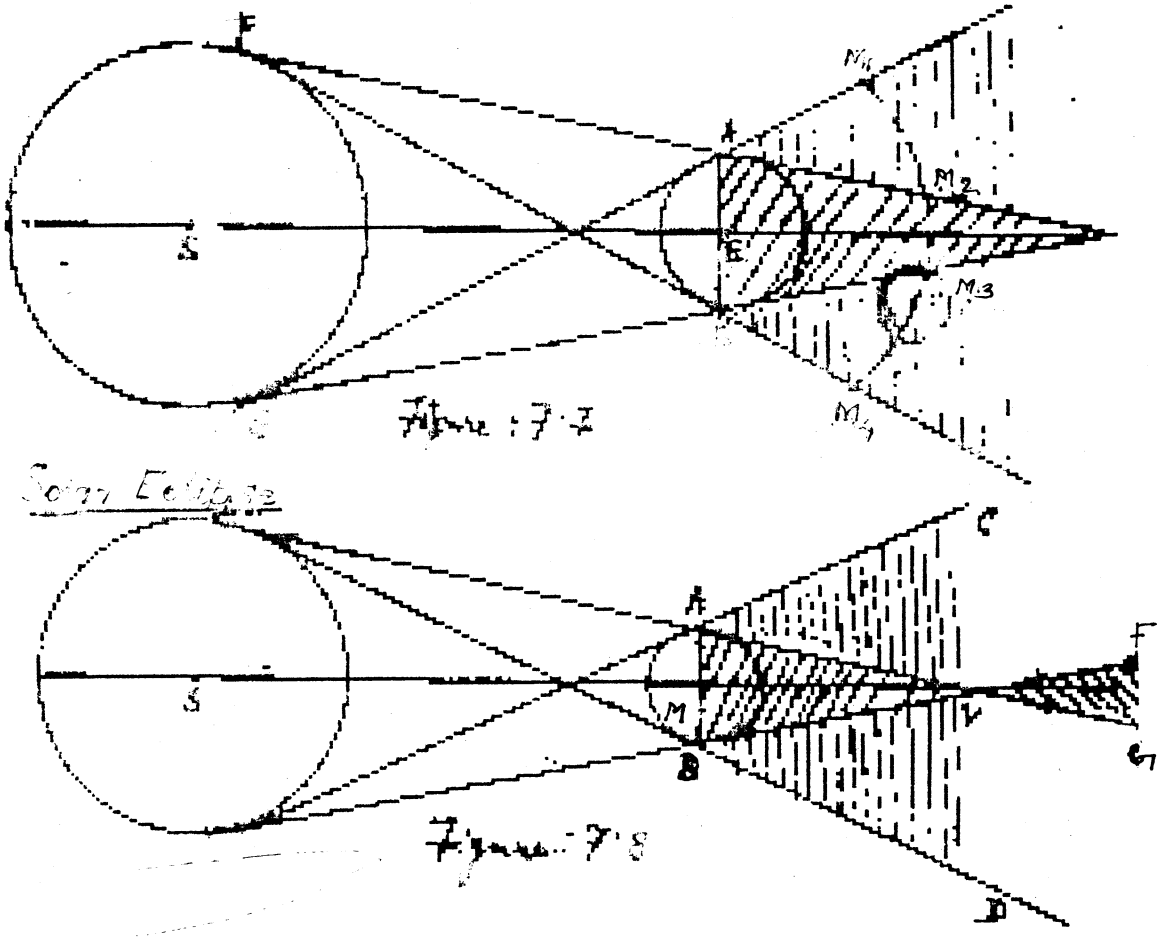
According to the Sūryaprajñapti (20.6, quot. no. 8.1-4), there are five colours of (parva) Rāhu, namely, kṛṣṇa (black), nīla (blue), lohita (red), pīta (yellow), and śukla (white). Observing this statement as an advancement over the Vedic theory of recurrence of eclipses into three different colours.

It is due to credit of S. S. Lishk (Klair) to have framed the theory of eclipses in Jaina School through the following topics:

*Petri,W., Colour of Lunar Eclipses according to Indian Tradition, IJHS, 3 (2), 91-98, 1968. Cf. also Shamshastri, Drapsa, The Vedic Cycle of Eclipses, p.16, 1938.

1. Frequency in the occurence of eclipses:

There could be two solar eclipses, at the minimum in a year. The time interval between them is almost equal to half of an eclipse year. The reason is that during this period the sun changes its position from the neighbourhood of either node of the lunar orbit to the neighbourhood of the other node and the moon also falls again in conjunction with the sun.



We know that

since an ecliptic year = 346.62 days

and lunar synadic month = 29.53 days

∴ half the length eclipse year = 173.31 days .....(7.16)

and 6 lunar synodic months = 29.53 6 = 177.18 days. .....(7.17)

Hence both the expressions (7.16) and (7.17) being the same half the length of an eclipse year ~ 6 lunar synodic month, indicating that after taking account of the ecliptic limits, at least one (solar) eclipse should occur within a period of about six months. Hence the idea of the Jaina School that parva Rāhu covers moon and (or) sun at least once in six months is justifiable.

2. Periodicity of Lunar Eclipses

According to the Sūrvaprajñapti (quot. no.8.1-1), parva Rāhu covers the moon excellently (once) in 42 months. Thus, this suggests a 42 months cycle of lunar eclipses. Could this theory be framed ?

A lunar eclipse is visible in the same degree on every part of the earth's sphere turned away from the sun, on any meridian between the hours of sunset and sunrise.

Theoretically, a lunar eclipse of any particular colour would repeat in the same colour after a period R such that

1. R contains the number of days integaral multiple of number of days in half the eclipse year because sun's angular distance from lunar nodes, the same node or the other as the integer is even or odd, falls again within ecliptic limits.

2. R contains M lunations (where M is a positive integral number) because the moon again must be full at the time.

Approximately, 173 days be taken as the length of the half an eclipse year and 29.5 days the lunation, the following relations hold,

$R = 29.5\ M = 173\ Z$, where Z is the integer

$$\text{or} \quad M = \frac{173Z}{29.5} \qquad \ldots\ldots(7.18)$$

$$= \frac{346Z}{59}, \qquad \ldots\ldots(7.19)$$

Note: We could prove that $Z = 7$, resulting in 41.05 lunations coincident with 42 eclipse months, by adopting the procedure as adopted by S. S. Lish as follows:

Proof:

Let $\{M\}$ and $\{Z\}$ denote two sets of positive integers

such that

$\{M\} = \{M_1, M_2, M_3, \ldots\ldots M_n\}$ and

$\{Z\} = \{Z_1, Z_2, Z_3, \ldots\ldots, Z_n\}$,

where there $M \neq f(Z)$, for Z, $Z \in \{Z\}$.

The solution of (7.19) may be given parametrically :

$$M = 346\,P + 346$$

$$Z = 59\,P + 59, \qquad \ldots\ldots\ldots(7.20)$$

where P is a parameter.

For $M > 0$, $346\,P + 346 > 0$, or $P > -1$

and for $Z > 0$, $59\,P + 59 > 0$, or $P > -1$. $\ldots\ldots\ldots(7.21)$

But for $P = 0$, $Z = 59$, $M = 346$ is one of the solutions.

For a better solution, let us have $-1 < P < 0$, such that

$M = f(Z)$, $[Z: Z \in \{Z\}]$. $\ldots\ldots(7.22)$

Attempting to solve equation (7.20), as $[M - 5Z]$ is also an integer,

$\therefore\ 51\,P + 51 = M - 5Z = M'$, where M' is an integer.

$$\text{Or } P = \frac{M' - 51}{51} \qquad \ldots\ldots\ldots(7.23)$$

From (7.20), we have

$Z = -59\,(-P) + 59$. and for Z to be a minimum, -P should be maximum possible.

$$\text{From equation (7.23), } -P\ \frac{51 - M'}{51} = \qquad \ldots\ldots\ldots(7.24)$$

For -P to be maximum, M' should be minimum.

Now, if $M' = 0$, $P = -1$, but $P \neq -1$

$\therefore$ P is such that $- < P < 0$, $\quad\therefore M' \neq 0$.

Putting the value of P from (7.23) in (7.20), we find

$$Z = 59\left(\frac{M' - 51}{51}\right) + 59 = \frac{59}{51} M' = \left(1 + \frac{8}{51}\right) M' = M' + \frac{8M'}{51}.$$

For Z to be a least positive integer,

$$\frac{8M'}{51} = \text{least positive integer, say, } Z', \qquad \text{.....(7.25)}$$

Let $Z' = 1$, we get $M' = \frac{51}{8} = 6 + \frac{1}{2} + \frac{1}{1} + \frac{1}{2} = 6$ to a first approximation.

$\therefore$ From equation (7.25), we get

$$Z = M' + \frac{8M'}{51} = 6 + 1 = 7 \text{ approximately.} \qquad \text{.....(7.26)}$$

$$\text{Thus } M = \frac{346 \times 7}{59} = 41.05 = 41 \text{ lunations approximately} \qquad \text{.....(7.27)}$$

and 41 lunations $= 41 \times 29.53 = 1210.73$ days and

$$42 \text{ eclipse months} = \frac{342.62}{12} = 1213.17 \text{ days.}$$

Thus, Lishk proved 42 eclipse months to be approximately equivalent to 41 lunations, that is, the lunar eclipse in its original colour recurs after 41 lunations or 42 eclipse month. Hence the Jaina concepts that parva Rāhu excellently covers moon (once) in 42 (eclipse) months is meaningful and significant.

3. Periodicity of Solar Eclipses

According to the Sūryaprajñpti, (quot. no. 8.1-1), parva Rāhu covers the sun excellently (once) in 48 years, suggesting 48 year cycle of solar eclipse. The theory could be framed as follows.

It is important to note that visibility of a solar eclipse differs from place to place on the earth. Hence the cycle refers to a particular locality, and if R denotes the period when the original colour recurs, such that the following holds.

1. R_t contains an integral number of sidereal revolutions of the sun because eclipse

may again be visible in that specific place,

2. R_1 contains an integral number of lunations because the moon must also again be in conjunction with the sun, we may proceed ahead, with the Jaina fixed quinquennial cycle or conjunction between the sun and the moon at a specific location among stars recurs after a yuga of 5 years. Hence the solar eclipse cycle repeats after a period R_1, such that

$R_1 = 5Z_1$ years, where Z_1 is a positive integer, ...(7.28)

3. The sun's distance from either node of moon's orbit should again fall within the ecliptic limits.

The sidereal period of Rāhu is 18.60 years, Rāhu and Ketu interchange their positions after 9.30 years and the period of repetion of solar eclipses should also be an integral multiple of 9.30 years. The angular distance between inferior ecliptic (solar ecliptic) limits is about 30^0 and it is traversed by Rāhu (or Ketu) in $\frac{18.60}{360} \times 30 = 1.55$ years.

Hence $R_1 = 9.30\ Z_2 \pm 1.55$ where Z_2 is a positive integer. .....(7.29)

Solving equatio (7.28) and (7.29), we have

$R_1 = 5Z_1 = 9.30\ Z_2 \pm 1.55$

or $Z_1 = 1.86\ Z_2 \pm .31$

or $Z_1 = \frac{186Z_2 \pm 31}{100}$ .....(7.30)

As 186 and 100 have common factor,

hence equation (7.30) cannot have an exact integral solution

or $Z_1 = \frac{93Z_2 \mp 15.5}{50}$ .....(7.31)

For the least approximate integral solution of equation (7.31), the Kuṭṭaka (pulverizer) and Valli techniques are applied which is the theory of indetermnates equations of first degree. Rupa-kuṭṭana or auxiliary equation is

$Z_1 = \frac{93Z_2 - 1}{50}$ .....(7.32)

odd Valli (1 13

(1 7

(6 0

(1

(0

∴ Auxiliary solution

is $Z_2 = 7$ and $Z_1 = 13$ .....(7.33)

Now for kṣepa (additive) $= \mp 15.5$

$Z_2 = \mp 8.5$

and $Z_{II} = \mp 15.5$.

Hence the parametric solution of equation with parameter p is given as

$Z_2 = 50\ P_1 \mp 8.5$

$Z_1 = 93\ P_1 \mp 15.5$ .....(7.34)

for $Z_2 > 0$, $P_1 > \mp \frac{8.5}{50}$ or $P_1 > \mp \frac{1}{6}$

for $Z_1 > 0$, $P_1 > \mp \frac{15.5}{93}$, or $P_1 > \mp \frac{1}{6}$ .....(7.35)

Further, from equation nnumber (7.34), we have

$Z_1 + Z_2 = 143P_1 \pm 24$

$Z_1 - Z_2 = 43\ P_1 \pm 7$ .....(7.36)

$Z_1 + Z_2$ and $Z_1 - Z_2$ are also integers.

Hence as $Z_1 + Z_2$, $Z_1 - Z_2$, 24 and 7 are all integers,

∴ $143\ P_1 = l$.

$43\ P_1 = m$, where l and m are arbitrarily chosen integers,

$$\therefore P_1 = \frac{l}{143} = \frac{m}{43} \qquad \text{.....(7.37)}$$

Now $$\frac{143}{43} = 3 + \frac{1}{3} + \frac{1}{14}.$$

The first approximation, i.e., $\frac{143}{43} \cong 3$ is too rough and hence we take the second approximation, i.e., $\frac{143}{43} \cong \frac{10}{3}$,

which gives for (7.37), $$P_1 = \frac{l}{14 \times 10} = \frac{m}{14 \times 3},$$

or $$14 P_1 = \frac{l}{10} = \frac{m}{10} = Z_3, \qquad \text{.....(7.38)}$$

where Z_3 is an integer such that l (=10 Z_3) and m (=3 Z_3) are also integers.

In order to get the least value of P_1, let Z_3 be the least integer, i.e., $Z_3 = +1$.

Two cases arise:

1. Either $14 P_1 = Z_3 = +1$

or $$P_1 = \frac{1}{14} < \frac{1}{6}$$

But as $P_1 > \frac{1}{6}$, as per equation (7.35),

$$P_1 \neq \frac{1}{14}, \quad \text{or} \quad Z_3 \neq 1$$

2. Or $14P_1 = Z_3 = -1$

or $P_1 = \frac{1}{14} > -\frac{1}{6}$ (see equation (7.35)).

Therefore l and m are integers arbitrarily chosen, such that

$$P_1 = \frac{1}{14}.$$

Putting the value of P_1 in equation (7.34), we have

$$Z_2 = -\frac{50}{14} \pm 8.5 =$$

$= +5$ or -12 approximately.

$\because$ Z_2 is, by definition, a positive integer

$\therefore$ $Z_2 \neq -12$, $Z_2 = +5$

Putting the value of Z_2 in equation (7.31) we have

$R_1 = 9.30 \times 5 \mp 1.55$

$= 45$ or 48 years approximately.

Again, two cases arise:

1. Either $R_1 = 48$ years, and from equation (7.30), we have

$5 Z_1 = 48$, or $Z_1 = \frac{48}{5} \neq$ an integer ($\because$ Z_1 is a positive integer

$\therefore$ $R_1 \neq 48$ years.

2. Or $R_1 = 45$ years

from equation (7.30), we have

$5Z_1 = 45$ or $Z_1 = 9$.

Hence $R_1 = 45$ years approximately

$$= \frac{45 \times 366}{346} = 47.6 \text{ eclipse years}$$

$= 48$ eclipse years approximately.

$\therefore$ 45 years $\approx$ 48 eclipse years .

Thus the statement of Jaina texts that parva Rāhu excellently covers the sun (once) in 48 (eclipse) years is meaningful and justifiable. Further, y = 5, the number of half cycles of either node of the moon's orbit during one cycle of solar eclipses is odd. Hence, at the beginning of next 48 (eclipse) year-cycle of solar eclipses the nodes interchange their positions. Thus the parva Rāhu that causes eclipses denotes both Rāhu (ascending node of moon) and Ketu (moon's descending node).

Lishk observes that if we combine the two cycles of 48 (eclipse) months, or $3\frac{1}{2} \times 2$ years and 48 (eclipse) year, we have a bigger luni-solar cycle of 336 (eclipse) year.

Further, Lishk finds the originality of Jaina cycle of eclipses, through the following.

336 eclipse years = 116464.22 days

and 3944 lunations = 116468.69 days .....(7.39)

There is a difference of 4.87 days.

Similarly, 48 eclipse years = 16637.75 days

and 563 lunations = 16625.73 days .....(7.40)

There is a difference of 12.03 days, i.e., a little less than half the lunation.

On the other hand, according to Chaldean Saros,

19 eclipse years = 6585.8 days

and 223 lunations = 6585.3 days .....(7.41)

19 years of $365\frac{1}{4}$ days each = 6939.75 days

and 235 lunations = 6939.69 days .....(7.42)

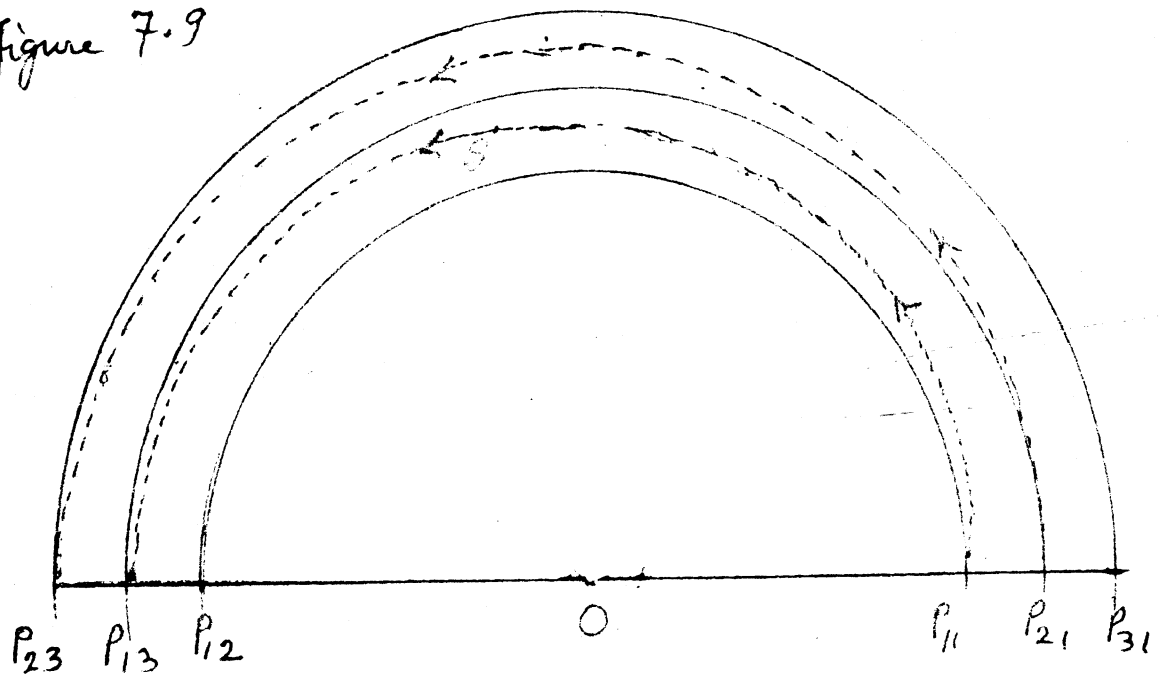
THE KINEMETICS OF THE SUN

(v.7.217)

There are two suns in the Jambū island as already shown in the of the case of two moons, one the real one and the other the counter one. Just as the path of the moon was shown to be spiro-elliptic one, so also in the case of the sun the motion is spiro-elliptic for each sun, the real as the counter one, the factual motion being projected for the real and the

counter one, as shown in the folloing figure.

Figure 7.9



The above figure shows the implied spiral motion of the sun (real) as implicity described in TPT, in terns of circular orbits. Naturally there donot exist jumps after a path of it is exactly circular. O is the point of interdection of the plane of the orbits and the meru axis. P is the starting point distant 49820 yojana from O. P_{12} is the opposite end of the diameter of the circle with radius OP_{12}.

The path of the sun is the spiral $P_{11} SP_{13}$ described in 30 muhūrta, displacing the sun to P_{13} where the distance $P_{13} P_{12}$ = yojana. The next point of the movement will be P_{21} , and the spiral will and at p_{23} with the same details.

The next figure, as follows, is the possible topological deformation of the above path, described above with radii and displacement, halved. The points now may be depicted with dashes, and the half circumference appearing as full spiro-ellectic orbit, with the same calculation for 30 muhūrtas.

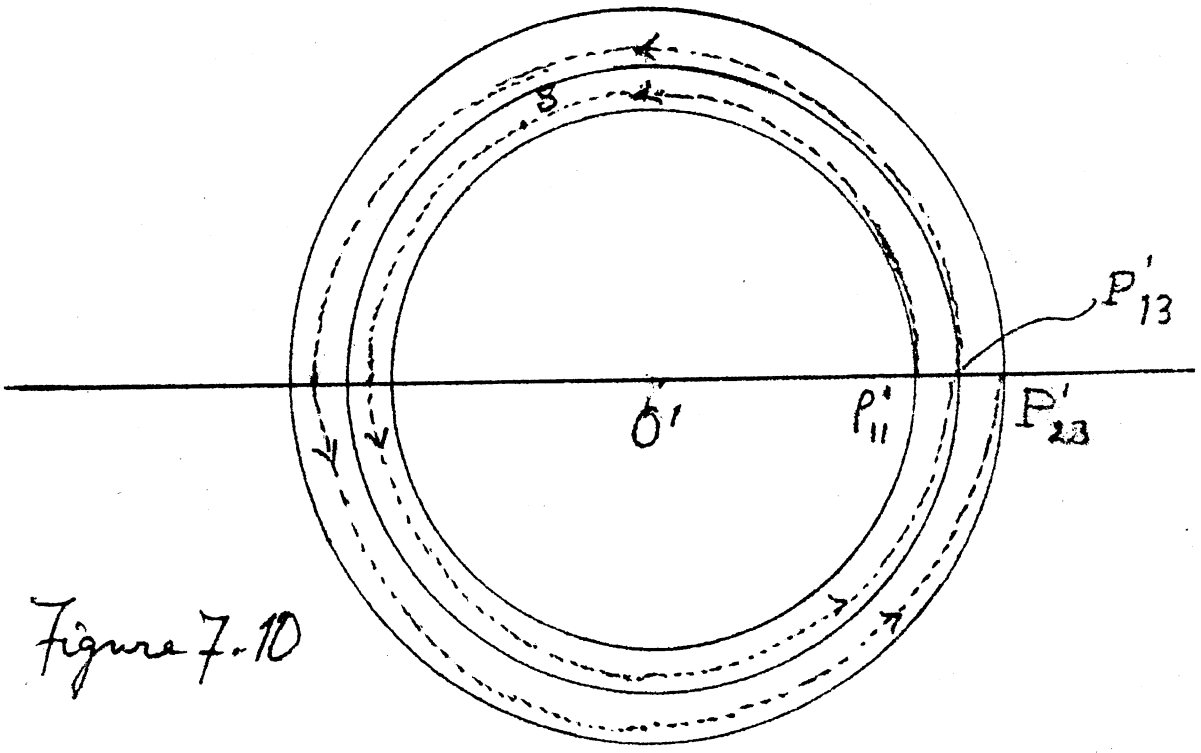


Figure 7.10

The above figures and detailed data suggest the following polar equations of the sun during the solar year of 366 day:

$$r = \frac{a+b.2\pi x}{1+c\cos\frac{\pi x}{183}}$$

for all real x, when $0 \leq x \leq 366$, and a, b, c are constants which are determinable from the boundary conditions detailed in the Tiloyapaṇṇatti.

$$x = 0,\ r = \frac{49820}{2};\ x = 183,\ r = \frac{50330}{2},\ \text{and}\ x = 366,\ r = \frac{49820}{2} + E,$$

where E is the amount of extra displacement of the sun from original starting point

just after a lapse of 366 days. E is the observational datum, whose introduction is essential for developing the equation of an opening cum-closing spiral with the given descr ip tion.

The above gives the following results for the values of a, b and c:

$$a = \frac{2507440600}{100150+E}, \quad b = \frac{100660E}{732\pi(100150+E)}$$

$$\frac{510-E}{100150+E}$$

When E = a, b = o, c the eccentricity reduces to be 0.005, and the path becomes an ellipse. Restoring E and replacing c, the path becomes an Archimedean spiral, however, as it is a periodic motion the term containing c is significant.

Now considering the motion of the sun relative to the constellations, the relative motion of the sun may be put in polar form as follows:

$$r = \frac{f+q\theta}{1 + h\cos\theta} \qquad \text{.....(7.45)}$$

Where θ is in radian measure and $0 \leq \theta \leq 2\pi$

Here f, g, h are constants, determinable from data in the TPT as under:

$$\text{for } \theta = 0, r = \frac{49870}{2}, \quad \theta = \pi$$

$$r = \frac{50230}{2} \quad \vartheta = 2\pi, \quad r = \frac{49820}{2} + E$$

On calculation, one finds that

$$F = \frac{2507440600}{100150+E}, \quad q = \frac{100660E}{732\pi(100150+E)}$$

$$\text{and } h = \frac{510-E}{100150+E}$$

Thus, the motion may be completely determined with the aid of the above polar equations, once E is known on observation.

We have already derived the dynamical low of the geometry of such a spiro-elliptic orbital motion.

(vv.7. 217 et seq.)

The stretch of the orbital erthis $510\frac{48}{61}$ yojanas. The sun traverses its orbits upto a width of 180 yojanas in Jambū island and upto a width of $330\frac{48}{61}$ yojanas in the Lavaṇa sea. There are 184 orbits of the sun out of which, each orbit has an equal extension as that of the sun and the depth is half of it. There are respectively $184\frac{48}{61}; \frac{24}{61}$.

There is interval between the 183 orbits, and both the real and the counter suns travel in the same path.

The interval between the first orbit from the meru is obtained by subtracting 360 yojanas and the width of meru which is 10000 yojanas, and further dividing it by two.

Thus, 100000 - 360 - 10000 = 89640 yojanas and then $\frac{89640}{2}$ = 44820 is the required interval.

Now the constant set (dhruvarāśi) for the suns is $510\frac{48}{61}$ or $\frac{31158}{61}$

the interval between two adjacent orbits

= [constants set - (suns diameter × 184)] ÷ 183

$$= \frac{31158}{61} - (\frac{48}{61} \times 184)] \div 183 = 2 \text{ yojanas}. \qquad \text{.....(7.47)}$$

The common differece for the sun's linear path is given by the interval added to the

sun, hence it is $2 + \frac{48}{61} = \frac{170}{61}$.

alternative method :

For example if the interval between for finding out interval

the third path and the meru is required. It is equal to $(3 - 1)\left(\frac{170}{61} \times 2\right)$ yojanas

$= 44825\frac{35}{61}$.

Here, 3 denotes the serial number of the path, the common difference being

$$\frac{170}{61} \times 2 = \frac{340}{61} = 5\frac{35}{61}. \qquad \text{.....(7.48)}$$

Similarly, the desired interval between the suns

$= (\text{number of path} - 1) + \left[\frac{340}{60} \times 183\right] + 99640$

$= (184 - 1) + 1020 + 99640 = 100660$ interval for the last path.

This may be carried out for every path.

Formula for finding the width of the sun :

Width of the sun = [(constant set) - (all path intervals)] ÷ 184

$$= \left[\frac{31158}{61} - \frac{22326}{61}\right] \div 184 = \frac{48}{61}. \qquad \text{.....(7.50)}$$

Alternatively the number of paths is given by the number

$= [\{(\text{constant set}) - (\text{all path inlervals})\} \div \frac{48}{61}]$

$$= \left[\frac{31158}{61} - \frac{22326}{61}\right] \div \frac{48}{61} = 184. \qquad \text{.....(7. 51)}$$

(vv.7.228 et seq.)

When the sun is on its first orbit, the interval between the sun and the meru (boundary) is 44820 yojanas. The increase in the subsequent intervals is $2\frac{48}{61}$ yojanas.

The interval between the sun on its outermost orbit from the meru is 45330 yojanas. This is obtained by adding $2\frac{48}{61} \times (184 - 1)$ or 510 to 44820 yojanas. Similarly, for inverse process, the same formula works.

(vv.7.234 et seq.)

The interval beween real and counter sun in the first path is given on subtracting 180 $\times$ 2 yojanas from the diameter of the Jambū island which is 10000 yojanas, because the suns traverse their paths in 180 yojana of the Jambū island. Thus, the interval = 100000 - 360 = 99640 yojanas.

The increase in the interval between the two suns is given by

$$2\frac{48}{61} \times 2 = 5\frac{35}{61} \text{ yojanas or } \frac{340}{61} \text{ yojanas.} \qquad \text{.....(7.52)}$$

Hence the desired interval of the suns, real and counter can be obtained on adding $\frac{340}{61} \times (184 - 1)$ to the interval between the two suns on the innermost interval 99640 yojanas.Thus, it is 99640 + 1020 = 100660 yojanas.

At the second orbit, the interval is $99640 + 5\frac{35}{61}$ or $99645\frac{35}{61}$ yojanas.

From the above data, the width of the sun's image also could be determined as follows. from the constant set (dh ruva rāśi) $\frac{31158}{61}$ or $510\frac{48}{61}$ the whole interval of paths is subtracted which is $\frac{22326}{61}$ or $(\frac{31158}{61} - \frac{48}{61} \times 184)$,

getting $\frac{31158}{61} - \frac{22326}{61} = \frac{8832}{61}$ or $\frac{48\times184}{61}$. When $\frac{48\times184}{61}$ is divided by 184 we get

$\frac{48}{61}$ yojana. This is the width of the sun's image. .....(7.53)

Similar, in order to know the number of orbits, the total intervals of all the suns, i.e $\frac{22326}{61}$ or 366 is subtracted from the constant set $\frac{31158}{61}$ or $510\frac{48}{61}$ or $\frac{31158}{61} - \frac{22326}{61} =$ $\frac{8832}{61}$ or $\frac{48\times184}{61}$. This is divided by the diameter of the sun or $\frac{48}{61}$ getting $\frac{48\times184}{61} \div$ $\frac{48}{61} = 184.$ .....(7.54)

LENGTH OF DAY ĀTAPA ĀND NIGHT TIMIRA

From here, 194 circumferences have been described starting with the outer boundary of the meru, which has a diameter of 10000 yojana or a radius of 5000 yojana from the centre of the Jambū island. The circumference is π D or 2π r.

Hence here it is given by $\sqrt{10}$ (10000) and as we know that $\sqrt{10}$ could be written in the form 3.16227766....., hence it has been taken roughly tobe 31622.

(v.7.247)

The extansion or diameter of the ground of the Sumeru montain situated in Jambū island is 10000 yojanas.On both sides of Sumeru the bhadraśāla forest has a diameter of 22000 × 2 = 44000 yojanas. Ahead of this is the set of 32 countries named Kacchā and Sukacchā, each being of $2212\frac{7}{8}$ yojanas. diameter. In the verse the circular boundary of the city Kṣema of Kacchā land, and that of Avadhyā city of Gandhamālinī and upto its view have been calculated as follows:

$10000 + 44000 + 2212\frac{7}{8}$ yojanas = $56212\frac{7}{8}$ yojanas.

As per verse 4.9, the circumference is

$$\sqrt{(56212\frac{7}{8})^2 \times 10} = \frac{1422085}{8} = 177760\frac{5}{8}$$

The left hand side is $\frac{449703}{8} \times \sqrt{10}$, where $\sqrt{10}$ = 3.16227766 etc.

(v.7.248)

The descrisption is the same as in the previous verre, but here, there are two Vakṣāra mountains, Citrakūṭa and Devamāla in the east of Kṣemapurī and Ayodhyā cities, having widths of 500 yojanas each. On adding the dimension in the previous result, the result is obtaind as follows:

$$1000 + 4425\frac{3}{4} \text{ yojanas} = 5425\frac{3}{4} \text{ yojanas.}$$

or $$\sqrt{(5425\frac{3}{4})^2 \times 10} = \frac{68631}{4} = 17157\frac{3}{4} \text{ yojanas.}$$

(The previous circumference $177760\frac{5}{8}$ yojanas.) + $17157\frac{3}{4} = 194918\frac{3}{4}$

(v.7. 249)

In the east of Khaḍgapurī and Ariṣṭā there are two rivers, the Urmimālinī and Drahavatī bifurcating tributories, each 125 yojanas in width. Thus

$$4425\frac{3}{4} + 250 = 4675\frac{3}{4} = \frac{18703}{4} \text{ yojanas}$$

Hence the circumference increase is

$$= \sqrt{(\frac{18703}{4})^2 \times 10} = \frac{59144}{4}$$

= 14786 yojanas .

And the total resulting circumference = $194918\frac{3}{8} + 14784 = 209704\frac{3}{8}$ yojanas.

In this way the circumferences what obtained are as follows :

TABLE:7.3

Ser.No.	Arbitrary Circumferential Region	Measure of the Circumference (vv. 244-263)	Remarks
1.	Meru	31622 yojanas	
2.	Kṣemā City	$177760\frac{5}{8}$ yojanas	
3.	Kṣemapurī	$194918\frac{3}{8}$ yojanas	
4.	Ariṣṭā	$209704\frac{3}{8}$ yojanas	
5.	Ariṣṭapurī	$226862\frac{1}{8}$ yojanas	
6.	Khaḍgapurī	$241648\frac{1}{8}$ yojanas	
7.	Mañjūṣāpurī	$258805\frac{7}{8}$ yojanas	
8.	Auṣadhipurī	$273591\frac{7}{8}$ yojanas	
9.	Puṇḍarikiṇipuri	$290749\frac{5}{8}$ yojanas	
10.	First orbit	315089 yojanas	

11.	Second orbit	315106 yojanas
12.	Third orbit	315124 yojanas
14	Middle orbit	316702 yojanas
15.	Outermost orbit	318314 yojanas
16	On the sixth part of the Lavaṇa sea	527046 yojanas

(v.7.264)

The suns of the Jambū island influence the region as one sixth part of the Lavaṇa sea, through darkness and brightness (tame and tāpa). The diameter is like this

The width of the Lavaṇa ring is 2 lac yojanas. Its total of both lateral parts, in one sixth part $= \frac{200000\times2}{6} = 66666\frac{2}{3}$ yojanas.

On adding the dimeter of Jambū island to the one sixth water part, the extention becomes as diameter

$$(100000 + 66666\frac{2}{3}) = 166666\frac{2}{3} \text{ yojanas.}$$

Its circunference

$$= \sqrt{(166666\frac{2}{3})^2 \times 10} = 527046 \text{ yojanas.} \quad \text{.....(7.58)}$$

(v.7.265)

Just like the moon, the suns while moving towards outer orbits have greater and greater velocities, and whole entering into inner orbits have smaller and smaller velocities.

(v. 7.266)

Every one of the circumferences is divided by 109800 sky parts. It may be noted that both of these may be taken to represent celestial latitudes and celestial longitudes. These have projective significance and may be kept to imply any other modern concept.

(v.7.267)

The sun moves 1830 sky parts in a muhūrta, hence the total number of 109800 sky

parts are traversed in 60 muhūrtas. But, as already shown that this is meant for the real and counter suns, hence, for a single sun the orbit 54900 sky parts are traversed in 30 muhūrtas. This is the velocity mentioned for all the orbits on the average.

(v. 7.269)

It can be determined how much circumferential part is traversed by the sun in a muhūrta, when it traverses 315089 yojanas in 60 muhūrtas; hence it traverses $\frac{315089}{60}$ yojanas or $5251\frac{29}{60}$ yojanas in the first orbit in a muhūrta.

This is carried upto the last but one (183rd) orbit.

(v.7.271)

The outer orbit's circumference is 318314 yojanas, which divided by 60 muhūrtas, gives $5305\frac{14}{60}$ as the velocity in yojanas per muhūrta.

(v. 7.272)

The Ketu's celestial plane is black, and travels below the sun's celestial plane 4 pramāṇāṅgula below. Its diameter is slightly less than one yojana. The thickness is 250 dhanuṣas.

(vv. 7.277 et seq.)

There is an extra verse in TPT(V), v.277.

chammāsesuṁ puha puha |

ravi-biṁbāṇaṁ ariṭṭha-biṁbāṇi |

amavassā avasāṇe, chādante gadi- viseseṇa || 277 ||

Translation:

Owing to special movements, the celestial plane of Ariṣṭa (Ketu) cover the sun's images separately at the and of amāvasyā (new moon) in six months. Further, the description of the lengths of day and night in the first orbit as 18 muhūrtas and 12 muhūrtas is given, whereas in the outer orbit, the convrse i.e., 18 muhūrtas of night and 12 muhūrtas of day

takes place in all the circumference. This denotes the place of the observer, where at different solstices (summer and winter), the length of the day and night interchange as shown.

A formula is given for finding out the increase or decrease in night and day measures.

$$\frac{\text{base}-\text{top}}{\text{number of paths -1}} = \text{increase or decrease in length night and day}$$

$$\text{or} \quad \frac{18-12}{184-1} = \frac{6}{183} = \frac{2}{61} \text{ muhūrtas / per path} \qquad \text{.....(7.58A)}$$

Thus, when the sun in the second path, in all the 194 circumferences the measure of length of day is $17\frac{59}{61}$ muhūrtas and the length of the night in all the circumferences is $12\frac{2}{61}$ muhūrtas.

Thus, as the sun passes through various orbits there is a change in lengths of days and nights in arithmetical progression and regression, with a common difference of $\frac{2}{61}$ muhūrtas.

This appears to be cotradictory and Lishk has tried to explain this phenomena, ultimately as a trend towards the concept of hour angle.

He gives the following table of distances of the sun from the man (observer), When the sun is occupying different maṇḍala (duirnal circles) explicity stated in Sūrya prajñapti. 2.3 (quot. No.5. 2-2). They are: "When the sun moves on the innermost maṇḍala (sun's diurnal circle on Summer solstice day),

its distance from the manuṣya (man) is $47263\frac{21}{60}$ yojanas , ...(7.59)

the second to the innermost maṇḍala,

$47179\frac{57}{60} + (\frac{1}{60} \times \frac{1}{61} \times \frac{19}{1})$ yojanas , ...(7.60)

The third to the innermost maṇḍala ,

$31831\frac{30}{60}$ yojanas. .....(7.62)

---the second from the outermost maṇḍala

$31916\frac{41}{60} + (\frac{1}{60} \times \frac{1}{61} \times \frac{6}{1})$ yojanas , ...(7.63)

---the third from the outermost maṇḍala

$32001\frac{51}{60} + (\frac{1}{60} \times \frac{1}{61} \times \frac{31}{1})$ yojanas , ...(7.64)

Let the above be tabulated in the following table and be rationalized through symbolic manipulation :

d_n = distance of the observer from the sun in B_n bīthī

V_n = average linear velocity of the sun on B_n

Ln = length of day when the sun traverses on B_n

and α_n = angular distance traversed by the sun along the circumference of B_n in a period from sunrise to suns transit of observers meridian, i.e. in half the length of daylight.

DISTANCE OF THE SUN FROM OBSERVER

TABLE 7.4

Bīthī (B_n) traversed by the sun	Distance of the sun from the observer d_n in yojana	first difference $d_n = dn+1 - d_n$	second difference $d_n = d_{n+1} - d_n$
B_1 (inner most)	$47263\frac{21}{60}$	$-83\frac{1445}{60\times61}$	$-\frac{36}{60\times60}$
B_2	$47179\frac{57}{60} + (\frac{1}{60} \times \frac{1}{61} \times \frac{19}{1})$	$-83\frac{1481}{60\times61}$	
B_3	$47096\frac{53}{60} + (\frac{1}{60} \times \frac{1}{61} \times \frac{2}{1})$		

B_{182}	$32001\frac{51}{60}+(\frac{1}{60}\times\frac{1}{61}\times\frac{31}{1})$	$-85\frac{641}{60\times61}$	$-\frac{36}{60\times60}$
B_{183}	$31916\frac{41}{60}+(\frac{1}{60}\times\frac{1}{61}\times\frac{31}{1})$	$-85\frac{677}{60\times61}$	
B_1	$3183.1\frac{30}{60}$		
outer most			

Note: The rationale for the above has been developed by S.S. Lishk, op. cit., in details and we shall give it in brief, ahead.

Rationale : We have already seen that the average velocity of the sun in the north south direction across the solar bīthīs

$$= \frac{510 \text{ yojanas}}{183 \text{ days}} = 2\frac{48}{61} \text{ yojana per day.} \qquad \text{.....(7.65)}$$

This represents the extension of a solar bīthī. This also signifies the interval between to adjacent orbits.

It may be noted that Lishk represent this type of yojanas as Y. The other type which is on flat earth is taken to be y.

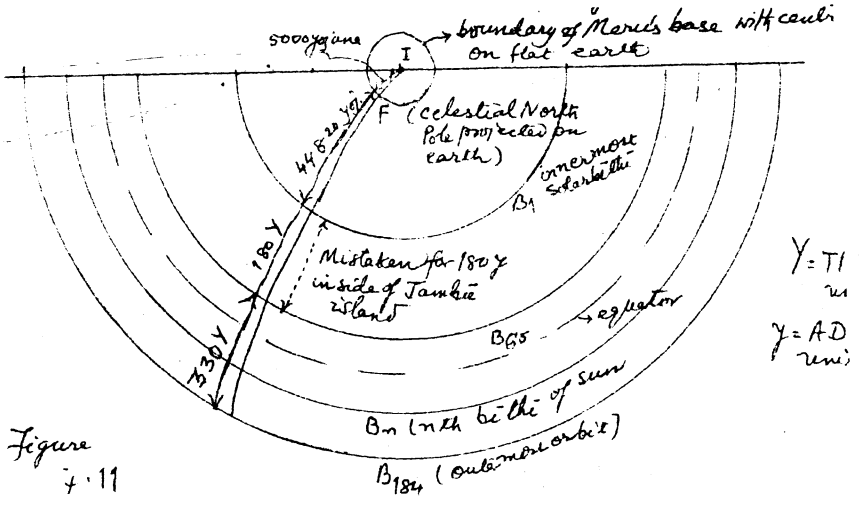
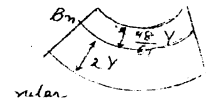


Figure 7.11

B_n : 1 n 184. Thickness of a solar bīthī = 84/61



The above figures illustrates the north-south angular intervals of set of solar bīthi (duirnal circles), their distances from the periphery of merus base on flat earth measured in linear measures along the surface of flat earth. (N.8. Actual determination fit the actual geometry of earth) as per Jaina canomical texts.

Note- F is important to note as a celestial north pole projected on the earth.

Let the radius related with a particular bīthī be denoted by

r_{Bn}, Hence $r_{B_1} = \frac{99640}{2} =$ 49820 yojanas

= 44820 y + 5000 y

= north polar distance of B_1 + radius of meru's base on flat earth

Similarly $^{r}B_n$ = north polar distance of B_n + radius of meru's base on flat earth

On diffrentiating both sides with respect to line t, we have

$$\frac{d}{dt}\ (^{r}B_n)\ \frac{d}{dt}\ (\text{north polar distance of } B_n) + o \qquad \text{.....(7.67)}$$

Hence the rate of change of radii of the solar bīthīs its in toto the same as the rate of variation of thier north polar distance from periphery of the mount merus base on flat earth.

So using equation

$$\text{north polar distance} = \int_0^n 2\frac{48}{61}\ Y + 44820\ y \qquad \text{.....(7.68)}$$

we have from (7.67)

$$\frac{d}{dt}\ (^{r}B_n) = 2\frac{48}{61}\ y \text{ per day (The time taken by the sun to traverse one solar bīthī)}$$

From equation, (7.66) , we have there fore

$$\frac{d}{dt}\left({}^{2r}B_n\right) = 5\frac{35}{61} \text{ y per day} \qquad \text{.....(7.69)}$$

Similarly,

$${}^{2r\pi}B_n = \sqrt{10\times(99640)^2} = \sqrt{(315090)^2-412100}$$

$$= 315090 - = \frac{412100}{630180} \text{ y on applying the}$$

formula $\sqrt{a^2-x} = a - x/2a$.

or ${}^{2\pi r}B_n$ = slightly more than 315089 y .....(7.70)

Now the velocity of the sun in the Śūrya prajñapti 2.3 (quot. no. 5.1-1) is given to be $5251\frac{29}{60}$ yojana per muhūrta, while it traverses the innermost bīthī. On the next it is $5251\frac{47}{60}$ yojana per muhūrta, and that makes an arithmatical progression up to its outermost bīthī with a common difference of $\frac{18}{60}$ yojana per muhūrta. At the outer most bīthī its velocity is $5305\frac{15}{60}$ yojana per muhūrta.

Now the velocity of the sun in n^{th} orbit is given by

$V_n = {}^{2\pi r}B_n$ yojanas per 60 muhūrtas

$= \frac{1}{60}\,{}^{2\pi r}B_n$ yojanas per muhūrta, $\therefore$ from equation (7.70)

$\therefore V_1 = \frac{1}{60}\,{}^{2\pi r}B_1\,\frac{315089}{60}$ yojana per muhūrta .....(7.71)

$= 5251\frac{29}{60}$ yojana per muhūrta, as quoted in SPT.

We can get acceleration on differentiating equation for V_n

$$\therefore \quad V_n = \frac{\sqrt{10}}{60} \qquad {}^{2r}B_n \qquad \text{.....(7.73)}$$

Using equation (7.69) we have

$${}^{2r}B_n = \frac{d}{dt}\left({}^{2r}B_n\right) = 5\frac{35}{61} \text{ y per day}$$

$$\text{or } V_n = \frac{1}{60}.\frac{340\sqrt{10}}{61} \text{ yojana per muhūrta per day}$$

$$= \frac{18}{60} \text{ approximately yojana per muhūrta per day.} \qquad \text{.....(7.73)}$$

On integration of the (7.73), we have

$$V_n = \int_0^n \frac{18}{60}\, dt + \text{constant.}$$

n = number of days counted from summer solstice day.

Initially, when $n = 1$, $V_1 = 5251\frac{29}{61}$ yojanas per muhūrta.

$\therefore$ putting the value of the constant in the above equation,

$$V_n = \int_0^n \frac{18}{60}\, dt + (5251\frac{29}{61} - \frac{18}{60}) \text{ yojanas per muhūrta}$$

$$= \frac{18}{60}(n-1) + 5251\frac{29}{60} \text{ yojanas per muhūrta} \qquad \text{.....(7.74)}$$

Now, distance = average velocity $\times$ time

$$\therefore \alpha_n = V_n \times \frac{l_n}{2} \qquad \text{.....(7.75)}$$

For n = 1,

$V_1 = 5251\frac{29}{60}$ yojanas per muhūrta from equation (7.71) and $l_1 = 18$ muhūrtas.

thus equation (7.74) gives

$$\therefore \quad \alpha_1 = 5251\frac{29}{60} \times \frac{18}{2} = 47263\frac{21}{60} \text{ yojanas}$$

$$= d_1 \qquad \text{.....(7.76)}$$

Similarly, for n = 184,

$V_{184} = 5305\frac{15}{60}$ yojanas per muhūrta, and $l_{184} = 12$ muhūrtas

∴ From equation (7.75) we have

$$\alpha_{184} = 5305\frac{15}{60} \times \frac{12}{2} = 31831\frac{30}{60} \text{ yojanas}$$

$$= d_{184} \qquad \text{.....(7.77)}$$

Similarly, d_n could be calculated as

$$d_n = \alpha_n = V_n \times \frac{l_n}{2}$$

and $$d_{n+1} = V_{n+1} \times \frac{l_{n+1}}{2} = \frac{(V_n + \Delta V_n)(l_n + \Delta l_n)}{2} \qquad \text{.....(7.78)}$$

Subtracting (7.77) from (7.78), we have

$$\Delta d_n = d_{n+1} - d_n = \frac{(V_n \Delta l_n)(\Delta V_n l_n + \Delta V_n \Delta l_n)}{2}$$

Now, as $\Delta l_n = \frac{-2}{61}$ muhūrta per day, vide equation (7.58A),

and $\Delta V_n = \frac{18}{60}$ yojanas per day, vide (7.73),

Further, $V_n = \frac{18}{60}(n-1) + 5251\frac{29}{60}$, from (7.74)

and $l_n = 18 - \frac{2}{60}(n-1)$ .....(7.79)

$\therefore \quad \Delta d_n = -\frac{36(n-1)}{60\times61} - 83\frac{1445}{60\times61}$ .....(7.80)

Hence $\Delta d_1 = -83\frac{1445}{60\times61}$, $\Delta d_2 = -83\frac{1481}{60\times61}$.

and $d_{183} = -85\frac{677}{60\times61}$ .....(7.81)

Note: These values d_n agrees with the given data given in the table.

Further,

$\Delta d_{n+1} = -\frac{36\,n}{60\times61} - 83\frac{1445}{60\times61}$ .....(7.82)

$\therefore \quad \Delta_1 = \Delta_{d\,n+1} = \Delta_{dn} - \frac{36}{60\times61}$ yojanas

= constant

When the sun occupies the nth solar bīthī (diurnal circle).

According to Lishk, the sun's distance from the observer, denoted the sun's diurnal arc from sun rise to solar transit of observer's meridian. The distance dn of the observer from the sun at the time of local mean noon (meridian transit of the sun) is zero according to expositon. This reflects their tendency towards the measurement of ..oc. -shadow length. It alsi appears that the celestial distances were measured in terms of corresponding distances over the surface of the earth.

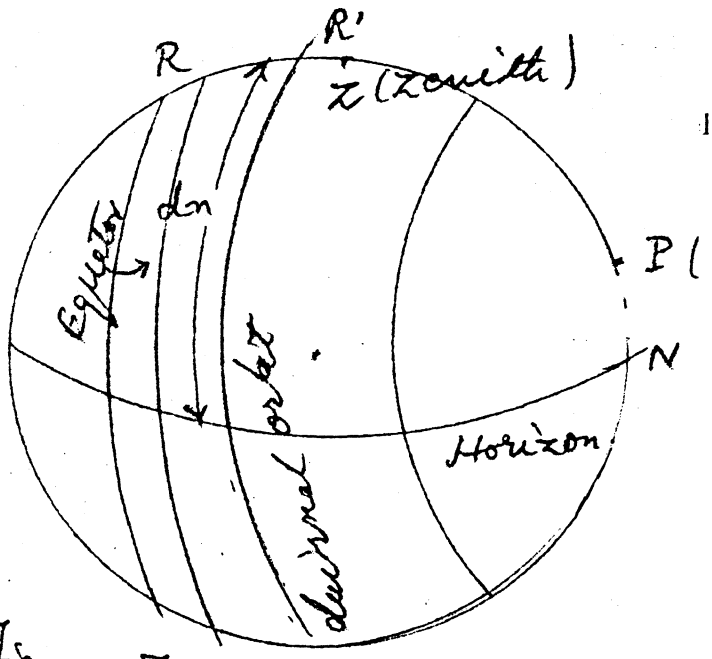


Figure 7.12

The pañcasiddhāntikā also mentions that the longitudinal difference between two places, i.e., the angular distance in degree was measured into yojana on the surface of the earth whose circumference was assumed to be 3200 yojanas. Further, the distance d_n should not be confused with vertical height of the sun while it is on B_n. The solar perigee occuredin Uttarāṣāḍhā (Sagitarii), in 2nd/3rd century B.C. the winter solstice occurred in Abhijit (Lyrae). From the above table it is evident that the distance of the man (observer) from the sun while it is on outermost orbit, is minimum. It creates an illusion as if the distance d_{184} of the man from sun occupying the outermost solar orbit (sun's diurnal circle on winter solstice day) impllies a notion of solar perigee. This is Lishk's finding, however, we have found that the spiroelliptic orbit has an eccentricity which is small, as seen above.

The statement of 7.277, that in all the paridhis there is 18 hour day, while the sun is on the innermost orbit is also subject to question and correct interpretation of paridhi, as well as the location of the observer. Was it Gandhāra ?

TABLE - 7.5

LENGTH OF DAY AND SUNSHINE- DARK AREAS

The following information is given in TPT(V), p. 317

Length of day	Length of night	Saṁkrānti	Month
Day 18 muhūrta.	night 12 muhūrta	Karka Saṁkrānti	Śrāvaṇa
day 17 muhūrta	night 13 muhūrta	Siṁha Saṁkrānti	Bhādrapada
day16 muhūrta	night 14 muhūrta	Kanyā Saṁkrānti	Asuja
day15 muhūrta	night 15 muhūrta	Tulā Saṁkrānti	Kārtika
day14 muhūrta	night 16 muhūrta	Vṛścika Saṁkrānti	Magasira
day13 muhūrta	night 17 muhūrta	Dhanu Saṁkrānti	Pauṣa
day12 muhūrta	night 18 muhūrta	Makara Saṁkrānti	Māgha
day13 muhūrta	night 17 muhūrta	Kuṁbha Saṁkrānti	Phālguna
day14 muhūrta	night 16 muhūrta	Mina Saṁkrānti	Caitra
day15 muhūrta	night 15 muhūrta	Meṣa Saṁkrānti	Vaiśākha
day16 muhūrta	night 14 muhūrta	Vṛṣa Saṁkrānti	Jyeṣṭha
day17 muhūrta	night 13 muhūrta	Mithuna Saṁkrānti	Aṣāḍha
day18 muhūrta	night 12 muhūrta	Karka Saṁkrānti	Śrāvaṇa

(vv.292 et seq.)

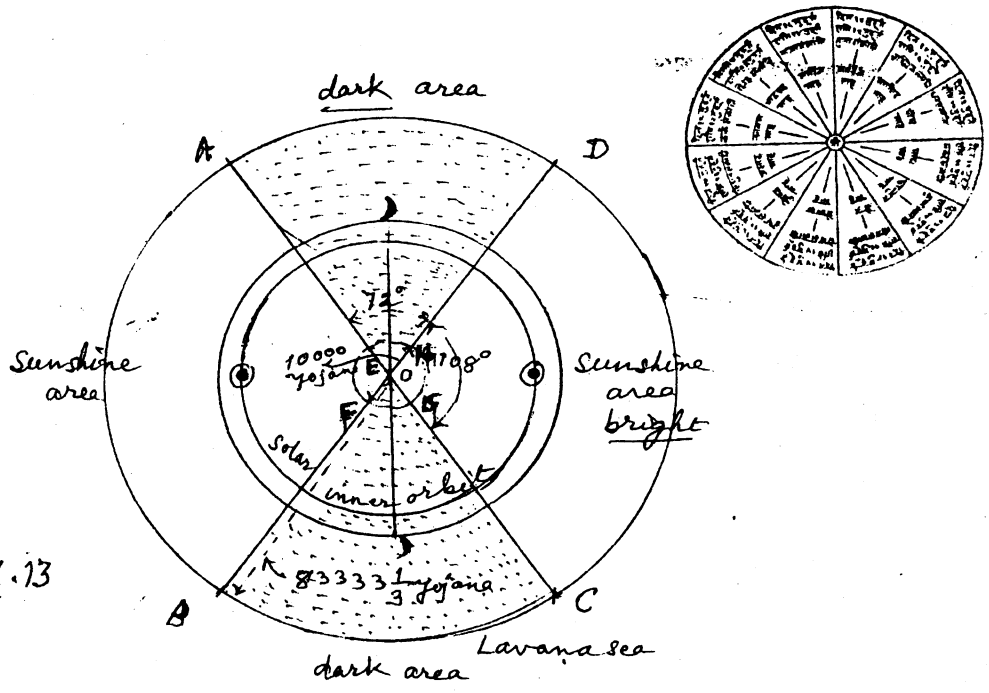


Figure 7.13

When the sun is on the innewrmost orbit, then the bright and dark have been imagined to be projection on the flat earth as the spokes of wheel of a cart, at any distance, divided into 3 : 2 proportion of areas, being bright BOA, COD and dark AOD and BOC, subtending angles 108^0 and 72^0 respectively. The case would be just converse when the sun is on the outermost orbit.

The total bright and dark areas extend from the centre to the sixth part of width of Lavana sae, or upto $83333\frac{1}{3}$ yojanas. Over the meru mountain, EF part, GH there is $9486\frac{3}{5}$ yojanas are as bright, and over the arcs FG, and HE, there is $6323\frac{2}{5}$ yojanas arc as dark. The area of the bright area here, could be calculated as follows:

Area OAB

$$= \frac{1}{2} \text{ (radius)}^2 \times \text{(angle in radian measure)}$$

$$= \frac{1}{2} (83333\frac{1}{2})^2 . \frac{108}{180} \pi = \frac{1}{2} (83333\frac{1}{3})^2 . \frac{3}{5} \pi$$

If $\pi = \sqrt{90}$, then the author has given the area as 65880750000 square yojanas. Similarly, the area of dark AOD portion $= \frac{1}{2} (83333\frac{1}{3})^2 . \frac{72}{180} . \pi = \sqrt{10}$ this gvies 4392050000 square yōjanas.

According to the author, the measure of the circumference of the bright area (tāpa kṣetra) is obtained on multiplying the desired circumferernce by three and dividing it by ten, this being the general formula for all the circumferences. As two suns traverse jointly every circumference in 60 muhūrta. When the sun is on the first path, in all the circumferences there is a day of 18 muhūtras.

In the orbitrarily chosen circumference, 18 muhūrta is the multiplier and 60 is the divisor, hence the sunshine area's circumfereces is obtained. Hence $\frac{18}{60} = \frac{3}{10}$ has been prescribed in the above formula.

Thus, the circumfernces 31622 yojanas of meru is multiplied by 3 and divided 10. the area of sunshine is obraied to be $\frac{31622\times3}{10} = 9486\frac{3}{5}$ yojana of arc. This is continued upto the outermost orbit. Similarly, the circumference of the dark area is obtaied by dividing the circumference by 5 as the rationale requires multiplication by $\frac{12}{60}$ or $\frac{1}{5}$ .The following table gives full details of the above phenomena.

The sunshine and dark areal arcs on both suns being on first orbit

s. no.	Arbitrarily chosn area	sun on first orbit sunshine areal arc	dark areal arc	combined areal arc of 2 suns [1+2] ×3	measure of the circumference in yojana result
1.	On meru	$9486\frac{3}{5}$	$6324\frac{2}{5}$	15811×2	31622
2.	On Kṣemā	$53328\frac{3}{16}$	$35552\frac{1}{8}$	$88880\frac{5}{16}\times2$	$177760\frac{5}{8}$
3.	On Kṣemapurī	$58475\frac{41}{80}$	$38983\frac{27}{40}$	$97459\frac{3}{16}\times2$	$194918\frac{3}{8}$
4.	On Ariṣṭā	$62911\frac{5}{16}$	$41940\frac{7}{8}$	$104852\frac{3}{16}\times2$	$209704\frac{3}{8}$
5.	On Ariṣapurī	$68058\frac{51}{80}$	$45372\frac{17}{40}$	$113431\frac{1}{16}\times2$	$226862\frac{1}{8}$
6.	On Khaḍgāpurī	$72494\frac{7}{16}$	$48329\frac{5}{8}$	$120824\frac{1}{16}\times2$	$241648\frac{1}{8}$
7.	On Mañjūṣāpurī	$76641\frac{61}{80}$	$51761\frac{7}{40}$	$12940\frac{15}{16}\times2$	$258805\frac{7}{8}$

8.	Auṣadhipurī	$82077\frac{9}{16}$	$54718\frac{3}{8}$	$136795\frac{15}{16}\times 2$	$273591\frac{7}{8}$
9.	Puṇḍarikiṇipurī	$87224\frac{71}{80}$	$58149\frac{37}{40}$	$145374\frac{13}{16}\times 2$	$290749\frac{5}{8}$
10.	First orbit	$94526\frac{7}{10}$	$63017\frac{4}{5}$	$157544\frac{1}{2}\times 2$	315089
11.	Second orbit	$94531\frac{4}{5}$	$63021\frac{1}{5}$	157553×2	315106
12.	Third orbit	$94537\frac{1}{5}$	$63024\frac{4}{5}$	157562×2	315124
13.	Middle orbit	$95010\frac{3}{5}$	$63340\frac{2}{5}$	158351×2	316702
14.	Outermost orbit	$95494\frac{1}{5}$	$63662\frac{4}{5}$	159157×2	318314
15.	On the sixth part of the Lavaṇa sea	$158113\frac{4}{5}$	$105409\frac{1}{5}$	263523×2	527046

(v. 7. 343)

A general formula has been given for finding out the sunshine areal arc on a specific day of M_n muhūrta when the sun is on the B_n bīthī.

This is given by $\frac{M_n B_n}{60}$ yojanas. This shown that the sunshine areal arc depends on the length the day as well as the specific orbit occupied by the sun.

Explanation :

Any circumference as a whole circle or the complete revolution of the meru by the sun is finished in 18 + 18 + 12 + 12 = 60 muhūrta. As the sun moves towards the outer most orbit, the measure of length of the day goes on decreasing at the rate of $\frac{2}{61}$ muhūrta per day and the sunshine areal arc reduces at the rate of $\frac{B_n}{60} \times \frac{2}{61}$.

This measure is $\frac{B_n}{10\times183}$ yojanas. Here the total intarvals are 183. It is natural to see that rate at which the sunshine areal arc decreases, at the same rate the dark areal arc increases in the same proportion under the same law.

(vv.7.415 et seq.)

From this verse, the sunshine and dark areas have been calculated.

Already in the verse 7. 264, the sunshine areal arc at the 6th part of Lavaṇa sea was calculated to be $[(100000 + 66666\frac{2}{3})^2 \times 10]^{1/2}$ or 527046 yojanas.

This is divided by the sixth part of both the lateral portions i.e. by 12, and on multiplying the quotient by the linear diametr 5 lac of the Lavaṇa sea, the area of the sunshine and dark areas are obtained.

Thus, the sunshine area = [(circumference of sunshine areal arc) ÷ 12] × 500000

= [(527046) ÷ 12] × 500000 = 21960250000 square yojanas. .....(7.83)

For finding out the area of one sunshine area and one dark area, the following methoed is applied

(1) Area of one sunshine area = $\frac{\text{area of dark and sunshine}}{1} \times \frac{3}{10}$

$\frac{21960250000}{1} \times \frac{3}{10}$

= 6588075000 yojanas .....(7.84)

(2) Area of dark area

$$= \frac{\text{area of one sunshine}}{1} \times \frac{2}{3}$$

$$= \frac{6588075000}{1} \times \frac{2}{3} \qquad = 4392050000 \text{ yajanas}$$

Similarly, areas corresponding to

The Citrā earth is stated to be 800 yojanas below (angular relation) all suns, and the Citrā earth is 1000 yojanas thick, hence the sunshine of the suns spreads below upto 1800 yojanas. The astral universe is 100 yojanas over the suns, heuse the sunshine spreads above, over 100 yojanas.

(vv.7.421 et seq.)

We shall first state the rule for finding out the square of the chord and the arrow (height of the seqment).

$(\text{chord})^2 = (\text{diameter} - \text{arrow}) \times 4 \text{ arrow}$ ..... (7.86)

and $(\text{arc})^2 = (\text{arrow})^2 \times 6 + (\text{chord})^2$ .....(7.87)

The arrow of the Harivarṣa from the shore the Lavaṇa sea is obtained on multiplying the arrow of Bharata region, $(\frac{10000}{19})$ by 31, getting $(\frac{10000}{19} \times 31)$ or $\frac{310000}{19}$ yojana. ...(7.88)

The measure of the arrow of the Harivarṣa region from the first orbit of the sun is obtained by subtracting 180 yojanas (orbital region of sun in Jambū island) or $\frac{3420}{19}$ from the arrow of Harivarṣa, getting $(\frac{310000}{19} - \frac{3920}{19})$ or $\frac{306580}{19}$ yojana. .....(7.89)

Now the diametor of Jambū island is one lac yojanas, and the orbital region in Jambū island of the sun etc. is 180 yojanas. From the diameter of jambū island, on subtracting the orbital region of both the lateral parts, the linear diameter of the first orbit is obtained as

$100000 - (180 \times 2) = 99640$ yojanas. .....(7.90)

The square of arc of Harivarṣa region is obtained as follows:

The innermost orbit has the diameter as 99640 yojanas and the arrow of Harivarṣa region from first orbit is $\frac{306580}{19}$ yojans. Now according to formula for finding $(\text{chord})^2$, equationn (7.86).

$$\therefore \quad (\text{chord})^2 = \left(\frac{99640}{1} - \frac{306580}{19}\right) \times \left(\frac{306580 \times 4}{19}\right)$$

$$= \frac{1945654785600}{361} \text{ yojana.} \qquad \text{.....(7.91)}$$

Similarly making use of the formula (7.87).

$(\text{arc})^2$

$$\left\{\left(\frac{306580}{19}\right)^2 \times 6\right\} + \frac{1945654785600}{361} = \frac{2509602564000}{361} \qquad \text{.....(7.92)}$$

The measure of the arc of the Harivarṣa region from the first path

$$= \frac{\sqrt{2509602564000}}{361} = \frac{1584172}{19} \text{ yojana.} \qquad \text{.....(7.93)}$$

Now in the verse 7.421 etc., the mention of the eye touch region (cakṣu sparṣa kṣetra) has been made. When the sun is on the B_n th orbit, then the eye touch region is given as $B_n \times \frac{9}{60}$ yojana. Here the sun completes the orbital arc form Niṣadha montuin to Ayobhā in 9 muhūrtas and completes one revolution of the whole orbital circumference in 60 muhūrtas. The measure of B_n for the maximal of eye touch region is 315089 yojanas.

After having known the measure of arc of Harivarṣa as $\frac{1584172}{19}$ yojana, the measure of upper layer of Niṣadha mountion could be obtained by subtracting its half part from the

eye touch region of $47263\frac{7}{20}$ yojana,

getting $\frac{945267}{20} - \frac{792086}{19} = \frac{2118353}{380} = 5574\frac{233}{380}$ yojanas.

The inner most orbit of the sun is 315089 yojanas, and for getting the eye-touch maximal region, this circumference is multiplied by 8 and divided by 60, hence it gives

$$\frac{315089 \times 9}{60} = \frac{945267}{20} = 47263\ \frac{7}{20} \text{ yojana.} \qquad \text{.....(7.95)}$$

This is the maximal eye-touch region. According to TLS, vv.389-391, on subtracting the eye-touch region from half of the Niṣadhācala arc, i.e., $(61884\ \frac{9}{10} - 47263\ \frac{7}{20})$

$= 14621\frac{47}{380}$ is the remainder in yojana. When the sun, situated on the first orbit, comes over Niṣadhācala, by $14621\frac{47}{380}$ yojana.

It is seen by the Emperor (Cakrevarti), and here it is told that when the sun comes over the Niṣadhācala by $5574\frac{233}{380}$ yojana, it is seen by the Emperor (Cakravarti), and there is no contradiction in both the statements. Since the arc of Niṣadhācala is $123768\frac{18}{19}$ yojanas and that of the Harivarṣa is $83317\frac{9}{19}$ yojana.

On subtracting the latter from the former, we get on halving the remainder, $\left(123768\frac{18}{19} - 83317\frac{9}{19}\right) \div 2 = 20195\ \frac{14}{19}$, the lateral side (pārśva bhujā) or arc joining

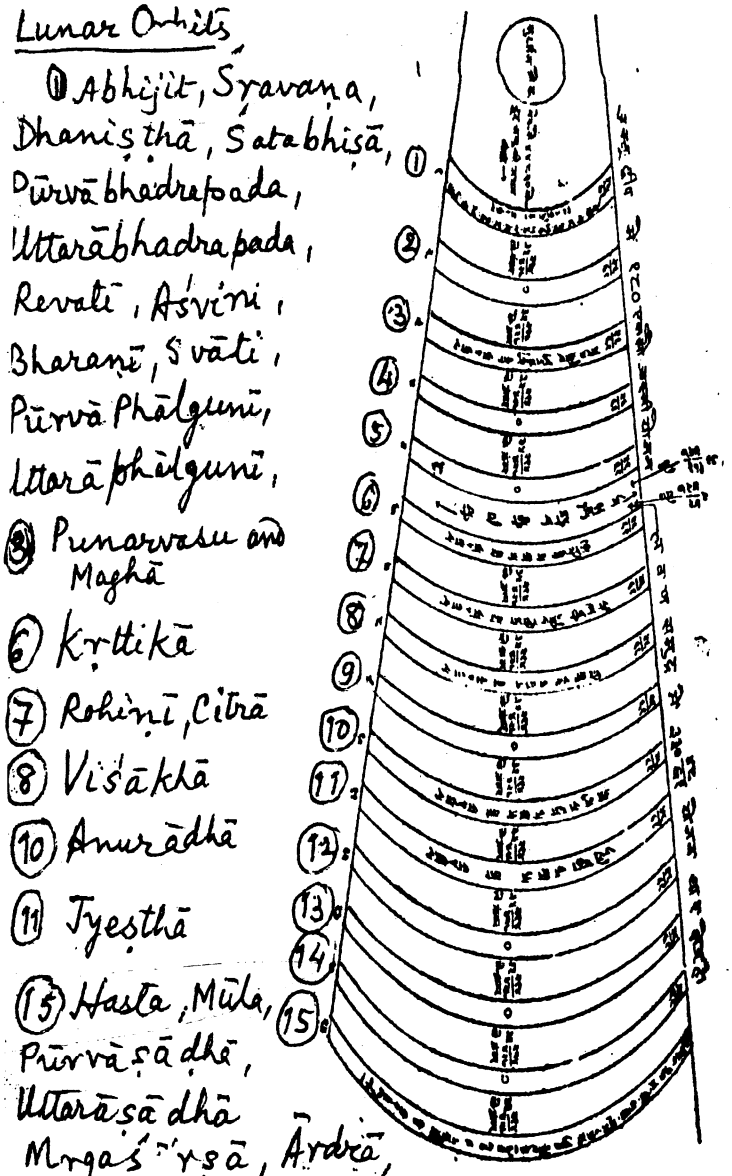
the southern shore with the northern shore, in yojanas.

According to the TLS, the sun is seen when it comes up by $14621\frac{47}{380}$ yojana. When this measure is subtracted from the lateral side,

we get $\left(20195\frac{14}{19} - 14621\frac{47}{380}\right)$ or $5574\frac{233}{380}$ yojana as remainder what has been quoted in the TPT. This explanation has been devised by Āryikā Viśuddha mati ji in the TPT (V), pp.362, 363) vol. 3. The same is the statement for the Emperer of Airāvata region.

Now the division of night and day when the sun, on its first path, rises in the Bharata region is taken up. In the first orbit, the sun while traversing it, seems to come over the Niṣadha mountain, when it rises in the Bharata region, at that time, on the northern bank of the Sītā - Sītodā in eastern Videha, where kṣemācity is situated, there is night of slightly greater than 2 hours and 24 minutes. At that time, there is night at kṣemapurī by slightly greater than 2 muhūrta (slightly greater than 1 hour, 36 minutes), at Ariṣta it is slightly greater then 1 muhūrta (slightly greater then 48 minutes), and at Ariṣtapurī, it is slightly lass then 1 nālī (slightly smaller then 24 minutes). Further when the sun rises in Bharata region, at that time in khaḍgapurī, the sun sets and there is noon slightly greater then 1 ghaṭī at Mañjūṣapura (slightly greater than 24 minute day), and at Auṣadhīpura the noon is slightly greater than one muhūrta (slightly greater than 48 minutes). At that instant in puṇḍarīkinī city there is day for slightly greater than one muhūrta (48 minuets) and in the Devāraṇya forest it is greater than two muhūrta (1 hour and 36 minutes).

At that time, on the first path near the Susīmā city, in devāraṇya at the southern bank of the Sītā great river, the day remains for slightly greater than 3 muhūrta (or 2 hours 24 minutes. At Susīmā and kuṇḍalapura. For greater than three muhūrta (2 hours 24 minutes), at Aparājita and Prabhaṅkarapura, for greater than two muhūrta (1 hour 36 minutes) at Aṅkapura and padmapura for greater than 48 minutes), and at Śubhanagara for greater than one nāli (or 24 minutes). Besides this, at Ratnasaṁcayapura the night becomes slightly less than one-third part of a nāli (or 7 minuts approximately).



The lunar zodiac constellations in different lunar orbits.

Figure 7.15

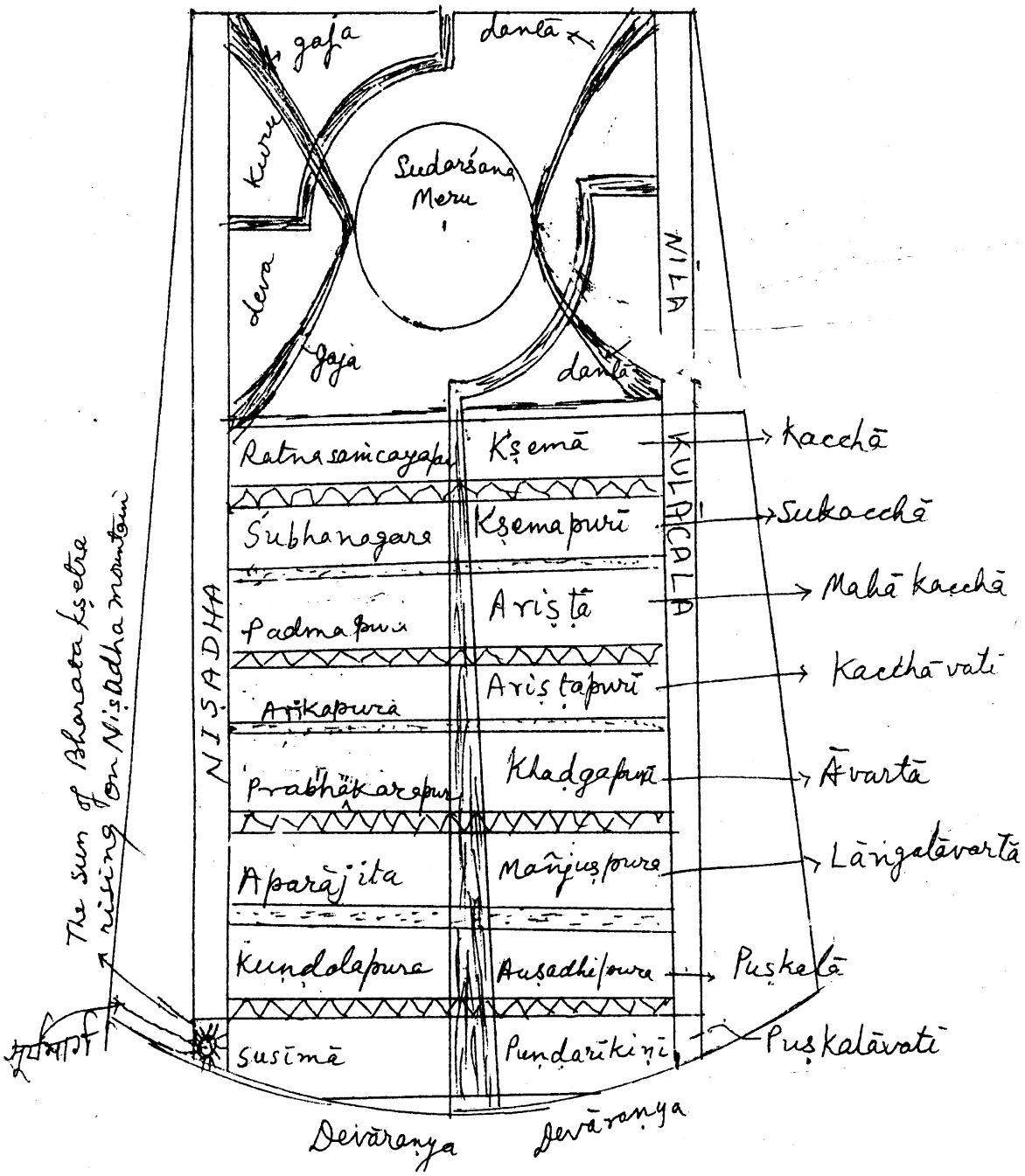

gaja
danta
kuru
Sudarśana Meru
deva
NILA
Gaja
danta
Ratnasamcayapura
Kṣemā
Kacchā
Śubhanagara
Kṣemapurī
Sukacchā
Padmapura
Ariṣṭā
Mahā kacchā
Ariṣṭapurī
Kacchāvatī
Arikapura
Prabhākarapura
Khadgapurī
Āvartā
Aparājita
Mañjuṣpura
Lāṅgalāvartā
Kuṇḍalapura
Auṣadhipura
Puṣkalā
Susīmā
Puṇḍarīkiṇī
Puṣkalāvatī
NISADHA
KULACALA
The sun of Bharata kṣetra rising on Niṣadha mountain
Devāraṇya
Devāraṇya

Figure 7.14

(vv.7.441 et seq.)

The description about day and night about the Airāvata is similar to that of kṣemā etc. cities, and it is about nine locations Aśvapurī etc. cities. In the Bharata and Airāvata regions, at the noon, there is night, slightly loss than six muhūrta in the Vītaśokā city. Just like the sunrise at Niṣadha and sunset, similar is, simultaniously there is sunrise, sunset in both lateral portions over the Nīla mountain.

In Bharata region, the emperor (Cakravartī) is unabla to sea the sun ahead of Niṣadha mountain over a distance of $5574\frac{233}{380}$ yojanas. Similar is the case in Airāvata region, ahead of Nīla mountain over a distance of $5574\frac{233}{380}$ yojana. Both the sun's images enter into the second orbit from the south east and north west.

(vv.7.456 et. seq.)

In the Jambū island the orbital region of the sun is 180 yojanas. The diameter of the altar of Jambū island is 4 yojanas and the orbital region of Lavaṇa sea is $330\frac{48}{61}$ or $\frac{20178}{61}$ yojanas. The measure of the sun's orbit is $\frac{48}{61}$ yojana and the interval from one orbit to another is 2 yojana. This $2+\frac{48}{61}$ or $\frac{170}{61}$ yojana is the motion area of every day of the sun. When there is the $\frac{170}{61}$ yojana of movement in a day, there happens to be one rises-station than how many will be the rise stations in (180 - 4) or (Jambū island's orbital region minus the diameter of its altar), or 176 yojanas. Through this (triratio or) rule of three sets, we get $\frac{176\times61}{170}=63\frac{26}{170}$ rise places are obtained. Similarly for the 4 yojanas, the rise places are $\frac{61\times4}{170}$ or $1\frac{74}{170}$ rise places. Similarly, if $\frac{170}{61}$ yojanas region has one rise station, then for

$330\frac{48}{61}$ yojanas region of Lavaṇa sea orbital region,

the rise stations are $\frac{61\times20178}{170\times61}=\frac{20178}{170}$ or $118\frac{118}{170}$ rise places.

On adding both these, we get

$63\frac{26}{170}+1\frac{74}{170}+118\frac{118}{170}=182$ rise stations + $\frac{218}{170}$ rise fraction.

What is the region for $\frac{218}{170}$ rise places when for $\frac{170}{61}$ yojana,

there is 1 rise station? This give $\frac{170\times218}{61\times170}=\frac{218}{61}$ yojana, for $1\frac{48}{170}$ rise stations.

On adding this $182 + 1\frac{48}{170} = 183\frac{48}{170}$

or

48 parts more over 183 rise stations.

(vv.7.459-460)

It is important to note that the author has stated that by his time description of planetary motion of 88 planets have become extinet due to course of time.

(vv.7.459 et seq.)

Graduation of Celestial Sphere

The whole stretch of the heaven in the Jaina calender is divided into 54900 celestial parts or gagaṇa khaṇḍas which may be kept equevalent to 360^0 of the modern celestial or armillary sphere. A measure of a sign of zodiac is 30^0, and that will be equivalent to 4575 celestial parts (abbr. c. p.)

CORRESPONDENCE BETWEEN ZODIACAL CONSTELLATIONS MOON SUN

No.	Name of Constellation	stretch in celestial parts	stretch of zodiac in c.p. from and upto	Duration for which moon is with costellation		Duration for which sun is with costellation		Linear velocity in yojanas of costellation in a muhūrta
				muhūrta	67 parts	days	muhūrta	
1	Aśvini	2010	Aries from 0 onwards	30	0	13	12	5265 and 18263/21960
2.	Bharṇi	1005	Aries continued	15	0	6	21	5265 and 18263/21960
3.	Kṛttikā	2010	Ari es upto 4575 and Taurus 0 upto 450	30	0	13	12	5285 and 37/594
4.	Rohiṇi	3015	Taurus continued	45	0	20	3	5288 and 20377/21960
5.	Mṛgaśirā	2010	Taurus upto 4575 and Gemini upto 900	30	0	13	12	5319 and 15998/21960
6.	Ārdrā	1005	Gemini continued	15	0	6	21	5319 and 15998/21960
7.	Punarvasu	3015	Gemini upto 4575 and cancer 0 upto 345	45	0	20	3	5273 and 11403/21960
8.	Puṣya	2010	Cancer continued	30	0	13	12	5319 and 15998/21960

9	Āśleṣā	1005	Cancer continued	15	0	6	21	5319 and 15998/21960
10.	Maghā	2010	Cancer upto 4575 and Leo 0 to 795	30	0	13	12	5273 and 11403/21960
11.	Pūrvā phālguni	2010	Leo continued	30	0	13	12	5265 and 18263/21960
12.	Uttarā phālguni	3015	Leo upto 4575 and virgo 0 upto 1245	45	0	20	3	5265 and 18263/21960
13.	Hasta	2010	Virgo continued	30	0	13	12	5319 and 15998/21960
14.	Citrā	2010	Virgo upto 4575 and Libra 0 upto 690	30	0	13	12	5288 and 20377/21960
15.	Svāti	1005	Libra continued	15	0	6	21	5265 and 18263/21960
16.	Viśhākhā	3015	Libra upto 4575 and Scorpio 0 to 135	45	0	20	3	5292 and 16947/21960
17.	Anurādhā	2010	Scorpio continued	30	0	13	12	5300 and 10454/21960
18.	Jyeṣṭā	1005	Scorpio continued	15	0	6	21	5304 and 7024/21960

19.	Mūla	2010	Scorpio upto 4575 and Sagittarius 0 to 585	30	0	13	12	5319 and 15998/21960
20.	Pūrvāṣāḍhā	2010	Sagittarius continued	30	0	13	12	5319 and 15998/21960
21.	Uttrāṣāḍhā	3015	Sagittarius upto 4575 and Capricorn 0 to 1035	45	0	20	3	5319 and 15998/21960
22.	Abhijit	630	Capricorn continued	9	27	4	6	5265 and 18263/21960
23.	Śrāvaṇa	2010	Capricorn continued	30	0	13	12	5265 and 18263/21960
24.	Dhaniṣṭā	2010	Capricorn upto 4575 and Aquarius 0 upto 1110	30	0	13	12	5265 and 18263/21960
25.	Śatabhiṣā	1005	Aquarius continued	15	0	6	21	5265 and 18263/21960
26.	Pūrvā bhādrapada	2015	Aquarius continued	30	0	13	12	5265 and 18263/21960
27.	Uttarā bhādrapada	3015	Aquarius up to 4575 and Pisces 0 upto 2563	45	0	20	3	5265 and 18263/21960
28.	Revatī	2010	Pisces up to 4575 and Arises 0	30	0	13	12	5265 and 18263/21960

Here, worthy of attention are the celestial parts and the velocities of the constellation.

Names of constellations, number of stars and shapes

TABLE 7.7

No.	Zodiacal constellation	Number of stars	Shapes of stars
1.	Kṛttikā	6	fan
2.	Rohiṇī	5	spoke of cart wheel
3.	Mṛgaśīrṣā	3	head of dear
4.	Ārdrā	1	lamp
5.	Punarvasu	6	arch
6.	Puṣya	3	umbrella
7.	Āśleṣā	6	serpent's or ant's hole
8.	Maghā	4	Cow urine
9.	Pūrvāphālgunī	2	sarajuga (double arrow)
10.	Uttarāphālgunī	2	hand
11.	Hasta	5	blue lotus
12.	Citrā	1	lamp
13.	Svāti	1	instrument (adhikaraṇa)
14.	Viśhākhā	4	garland
15.	Anurādhā	6	lute
16.	Jyeṣṭhā	3	horn
17.	Mūla	9	Scorpion
18.	Pūrvāṣāḍhā	4	cruel well
19.	Uttarāṣāḍhā	4	head of a lion
20.	Abhijita	3	head of an elephant
21.	Śrāvaṇa	3	drum
22.	Dhaniṣṭhā	5	falling birds
23.	Śatabhiṣā	111	army

24.	Pūrvābhādrapada	2	forepart of elepant
25.	Uttarābhādrapada	2	rear portion of elephant
26.	Revati	32	boat
27.	Aśvini	5	head of a horse
28.	Bharṇi	3	cuisine hearth (cūlikā)

Numbers of stars in constellations

TABLE 7.8

No.	constellation	Number of family stars	No of basic stars	Total number of stars of constellation
1.	Kṛttikā	1111 × 6 = 6666	6	6672
2.	Rohiṇī	1111 × 5 = 5555	5	5560
3.	Mṛgaśīrṣā	1111 × 3 = 3333	3	3336
4.	Ārdrā	1111 × 1 = 1111	1	1112
5.	Punarvasu	1111 × 6 = 6666	6	6672
6.	Puṣya	1111 × 3 = 3333	3	
7.	Āśleṣā	1111 × 6 = 6666	6	6672
8.	Maghā	1111 × 4 = 4444	4	4448
9.	Pūrvāphālgunī	1111 × 2 = 2222	2	2224
10.	Uttarāphālgunī	1111 × 2 = 2222	2	2224
11.	Hasta	1111 × 5 = 5555	5	5560
12.	Citrā	1111 × 1 = 1111	1	1112
13.	Svāti	1111 × 1 = 1111	1	1112
14.	Viśhākhā	1111 × 4 = 4444	4	4448
15.	Anurādhā	1111 × 6 = 6666	6	6672
16.	Jyeṣṭhā	1111 × 3 = 3333	3	3336
17.	Mūla	1111 × 9 = 9999	9	10008

18.	Pūrvāṣāḍhā	1111 × 4 = 4444	4	4448
19.	Uttarāṣāḍhā	1111 × 4 = 4444	4	4448
20.	Abhijita	1111 × 3 = 3333	3	3336
21.	Śrāvaṇa	1111 × 3 = 3333	3	3336
22.	Dhaniṣṭhā	1111 × 5 = 5555	5	5560
23.	Śatabhiṣā	1111 × 111 = 133321	111	123432
24.	Pūrvābhādrapada	1111 × 2 = 2222	2	2224
25.	Uttarābhādrapada	1111 × 2 = 2222	2	2224
26.	Revatī	1111 × 32 = 35552	32	35584
27.	Aśvinī	1111 × 5 = 5555	5	5560
28.	Bharaṇī	1111 × 3 = 3333	3	3336

Note:

The above number of stars shows a definite proportion with 111, worthy of attention.

RELATIVE MOTION OF NAKSHATRA

The motion of astral bodies, as already mentioned is, as per muhūrta, as follows:

The nakṣatra	1835 celestial parts or sky parts per muhūrta
The sun	1830 celestial parts or sky parts per muhūrta
The moon	1768 celestial parts or sky parts per muhūrta
The Rāhu	$1829\frac{11}{12}$ celestial parts or sky parts per muhūrta

Thus, relative to the nakṣatra, the sun, the moon and the rāhu move at the rate of 5, 67 and $5\frac{1}{12}$ celestial parts per muhūrta. Now the ṛtu Rāhu, (TLS), appears to be a fictitious body, meant for a seasonal or sāyana, ṛtu or Karm year (saṁvatsara). This Rāhu traverses $\frac{61}{12}$ celestial parts (gagana khaṇḍa) in $\frac{1}{50}$ of a solar day, hence the stretch of a

zodiacal sign of 30^0 or 4575 celestial parts is traversed in a month of 30 solar days. Thus, 54900 celestial parts are traversed in 360 days or twelve Karma months. This Rāhu thus defines the division of the celestial sphere into 12 zones and it seems this might have been the way to the 12 zodiac constellation, rāśis or signs. This also defines the mean annual motion of the sun, which describes 1830 celestial parts in $\frac{1}{30}$ of a day or 360^0 in a day, defining again the basic unit, the solar day.

The daily motion of the nakṣatra is defined as 1835 celestial parts or degrees per muhūrta or per 48 minutes. Thus, 54900 celestial parts or 360° arc covered in $\frac{1830}{1835}$ part of a day, or 23 hours 56 minutes and 4 $\frac{1060}{1835}$ seconds (4.577 seconds). Modern value of such a sidereal day is 23 hours 56 minutes 4.1 seconds. Thirty such revolutions make $29\frac{1685}{1835}$ days. Three hundred sixty such revolutions make $359\frac{35}{1835}$ days. Three hundred sixty-six such revolutions make $365\frac{5}{1835}$ days. Relatively, this will be regarded as rotation of the earth with respect to a fixed nakṣatra or a star fixed therein.

With respect to the nakṣatra, the sun moves 5 celestial parts less per muhūrta. Thus, it traverses 150 celestial parts in a day and 54900 parts or 360° in 366 days, which is in relation to fixed stars. The average solar month is thus of $30\frac{1}{2}$ days.

Similarly the moon covers 67 celestial parts less with respect to the nakṣatra per muhūrta covering the strip of 54900 celestial parts in $27\frac{21}{61}$ solar days or 27.313 days, whereas the modern value for a lunar sidereal month is 27 .32166 days.

The Rāhu moves $1829\frac{11}{12}$ celestial parts per 48 minutes and describes the strip of

54900 celestial parts in a $\frac{21060}{22259}$ solar day. The $\frac{61}{12}$ celestial parts in a muhūrta are traversed by Rāhu relative to nakṣatra, hence 54900 celestial parts (360°) are covered in 360 solar days. Here one degree has been set in equivalent with one day, as in China. (Vide Needham and Ling, vol. III, op. cit. pp. 218-219). The mean solar day is thus $\frac{22259}{21060}$ or 1.056932 day of which the modern value is 24 hours, 3 minutes, and 56.5 seconds.

Regarding the relative motion of the moon with respect to the nakṣatra, the moon travels 67 celestial parts kinematically less than those traversed by nakṣatra covering the strip of 54900 celestial parts in $27\frac{21}{67}$ solar days or 27.313 days, the modern value for the lunar sidereal month being 27.32166 days. The relative motion of the moon with respect to the sun being 62 celestial parts in $\frac{1}{30}$ th day, it covers the stretch of 54900 celestial parts in $29\frac{32}{62}$ or 29.516 days, whereas the modern value for lunar synodic month is 29.5305 days. This is the data for a mean motion. The motion of the ṛtu Rāhu with respect to the moon is $\frac{743}{12}$ celestial parts less, in a muhūrta, hence the moon covers 54900 celestial parts ahead of it in $29\frac{413}{743}$ or 29.555 days, which is lunar fictitious synodic month. The mean of true and fictitious being 29.535, differing from modern value by .005 only.

THE YUGA SYSTEM (OF LIFE YEARS)

(vv.525 et seq.)

There are two solstice (ayana) in a year. Three months after every solstice, there is an equinox (viṣupa). In this way, there are 10 equinoxes in a yuga. On dividing these by two, there are 5 equinoxes each set corresponding to a specific solstice in every yuga.

The method for finding out the tithi white or dark half and the end point of the new or full moon or parva, has been given as follows:

The end of the earlier solstice and beginning of new solstice is called āvṛtti (frequency), and the number of frequencies in a yuga are ten, those corresponding to southern solstice are 1, 3, 5, 7, 9th and those corresponding to northern solstice are 2, 4, 6, 8 and 10th frequency, respectively.

Whatever frequency is desired to be chosen, one is subtracted from it, the remainder multiplied by six, and one is added, giving the lunar day or tithi of the frequency. When in the result 3 is added the lunar day (tithi) of the equinox is obtained.

An example thereof - Let the arbitrarily chosen frequency be the third,

hence, $(3 - 1) \times 6 + 1 = 13$, which gives the lunar day. The third frequency falls on the 13th lunar day of the dark half.

Further, $(3 - 1) \times 6 + 3 = 15$, which gives the lunar day, which shows that the third equinox falls on dark half, new moon (amāvasyā).

Note that both the numbers 13 and 15 are odd, hence the dark half is to be taken. The second equinox happens to be on 9th tithi,

hence on doubling it ($9 \times 2 = 18$), we get 18 parvas of the second equinox (viṣupa).

Method for finding out the constellation of a frequency and an equinox.

Let the arbitrarily chosen frequency be 8th. Its constellation is the mūla.

Here $(8 - 1) \times 7 \div 10 = 4\frac{9}{10}$, thus, giving the 9 as remainder.

Now, $9 \times 184 \div 67 = 24\frac{48}{67}$. As $\frac{48}{67}$ is greater than $\frac{1}{2}$,

therefore, approximately, $24\frac{48}{67}$ is taken as 25.

On counting from constellation Abhijit, the Jyeṣṭhā constellation is 25th which has elapsed and the mula is ahead being the constellation of the 8th frequency.

On every Māgha month the sun is situated in the south direction, and in a yuga of five years, there are 5 frequencies in the northern solstice sun, as shown in following table.

TABLE - 7.9

SOLSTICES

SOUTHERN-SOLSTICE-SUN

Frequency	year	month	dark half or white half	lunar day (tithi)	constellation
1st	first	śrāvaṇa	dark	1st	Abhijita
3rd	second	śrāvaṇa	dark	13th	Mṛgaśirā
5th	third	śrāvaṇa	white	10th	Vitaśoka
7th	fourth	śrāvaṇa	dark	7th	Revatī
9th	fifth	śrāvaṇa	white	4th	Pūrvāphālguni

NOTHERN- SOLSTICE-SUN

Frequency serial	year	month	dark half or white half	lunar day (tithi)	constellation
2nd	first	māgha	dark	7th	Hasta
4th	second	māgha	white	4th	Śatabhiṣā
6th	third	māgha	dark	1st	Puṣya
8th	forth	māgha	dark	13th	Mūla
10th	fifth	māgha	white	10th	Kṛttikā

Table 7.10

EQUINOXES

Year	equinox number	Elapsed parva number	month	dark or white half	tithi (lunar day)	constellation
1st	1st	6 parva	kārtika	dark	3rd	conjunction of Rohiṇī
	2nd	18 parva	Vaiśākha	dark	9th	conjunction of Dhaniṣṭhā
2nd	3rd	31 parva	kārtika	white	full moon 15th	conjunction of Swāti
	4th	43 parva	Vaiśākha	white	6th	conjunction of Punarvasu
3rd	5th	55 parva	kārtika	white	12th	conjunctionof Uttarābhāḍrapad
	6th	68 parva	Vaiśākha	dark	3rd	conjunction of Anurādhā
4th	7th	80 parva	kārtika	dark	9th	conjunction of Maghā
	8th	93 parva	Vaiśākha	white	15th full moon	conjunction of Aśvini
5th	9th	105 parva	kārtika	white	6th	conjunction of Uttarāṣāḍhā
	10th	117 parva	Vaiśākha	white	12th	conjunction of Uttarāphālgunī

Important note:

The two yuga are ten years. In a single yuga of 5 years, there are 5 frequencies of the southern solstices and 5 frequencies of the northern solstices, counting to a total of ten solstices. Similarly, there are 10 eqiunoxes, as is clear from the above tables. Now, each revolution means 360^0, which when divided by 10gives 36, which appear to be similar to 36 decans in Egypt. (vide Neugebauer, op. cit.)

In the Jaina school, the yuga is perhaps the shortest period of a cyclic character, for it further leads to the solstices and equinoxes of the hyper-serpentine-hyposerpentine (utsarpiṇī and avasarpiṇī) periods, during which the numbers of the southern solstices and equinoxes as follows: $\frac{p}{\text{innumerate}}$, $\frac{p}{\text{innumerate}}$ and $\frac{2p}{\text{innumerate}}$ respectively, when P is the time-set palya.

One utsarpiṇī and avasarpiṇī are each of 10 crore-squared palya. When there are 10

crore-squased palya are contained in the time-instant-set sāgara, than how many palya are there in 10 crore-squared? this rule of three gives $(10)^{28}$ palya in crore-squared sāgara.

The measure of time is done through the the instant-set addhāpalya. When in one addhāpalya there in $(10)^{28}$ addhāpalya? The rule of three gives the measure of years, twice as many is the number of the solstices (ayana). This amount has been shown through the gauge symbolism

दक्खि प उत्त प उसुप प २

a a a

The projections (prakṣepa) of the sun are infinite infinite or endlessly-endless, as before.

(vv.7.550 et seq.)

DESCRIPTION OF LUNAR IMAGES

From Lavaṇa sea to Puṣkarārdha

In the Lavaṇa sea there are 4 moons; in the Dhātakikhaṇḍa island, there are 12 moons; in the Kāloda sea there are 42 moons and in the Puṣkarārdha island, there are 72 moons. These moons move in a linear order, half in one part and other half in another part of their own islands and seas. As before, each pair of moons has its own orbital region and its extension is greater by $\frac{48}{61}$ over 510 yojanas, where $\frac{48}{61}$ yojanas is the width of the sun's disc. In separate orbital regions, there are 15 moons orbits for each, their extension being $\frac{56}{61}$ yojanas.

The width of the Lavaṇa sea is 200000 yojanas, and there are 4 moons in it. Formula is given to find out the interval between the moon on the first orbit and the boundary of Lavaṇa sea as follows:

$$\text{Interval} = \left[- \left(\frac{\text{number of moons in the region}}{61} \times 28 \right) + (\text{width of the sea}) \right] \div 4$$

or $$\text{interval} = \left[- \left(\frac{4}{61} \right) \times 28 + \frac{200000}{1} \right] \div 4 = 4999\frac{33}{61} \text{ yojanas.} \quad \text{.....(7.96)}$$

The interval between the moons on the first orbit and the Dhātakikhaṇḍa island is given by similar formula:

$$[-(12 \div 61) \times 28 + \frac{400000}{1}] \div 12 = 33332\frac{160}{183} \text{ yojanas.} \quad \text{.....(7.97)}$$

Similarly, the interval in Kālodadhi sea in te first orbit from its boundary is

$$[\frac{800000}{1} - (42 \div 61) \times 28] \div 42 = 19047\frac{205}{1281} \text{ yojanas.} \quad \text{.....(7.98)}$$

In the Puṣkarārdha island, this interval

$$= [\frac{800000}{1} - (72 \div 61) \times 28] \div 72 = 11110\frac{358}{549} \text{ yojanas.} \quad \text{.....(7.99)}$$

INTERVAL BETWEEN TWO MOONS IN LAVAṆA SEA

The width of Lavaṇa sea is 2 lac yojanas, number of moons is 4, and the width of the 4 moons is $\frac{56}{61} \times 4 = \frac{224}{61}$ yojanas.

This is halved and subtracted from the width of the Lavaṇa sea and the difference is halved getting the interval.

Thus, $[\frac{200000}{1} - (\frac{56}{61} \times 4) \div 2] \div 2 = 99999\frac{5}{61}$ yojanas. .....(7.100)

Similarly, the interval between the two moons in Dhātakī khaṇḍa island is

$$[\frac{400000}{1} - (\frac{56}{61} \times \frac{12}{1}) \div 2] \div \frac{12}{2} = 66665\frac{137}{83} \text{ yojanas.} \quad \text{.....(7.101)}$$

where the number of moons is 12.

For the Kālodadhi sea, width is 8 lac and number of moons is 42,

here the interval $= [\frac{800000}{1} - (\frac{56}{61} \times 42) \div 2] \div \frac{42}{2} = 38094\frac{410}{1281}$ yojanas.

.....(7.102)

Similarly, for the Puṣkarārdha island,

the width is 8 lac yojanas, number of moons is 72, hence

$$\text{the interval} = [\frac{800000}{1} - (\frac{56}{61} \times 72) \div 2] \div \frac{72}{2}$$

$$= 22221\frac{167}{549} \text{ yojanas.} \qquad \text{.....(7.102)}$$

(v. 7. 572)

The number of orbits is 15 in the orbital region of $510\frac{48}{61}$ yojanas for the moon, completed by two moons. In Lavaṇa sea etc., there are 4, 12, 42 and 72 moons, respectively, hence the orbits at those places, are given by

$$\frac{15 \times 4}{2} = 30\,,\ \frac{15 \times 12}{2} = 90\,,\ \frac{15 \times 42}{2} = 315$$

and $\frac{15 \times 72}{2} = 540$ respectively.

(vv. 7.581 et seq.)

The interval between the first orbit of the sun from the boundary of the Lavaṇa sea is found out through a similar method. Lavaṇa sea is 200000 yojanas wide, number of suns is 4 and the width of the discs $= \frac{48}{61} \times \frac{4}{2} = \frac{96}{61}$. Hence,interval between two suns is given by

$$[\frac{200000}{1} - (\frac{48}{61} \times \frac{4}{2}) \div \frac{4}{2}] = 99999\ \frac{13}{61} \text{ yojanas.} \qquad \text{.....(7.104)}$$

And the interval between the first orbit and the boundary is

$$= \frac{1}{2}\ (99999\frac{13}{61}) = 49999\ \frac{37}{61} \text{ yojanas.} \qquad \text{.....(7.105)}$$

Similarly, interval for subsequent islands and seas could be calculated.

(vv.7.599 et seq.)

TABLE 7.11

TOTAL NUMBER OF ASTRAL DEITIES IN HUMAN UNIVERSE

No.	Name of island/sea	moons	suns	planets	constellation	stars	
						(moving) unstable stars	stable stars
1.	Jambū island	2	2	176	56	133950 crore squared	36
2.	Lavaṇa sea	4	4	352	112	267900 crore squared	139
3.	Dhātakikhaṇḍa	12	12	1056	336	803700 crore squared	1010
4.	Kālodadhi sea	42	42	3696	1176	2812950 crore squared	41120
5.	Puṣkarārdha island	72	72	6336	2016	4822200 crore squared	53230
	Total	132	132	11616	3696	88407 crore squared	95535

(v.7.612 et seq.)

From here, and what follows, the description of such astral bodies are given which, extending from Mānuṣottara mountain upto Svayaṁbhūramaṇa sea, are distributed and fixed. The method of their arrangement and distribution is given as follows:

Ahead of the Mānuṣottara mountain, at a distance of 500000 yojanas, there is the first ring. Ahead of this, upto the Svayaṁbhūramaṇa sea, each at a distance of 1 lac yojanas, there are second etc. rings. The specific fact is that from the altar of Svayaṁbhūramaṇa sea, 50000 yojanas towards the rear side of the Svayaṁbhūramaṇa sea, there is the last ring in that region. Thus the total number of rings could be found out from the formula (

$$\frac{\text{universe line}}{1} \div 1400000) - 23$$

$$\text{or} \quad \frac{L}{1400000} - 23 \text{ rings} \qquad \text{.....(7.106)}$$

Now, the number of the moons and the suns lying on those rings may be calculated.

In the first ring of the Puṣkarārdha island, each of the suns and the moons lying therein are each 144. The moons and the suns each lying in the first ring of the Puṣkaravara sea, are each 288. In this way in the each of successive ring of the successive island or sea,

from the first ring, on the first ring, the number of moons and that of the suns have gone doubling successively upto the Svayaṁbhūramaṇa sea. Out of them the last abstraction is related

The number of the moons and the suns, each in the first ring of the Svayaṁbhūramaṇa sea is given by the formula

$$\frac{9L}{2800000} + \frac{27}{4} \qquad \text{.....(7.107)}$$

There is the Puṣkarārdha island, outwards of the mānuṣottara mountain. In its first ring, the number of the moons-suns is 144 and 144 respectively. In its second, third etc. rings, the number of each increased by four, there are 148, 152, 156, 160, 164, 172, 176, 180, ... In this way this increase goes on upto the last ring of the Puṣkarārdha island, and in the first ring of the Puṣkaravara sea ahead of the island, this numbertwice of much, i.e. $144 \times 2 = 288$. This set, in the first ring of every island-sea is twice as such, hence in the serial order of common-difference increase, this first ring has been left out.

FINDING OUT INTERVAL BETWEEN MOONS-SUNS IN THE FIRST RING AHEAD OF MĀNUṢOTTARA MOUNTAIN

The first ring is 50000 yojanas ahead of mānuṣottara mountain is 45,00000 yojanas. When the ring diameter of the lateral both sides, each being 50000 (totalling to 100000 yojanas) is added to the former, the linear-diameter becomes 4500000 + 100000 = 4600000. Its rough circumference is $4600000 \times 3 = 13800000$ yojanas. This is divided by the number of moons and suns, that is, 288 corresponding to ring diameter, and the quotient is reduced by the width of the both images, giving the interval between them as

$$\frac{13800000}{288} - \frac{104}{61} = 47914\,\frac{176}{183} \text{ yojanas.} \qquad \text{.....(7.108)}$$

Here Āryikā Viśuddhamati (TPT(V)), p.422, has raised a question whether the sum $\frac{56}{61} + \frac{48}{61} = \frac{104}{61}$ as deduced from the linear diameter is a correct process. She calculates

$\frac{13800000}{144} - \frac{56}{61} = 95824$ and $\frac{575000}{6} - \frac{48}{61} = 95825\frac{1}{3}$ yojanas, the former being the interval between moon and moon and the latter being that between two suns.

INTERVAL BETWEEN THE MOONS-SUNS SITUATED ON THE SECOND RING AHEAD OF THE MĀNUṢOTTARA

In every ring the common difference of increment of the moon and suns is 4 for each. Hence, in the second ring there measure is 148 + 148 = 296. This second ring is 100000 yojanas ahead of the first ring. There the width of the ring in the lateral parts is 100000 yojanas for each, hence the linear diameter of the second ring is 4600000 + 200000 = 4800000 yojanas. According to the rule, here the interval between the moons and suns is as follows -

$$\left(\frac{4800000 \times 3}{296} = \frac{1800000}{37}\right) - \frac{104}{61} = \frac{109796152}{2257} = 48646\frac{2110}{2257} \text{ yojanas.}$$

.....(7.109)

Out of these the last observation is described:

The linear diameter of the first ring of the Svayaṁbhūramaṇa sea is $\frac{L}{14}$ - 150000 yojanas, and the rough circumference of this ring is 3 - ($\frac{L}{14}$ - 1500000 + 100000 yojanas).

The number of moons in this ring is $\frac{L \times 9}{2800000} + \frac{27}{4}$. The number of suns is also the same. Hence on making it double we get $\left(\frac{L \times 9}{2800000} + \frac{27}{4}\right) \times 2$. The width of lunar-solar discs is $\frac{56}{61} + \frac{48}{61} = \frac{104}{61}$ yojanas. Here also, as before, the interval between the moon-sun is given by

$$\frac{3\left(\frac{L}{14} - 1500000 + 100000\right)}{2\left(\frac{L.9}{2800000} + \frac{27}{4}\right)} - \frac{104}{61}$$

$$(\frac{1}{14} \times \frac{1400000}{3}) - \frac{104}{61} = 33331\frac{115}{183} \text{ yojanas} \quad \text{.....(7.110)}$$

Here, after reduction, the terms 150000; 100000 and $\frac{27}{4}$ are insignificant in comparision with universe-line, hence they have been neglected.

INTERVAL BETWEEN THE MOON-SUN IN THE LAST RING OF SVAYAṂBHŪRAMAṆA SEA:

The outer linear diameter of the Svayaṁbhūramaṇa sea is 1 rāju or $\frac{L}{7}$. On adding 100000 and multiplication by 3 we get the rough circumference as 3 ($\frac{L}{7}$ + 100000). In the innumerate islands and seas, the total number of rings of all the moons-suns is $\frac{L}{1400000}$ - 23 and half of this total number of rings is $\frac{L}{2800000} - \frac{23}{2}$, which is the number of rings of the Svayaṁbhūramaṇa sea. Here the measure of each of moons-suns is $2(\frac{L.9}{2800000} + \frac{27}{4})$.

.....(7.111)

Now, the formula for obtaining the measure of the moons-suns in the last ring is -

first term + (number of rings - 1) $\times$ common difference

or, $2(\frac{L.9}{2800000} + \frac{27}{4}) + (\frac{L}{2800000} - \frac{23}{2} - \frac{1}{1}) \times 4$

$2(\frac{9L}{2800000} + \frac{27}{4}) + (\frac{L}{2800000} - \frac{25}{2}) \times 4$

$(\frac{9L}{1400000} + \frac{27}{4}) + \frac{4L}{1400000} - 50)$ .....(7.113)

Now, $\frac{13L}{1400000}$ is the measure of all mons-suns of the last ring.

The rough circumference Svayaṁbhūramaṇa sea is divided by $\frac{13L}{1400000}$,

and on reducing it by $\frac{104}{61}$ yojanas,

the interval between moons and suns in the last ring is obtained as

$$\frac{3\left(\frac{L}{7}+100000\right)}{\frac{13\ L}{1400000}}-\frac{104}{61}$$

or $\frac{3\ L}{7}\times\frac{140000}{13\ L}-\frac{104}{61}$ yojanas

or $\frac{3}{1}\times\frac{200000}{13}-\frac{104}{61}$

or $\frac{600000}{13}-\frac{104}{61}$ yojanas

or $46152\frac{112}{793}$ yojanas .....(7.114)

This gives the last description about the fixed astral bodies in the universe.

♦ ♦ ♦

CHAPTER VIII

(AṬṬHAMO MAHĀHIYĀRO)

INTRODUCTION

The chapter deals with the knowledge of the divine universe (suraloya) in 21 topics. These include their residential dimension extending to a height of 7 rājus, excluded by some empty spatial heights. Formulas are given for successive decrease or increase in the diameter of the chief celestial plane of the divine beings. The dimensions in the vertical directions of different types of divine worlds are also given. The celestial plane in various divine worlds, in the case of the serially ordered (śreṇibaddha), have been totalled with the help of formulas. Geometrical progression and arithmetical progression are thus given in various cases. Maximum ages of the divine beings are given in terms of great instant-sets, the sāgara and the palya, already described for their values of cardinality. Their age corresponds to the interval between their consecutive food-intake. Some black holes are also described, near which some types of divine beings reside. Clairvoyance possession is also mentioned. Number for certain divine beings are also given for different divine beings in different celestial worlds.

Symbolism

(v.8.7)

The jagaśreṇi is denoted by a bar $-$. When it is divided by 7 , it becomes a rāju written as $\bar{7}$ or $\frac{L}{7}$.

Minus is denoted by riṇa (रिण) or ri (रि) alone. Rod measure is denoted by daṇḍa or दंड । bā appears for bāla (hair) or बा for बाल ।

(v.8.9)

Yo or यो appears for yojana.

(vv.8.12 et seq.)

Same place value appears with digits from right to left. Rāsi (रासि) word appears for set.

(v.8.37)

For example, the number 3293548 $\left|\begin{matrix}12\\31\end{matrix}\right|$ is written as thirty-two lac, ninety-three thousand five hundred and forty-eight

(बत्तीसं चिय लक्खा तेण उदिसहस्स पण सयाणिं अडदाल जोयणाणि बारस भागा फलिहरुंदो)।

३२९३५४८ । $\begin{matrix}१२\\३१\end{matrix}$

(v.8.176)

The symbol for zero is a circle or a point in this verse showing the absence. it is like 0.

(v.8.402)

The Ko (को) is the symbol for kośa.

(v.8.495)

The symbol for fraction (kalā) or numerator is Ka (क)

(v.8.549)

The symbol for diṇa is Di or (दि) and the symbol for māsa is Mā or (मा)

(v.8.571)

The symbol for sāgara is Sā or (सा)

(v.8.658)

The symbol for aṅgula is Aṁ or (अं)

(v.8.694)

The symbol for palya is Pa or (प)

The symbol for the numerate (saṁkhyāta) is २

MATHEMATICAL CONTENTS

(vv. 8.6-7)

The upper universe stands from the bottom of the Meru upto the accomplished beings universe, with a measure of seven rājus. Out of this the middle universe is equivalent to the height of meru, i.e., 100040 yojanas. From the peak of meru, the celestial heaven paradise begins, just after an interval of a hair of the best pleasure-land's human.

At the end of the universe, there is the thin air envelop with a height of 1575 dhanuṣas, the thick dense air envelop is 1 kośa, and the dense water air envelop is 2 kośas. The rock of the accomplished is 8 yojanas thick in the central portion.and below this, the flag-staff of the Sarvārthasiddhi celestial plane is 12 yojanas below.

In this way, from the end of the universe [(12 + 8) + (1 yojana - 425 dhanuṣas)]

or 21 yojanas as reduced by 425 dhanuṣas below, and from the meru's bottom 100040 yojanas + 1 hair over, i.e., the paradise universe is in the extension height of 7 rājus - [(100040 yojanas + 1 hair) + (21 yojanas - 425 dhanuṣas)].

(vv. 8.19-20)

The width of first Ṛtu plane or first disc is 45 lac yojanas as the diameter of the human region.

The width of the last disc's celestial plane of Sarvārthasiddhi is 1 lac yojanas as that of the Jambū island. On subtraction, one gets 4400000 yojanas.

On dividing these by the number of the chief (indrakas) as reduced by unity, i.e., (63 - 1) or 62,

we get $(4400000 \div 62) = 70967\frac{23}{31}$ yojanas as the decrease or increase measure.

For details of the width of 63 celestial planes vide the index given in TPT(V), p. 460, vol.3.

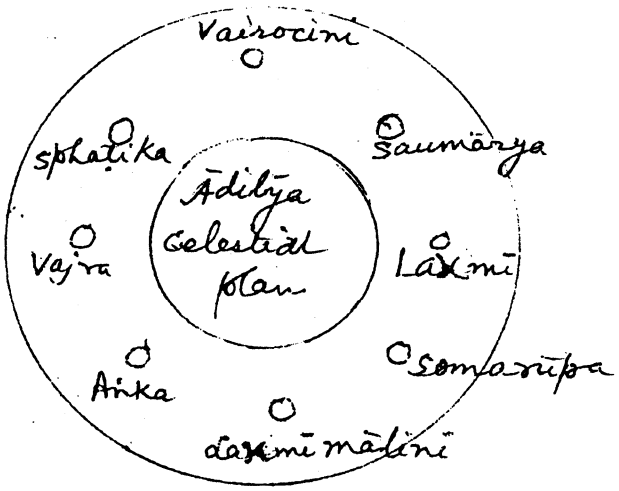
(v. 8.119)

The measurement giving the extension of height of the 12 kalpas is as follows:

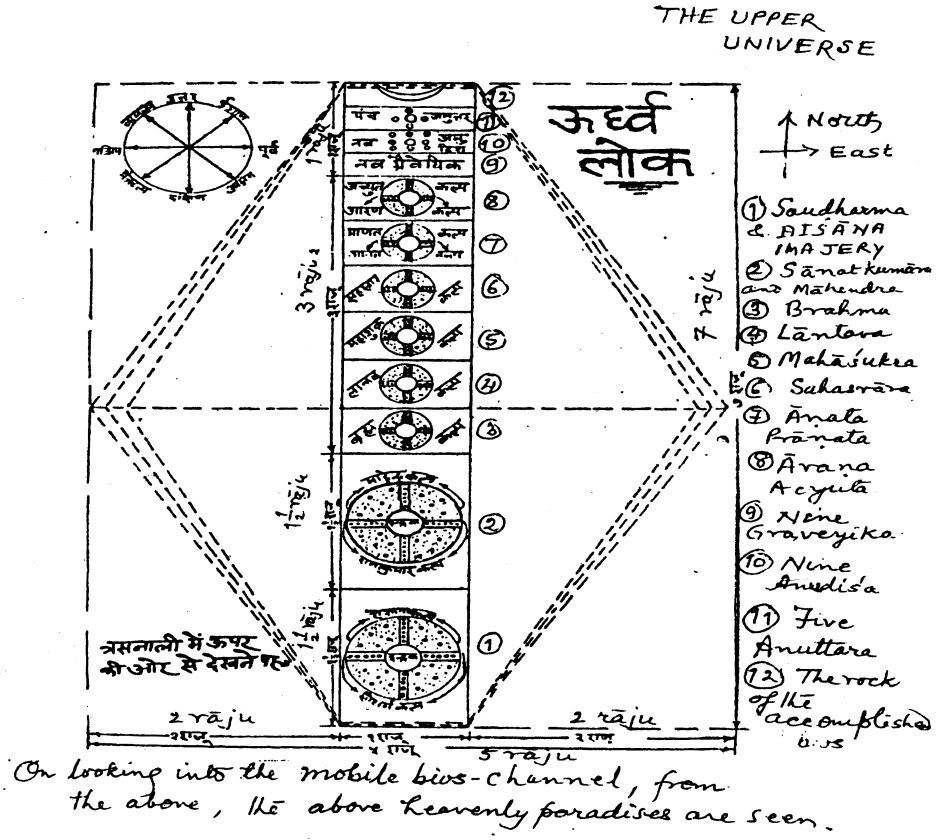
TABLE 8.1

1. Saudharma	$1\frac{1}{2}$	rājus
2. Īśāna	$1\frac{1}{2}$	rājus
3. Sānatkumāra	$1\frac{1}{2}$	rājus
4. Māhendra	$1\frac{1}{2}$	rājus
5. Brahma-Brahmottara	$\frac{1}{2}$	rāju
6. Lāntava-Kāpiṣṭha	$\frac{1}{2}$	rāju
7. Śukra-Mahāśukra	$\frac{1}{2}$	rāju
8. Śatāra-Sahasrāra	$\frac{1}{2}$	rāju
9. Ānata	$\frac{1}{2}$	rāju
10. Prāṇata	$\frac{1}{2}$	rāju
11. Āraṇa	$\frac{1}{2}$	rāju
12. Acyuta	$\frac{1}{2}$	rāju

(vv. 8.123-124)



The eastern etc. direction planes are ordered in a series, and the rest are scattered planes.



(vv. 8.156 et seq.)

These verses are concerned with finding out the sum of an arithmetical progression when the number of terms (gaccha), first term (mukha) and the initial sum (ādi dhana) and post-(common difference)-sum (uttara dhana) etc. are given in different cases.

The formula is

Ordered in a series plane in every imagery (kalpa)

= {(first term × 2 + common difference)

$$\text{- (number of terms} \times \text{common difference)}\} \times \frac{\text{number of terms}}{2} \qquad \text{.....(8.1)}$$

For example, the number of terms in the Saudharma kalpa is 31 indrakas, the first terms is 186, and the negative common difference is 3. Hence, according to the above formula, the serially ordered (śreṇibaddha) planes are

$$= [(186 \times 2 + 3) - (31 \times 3)] \times \frac{31}{2} = 4371. \qquad \text{.....(8.2)}$$

Similarly, the śreṇibaddha planes for other imageries may be found out, through the same formula. When the indraka planes are added to we get 31 + 4371 planes. The total planes of Saudharma imagery is 3200000, hence the scattered planes are 3195598.

(vv.8.309-310)

The family deities of Saudharma and Īśāna indras and subsequent imagery indras upto Mahāśukra are given as

16000 | 8000 | 4000 | 2000 | 1000 |

which is a geometric regression with $\frac{1}{2}$ as the common ratio.

(v. 8.315)

The senior deities of Saudharma, Ānata four indras are given by

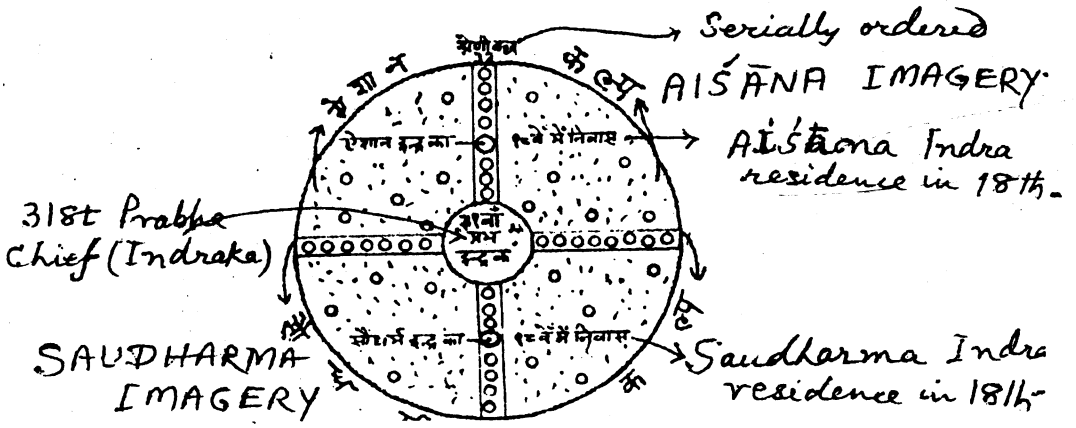
16000 | 32000 | 64000 | 128000 | 256000 | 512000 | 1024000 |

which is a geometric progression with 2 as common ratio.

(vv. 8. 341-342)

The figure of this description is as follows:

The 3187 indrakas from the first, the so called Prabha has Saudharma indra as situated in 18th in the serially ordered 32 planes, and just opposite in the north is that of the Īśāna:



(v. 8. 493)

The Saudharma couple has at its last place the maximal longevity as 2 sāgaras. In this way, maximal age has been defined for the divine beings.

(vv. 8. 544)

In the first couple, the total number of discs (number of terms) or gaccha is 31, and relative to ghāta āyuṣka, the minimal and maximal longevity. The first term is $\frac{1}{2}$ sāgaropama and $2\frac{1}{2}$ sāgaropama is the base, signifying the minimal and maximal longevity. Hence the measure of the difference between these is to be divided by the number of terms as reduced by unity for getting the increase or decrease.

Here,

$$\frac{1}{15} \text{ sāgara} = (\frac{5}{2} \text{ sāgara} - \frac{1}{2} \text{ sāgara}) \div (31 - 1). \qquad \text{.....(8.3)}$$

* Similarly, this amount is multiplied by the number of discs as reduced by unity, and added to first term gives the measure of longevity in the chosen disc.

For example, in the Vimala, it is

$$\frac{17}{30} \text{ sāgara} = [\frac{1}{15} \text{ sāgara} \times (2 - 1)] + \frac{1}{2} \text{ sāgara} \quad \text{.....(8.4)}$$

* Similarly, the measure of increase and decrease in the longevity is given by the following, in the four discs Brahma-Brahmottara as -

$$(10\frac{1}{2} - 7\frac{1}{2}) \div 4 \text{ height} = \frac{3}{4} \text{ sāgara} \quad \text{.....(8.5)}$$

This amount is to be added to $7\frac{1}{2}$ for getting that at Ariṣṭa-

Thus it is $7\frac{1}{2} + \frac{3}{4} = 8\frac{1}{4}$ sāgaras.

(vv. 8.551 et seq.)

Here is an important correspondence between the longevity and the interval between his food-intake which may be mental and not physical. Thus the deity whose longevity is one sāgaropama, he takes mental food in 1000 years. The deity takes food in as many thousand of years after, as is the number of sāgaropama of his longety. The deity who lives for a palya, he takes food after five days of interval. Similarly food-take interval for various types of divine beings has been defined. Now the frequency of breath per muhūrta is also defined. For example, whatever period has been given for food interval, the very number of respirations are taken by the divine being per muhūrta.

Thus the proportional symmetry is maintained here.

(vv. 8.596 et seq.)

The Nandīśvara sea is surrounded by the ninth island, Aruṇavara, which is further surrounded by the ninth Aruṇavara sea. The diameter of this is ringly shaped sea is 13107200000 yojanas. From the outer boundary of the Aruṇavara island or the inner boundary of the Aruṇavara sea. There is situated a ring shaped darkness in the sky, called the

Ariṣṭa, at a distance of 1721 yojanas, and it covers the first four imageries (kalpas), partially, and gets collected at the bottom of the Ariṣṭa indraka. There it has the shape of the hen's cottage, or like a cone-shaped vessel, with vertex at the top. That very is the structure of this darkness matter. From the bottom part of this Ariṣṭa celestial plane, having the shape of axis-joint, or like the altar of yamakā, this darkness has divided into eight series (śreṇis). These rows of darkness in shape of drums, go to the end of the universe in all the four directions, each divided into and becoming oblique. In the interval betwen those dark rows in the eight directions, the Laukāntika deities, called Sārasvata etc. reside. (This information is based on the Lokavibhāga and V volume of the Tattvārtha Śloka Vārtikālaṅkāra). That darkness is supposed to be the black manifestation or event of the matter and is eternal.

(vv. 8. 601 et seq.)

The illustration of the Laukāntika deity is as follows, as found on looking into the mobile bios channel (trasa nālī).

TABLE 8.2

1. Sārasvata	700
2. Annyābha	7007
and Sūryābha	9009
3. Āditya	700
4. Chandrābha	11011
and Suryābha(Satyābha)	13013
5. Vahni	7007
6. Śreyaskara	15015
and Kṣemaṅkara	17017
7. Aruṇa	7007
8.Vṛṣakoṣṭha	19019
and Kāmadhara	21021
9. Gardatoya	9009
10. Nirmāṇarāja	23023

and Digantarakṣita	25025
11. Tuṣita	9009
12 Ātmarakṣa	27027
and Sarvarakṣa	29029
13. Avyābādha	11011
14. Maruta	31031
and Vasudeva	33033
15. Ariṣṭa	11011
16. Aśva	35035
and Viśva	37037

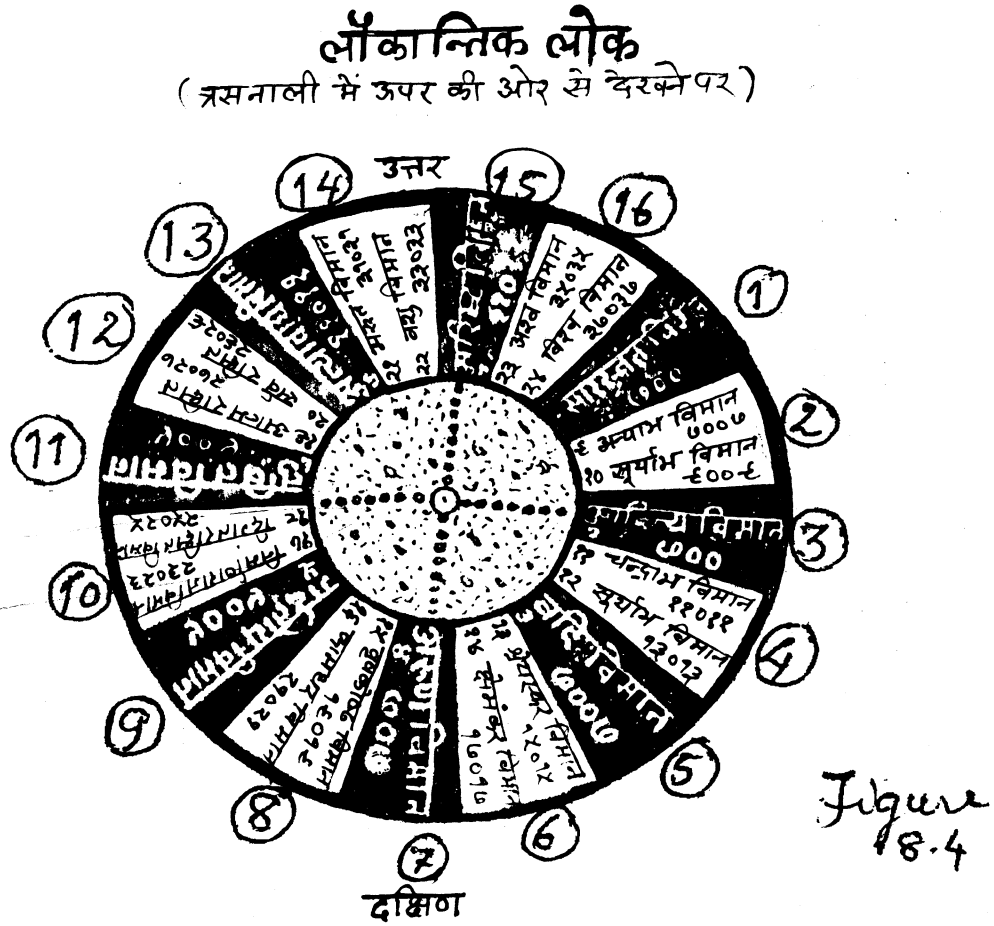
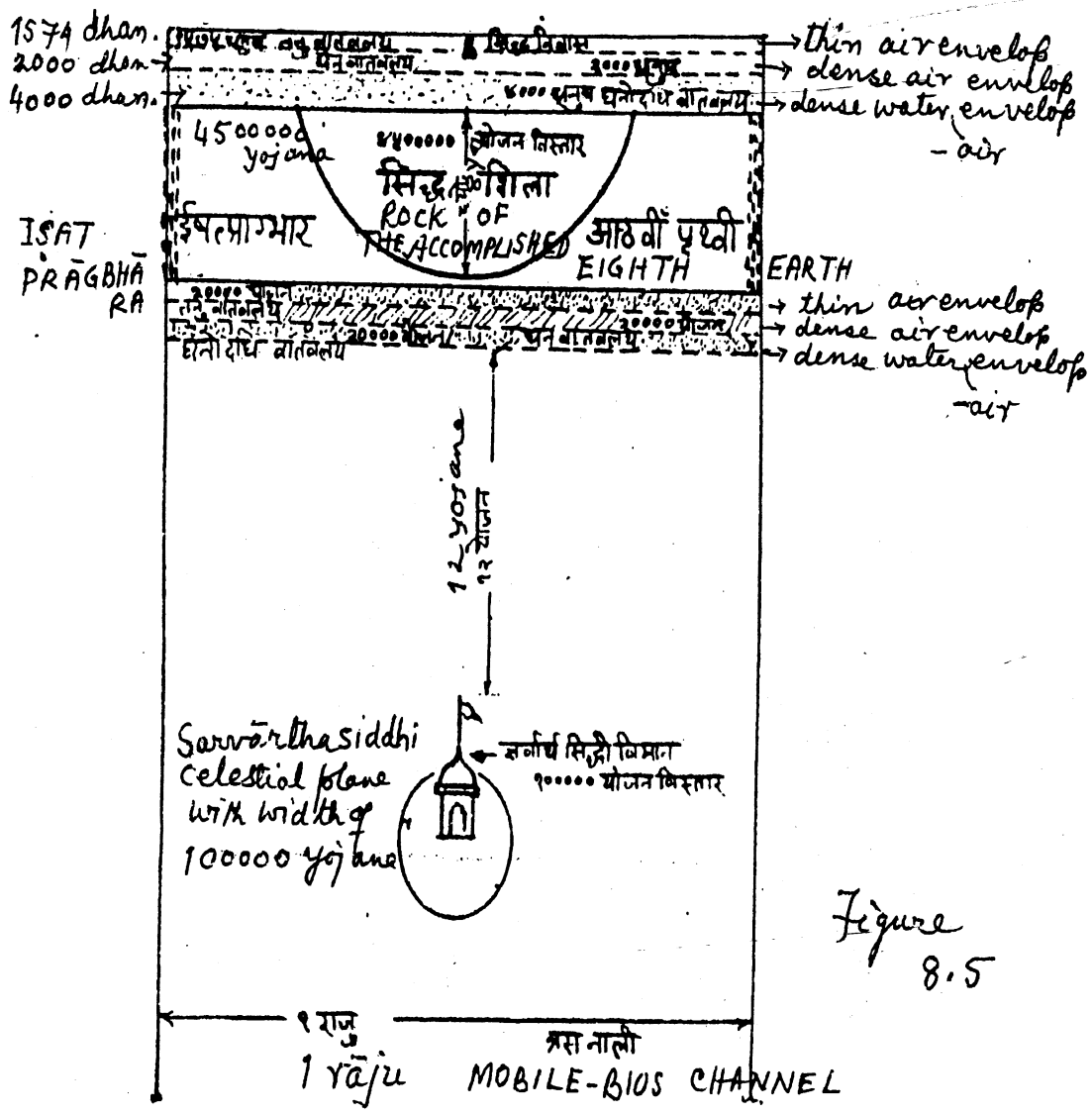


Figure 18.4

There are variant readings also, there is an important information about the Laukāntika deities as they have no family, know eleven parts of the scripture, are pure due to serene vision, naturally (satisfied and) fulfilled and attain liberation after only one human birth, and are without all sufferings. Their virtues are great.

(vv. 8. 652 et seq.)

These verses describe the eight earths which is 12 yojanas above the flagstaff of Sarvārthasiddhi indraka. The following figure is self explanatory.



(vv. 8. 685 et seq.)

These verses describe regions and the measure of the fluent or material particles which are the limits of the clairvoyance possessed by the various types of deities.

Whatever subjective regions of various types of clairvoyance possessed by the celestial-planed deities and whatever are the points of the region (pradeśa) are to be collected and established.

So also the Karmic ultimate particles of own clairvoyance knowledge screening in state without natural accumulation fluent (visrasopacaya) are established on one side.

Then this clairvoyance knowledge-screening fluent is divided for the first time by the constant divisor (dhruvahāra), and at this instant one point or pradeśa be subtracted from the point-set of the region point-set.

Similarly, for the second time, third time and so on. Thus, this process is to be carried out with the resulting quotient set every time, and one is to be reduced every time from the point-set of the region corresponding to the clairvoyance knowledge.

This process is to be carried on with the constant divisor till on the points of the point-set of the region are exhausted.

At the end, the resulting quotient set gives the amount of material object which could be observed by the celestial planed deity through his clairvoyance eye.

Example-

Let there be ten points in the region of clairvoyance, and the ultimate particle of Karmic molecule (-set) corresponding to clairvoyance knowledge-screening without natural accumulation fluent (visrasopacaya drvya) are given to be 100000000000.

Let the constant divisor be $\frac{1}{5}$. Then we have the following table of calculation for ultimately finding out the material molecule (pudgala skandha) which is observed or known by the celestial planed deity, through his clairvoyance eye.

Of course, the amount of the clairvoyance knowledge-screening fluent particles are different for different deity according to their rank and position.

TABLE 8.3

Measure of the region point-set	Fluent of the clairvoyance knowledge-screening Karma
10 points	100000000000

10 - 1 = 9	$(10)^{11} \div 5$	=	$2\,(10)^{10}$
9 - 1 = 8	$(10)^{10} \div 5$	=	$4\,(10)^{9}$
8 - 1 = 7	$4(10)^{9} \div 5$	=	$8\,(10)^{8}$
7 - 1 = 6	$8(10)^{8} \div 5$	=	$16\,(10)^{7}$
6 - 1 = 5	$16(10)^{7} \div 5$	=	$32\,(10)^{6}$
5 - 1 = 4	$32(10)^{6} \div 5$	=	$64\,(10)^{5}$
4 - 1 = 3	$64(10)^{5} \div 5$	=	$128\,(10)^{4}$
3 - 1 = 2	$128(10)^{4} \div 5$	=	$256\,(10)^{3}$
2 - 1 = 1	$256(10)^{3} \div 5$	=	$512\,(10)^{2}$
1 - 1 = 0	$512(10)^{2} \div 5$	=	$1024\,(10)^{1}$

In the following verses, the measure of the number of celestial plane deities are given, which are given in terms of the instant-sets palya, and rāju, cubic finger or ghanāṅgula. For example, the number of deities in the Saudharma Īśāna couple is given by the product of the universe-line and the third squareroot of cubic finger or $L(F^3)^{(\frac{1}{2})^3}$. Similarly, the number in the second couple is given by the division of universe-line by the eleventh squareroot of the universe-line itself. This is the same as $L \div (L)^{(\frac{1}{2})^{11}}$

Here रि denotes the innumerate and प is palya, the division quotient $\frac{\text{प}}{\text{रि}}$ or $\frac{P}{A}$ gives the number of deities in the remaining two kalpas, after Sahasrāra imagery (kalpa). Vide TPT(V), pp. 614-615.

✪✪✪

CHAPTER NINTH

(NAVAMO MAHĀDHIYĀRO)

(vv. 9.3 et seq.)

See the figure 8.5. Above the eighth earth, at the end there is the dense water-air envelop with a height of 4000 dhanuṣas, the dense air envelop with a height of 2000 dhanuṣa and the thin air envelop with a height of 1575 dhanuṣas. The accomplished supremely worshipped reside in the thin air envelop and their maximal height or immersion is 525 dhanuṣas. The remaining height, thus, lying vacant is 7050 dhanuṣas, that is (4000 + 2000 + 1575 - 525) dhanuṣas.

* The residence of the accomplished souls has a diameter of 45 lac yojanas, like that of the human universe and the maximal height of the accomplished souls is 525 dhanuṣas. The volume is thus taken out as follows:

The circumference of the residence of the accomplished

$$= \sqrt{(45 \text{ lac})^2} \times 10 = 14230249 \text{ yojanas} \quad \text{.....(9.1)}$$

The volume of the accomplished region

$$= (\text{circumference}) \times (\frac{\text{Diameter}}{4}) \times (\text{height})$$

$$= (\frac{14230249}{1}) \times (\frac{4500000}{4}) \times (\frac{525}{2000 \times 4}) \text{ cubic yojanas}$$

$$= \frac{8404740815625}{8} \text{ cubic yojanas} \quad \text{.....(9.2)}$$

$$= 10505926119153\frac{1}{8} \text{ cubic yojanas.}$$

* The number of accomplished souls at the present instant

= [(Instant in the post time ÷ (6 months 8 instants)] × 592

The minimal height of the accomplished souls

$= 3\frac{1}{2}$ hātha .

The maximal height of the accomplished souls is found by dividing the product of the thickness of the thin air envelop and five hundred by 1500,

that is (1575 × 500) ÷ 1500 = 525 dhanuṣas.

* In order to find out the maximal immersion of the accomplished souls, we know that the thickness of the thin air-envelop is 1575 dhanuṣa, relative to pramāṇaṅgula and the immersion (maximal or minimal) of the accomplished is relative to vyavahāra aṅgula. On multiplying the thickness by 500, we get 1575 × 500 = 187500 vyavahāra aṅgulas. The supreme accomplished are situated in one part of the thin air envelop at most.

When $(525 \times \frac{2}{3}) = 350$ has one part, how many there could be of 787500 ? Thus we get $\frac{787500}{350} = 2250$ parts. These 2250 parts in vyavahāra dhanuṣas. For converting them into pramāṇa aṅgula, we divide these by 500, getting $\frac{2250}{500} = 4\frac{1}{2}$ or $\frac{9}{2}$ pramāṇa dhanuṣas.

When 2050 or $\frac{9}{2}$ parts have a place for 1575 dhanuṣas, then what will be for one part ?

Thus, by rule of three, $\frac{1575 \times 2}{9} = 350$ dhanuṣas give the maximal immersion.

Similarly the minimal immersion may be found out to be $\frac{7}{3}$ hātha.

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ERRATA

Pages No.	Incorrect word	Correct word	Line no from above
76	Krośas	Kośa	1
76	Krośas	Kośa	2
76	ractical	practical	28
77	Thrd	Third	5
82	Umiverse	Universe	25
83	nad	and	27
86	anbitrary	arbitrary	14
86	eath	earth	22
96	obliqne	Oblique	11
97	evelops	envelops	14
115	name	same	21
127	whet	what	21
128	abtained	obtained	22
140	ninety-	ninety-nine	7
145	mukh	top (mukh)	5
152	lthe	the	25
174	givs	gives	25
177	aphoriom	aphorism	15
181	thesond	thousand	6
183	Lavan	Lavaṇa	23
188	prjected	projected	9
196	undevelped	undeveloped	13
205	mentined	mentioned	8
206	minety	ninety	13
225	twety	twenty	8
236	cancel second line after "m"	and third line before "a"	2 &3
241	penultimalte	penultimate	7
258	sum	sun	17
263	consellation	constellation	26
264	constellion	constellation	12
269	equnox	equinox	9
269	orbilal	orbital	30
250	mutuplied	multiplied	21
285	norhem	northern	9
289	clairvayance	clairvoyance	23
291	spac	space	5
293	nuiverse	ùniverse	17
293	complte	complete	29

Pages No.	Incorrect word	Correct word	Line no from above
294	denots	denotes	
295	symblism	symbolism	12
296	contiainod	contained	8,10
296	contianod	contained	9
296	wich	which	9
305	mesure	measure	24
306	cylemder	cylinder	24
306	diemeter	diameter	6
314	seetion	section	12
316	trapzium	trapezium	20
316	spectific	specific	13
321	toto	to	20
322	trapzium	trapezium	20
327	nter	inter	22
326	comentry	commentary	9
334	smae	same	7
334	commonor	common or	13
339	n..ns	means	16
341	Fo rth	forth	16
343	portaions	portion	6
343	auther	author	8
364	rajus	rājūs	5
368	frustrum	frustum	9
370	frustrum	frustum	5
370	frustrum	frustum	15
374	yojan	yojana	5
374	outher	author	11
382	oexpression	expression	27
401	resalta	result	13
404	Geo	Geometrical	8
408	typs	types	3
411	attantion	attention	6
412	experesse	express	21
413	experessed	expressed	14
422	abtained	obtained	11
425	calculeted	calculated	9
435	smoller	smaller	12
435	ganges	Gaṅgă	18
441	mathemeties	mathematics	31
443	fiture	future	17
446	th	the	11

Pages No.	Incorrect word	Correct word	Line no from above
448	Aa	Aau	10
448	avi	avibhāgī	28
450	subject	subjected	5
452	ses	set	14
453	mathematies	mathematics	9
460	obcissance	obeisance	10
465	untuous	unctuous	18
466	Psi	Rsi	27
471	alki	Kalkī	4
474	en	of given	16
481	frustrums	frustum	8,9
488	increasa	increase	13
490	Th	The Northern	18
492	g	given	16
498	va	vana group	20
510	circmference	circumference	9
511	masure	measure	11
524	aera	area	10
528	adoptad	adopted	10
530	ain	again	17
534	In	It	21
537	haning	having	3
540	kos'a	kośas	5
546	takin	taking	8
549	are a	area	5
557	s	has a	6
558	desi d	desired	20
559	if	of	10
561	casse	case	16
567	K	Ks (n'-1)	18
585	mula	formula	3
586	yojana	yojanas	15
586	entermidiate	intermediate	16
586	yojana	yojanas	17
591	08	108	13
593	a-a	area	1
593	000000	400000	14
594	se	, seas	2
594	increasse	increase	27

Pages No.	Incorrect word	Correct word	Line no from above
600	cube	cubic	10
608	r	air	9
613	msasure	measure	4
614	bidied	bodied	15
615	bidied	bodied	9
615	stracted	subtracted	13
620	BIOSET	BOIS SET	21
630	metioned	mentioned	26
633	con-on	common	1
634	tative	vegetative	17
635	re	fire	10
635	attainmeet	attainment	14
637	attainmet	attainment	12
641	maximas	maximal	9
641	eareh	earth	16
648	bodies	bodied	8
650	nimerate	numerate	8
650	develope	developed	13
650	voluma	volume	16
651	iudinidual	individual	8
651	bio	bios	15
652	cublic	cubic	13
660	oons	the moons	17
661	o	of	3
661	who	whose	26
662	eighta	eight	1
662	heliacal	helical	10
663	gre	great	13
663	T	ī	13
668	breadh	breadth	19
668	oied	cuboid	19
668	circufernce	circumference	27
669	middla	middle	20
671	uppon	upon	8
671	uppon	upon	9
677	hights	heights	1
677	d.	wards	7
677	consequetty	consequently	9
677	earh	earth	12
678	hight	height	24
678	lowerst	lowest	26
678	hights	heights	28

Pages No.	Incorrect word	Correct word	Line no from above
679	innease	increase	1
680	perihetion	perihelion	3
680	eqation	equation	11
683	amore	and more	8
683	trangress	transgress	9
683	staes	states	12
695	repetion	repetition	10
695	equatio	equation	14
695	repetion	repetition	10
695	equatio	equation	14
695	indetermnates	indeterminates	22
696	nnumber	number	16
697	g	get	8
700	terns	terms	3
703	erthis	earth is	6
706	montain	mountain	13
707	descrisption	description	5
707	verre	verse	5
709	circunferance	circumference	14
710	and	end	23
710	convrse	converse	25
711	cotradictory	contradictory	11
714	toto	to	14
718	----	moon's	16
718	alsi	also	17
721	innewrnost	innermost	1
721	orbitrarily	arbitrarily	21
722	obraied	obtained	2
722	obtaied	obtained	3
725	heuse	hence	7
728	mountion	mountain	18
731	loss	less	3
731	unabla	unable	6
732	extinet	extinct	12
744	squased	squared	1
744	The	x	3
745	te	the	4
751	mons	moons	1

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Remarks on the Work of Professor L.C. Jain

No doubt, your books are of outstanding significance. Zimmer (Philosophy of India) has stated that Jainism is the most ancient tradition of India and is either coexisting with Vedas, if not earlier. Your books are of very general significance and valuable, needed and timely contribution to an aspect of India, for which we are all indebted and proud.

Professor R.K. Mishra,
M.D., D.Sc. (Berlin, Montreal),
Formerly at A.I. I. M.S.,
President, International Institute of Biophysics,
Kaiserslautein, Germany

I have had the privilege of going through the publication series of "Exact Sciences in the Karma Antiquity, vol. I and vol. II. The authors have tried to reveal the various mysterious aspects of the Prakrit texts which form the basic foundation of the Karma Theory. This will be helpful for research workers, in delving deep into the past,when efforts were on towards science awakening, all over the world.

❒ ***Santosh Danpati***
M.C.A.

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● प्रकाशक का निवेदन ●

कुछ अप्रत्याशित बाधाएं आ जाने के कारण प्रस्तुत प्रकाशन के तीन भागों के सेट का मुद्रण फीका हुआ है, क्योंकि मुद्रण में प्रायः चार वर्षों का विलम्ब हो जाने के कारण बटर पेपर फीके पड़ते चले गये थे। साथ ही श्रुत संरक्षण एवं संवर्द्धन की दृष्टि से तत्काल मुद्रण कराना आवश्यक भी था। इसका अगला संस्करण स्पष्ट एवं विशेषताएं लिये हुए प्रकाशित होगा।



About the Co-author

She was born at Pindari Mandla (M.P.) on 1st July 1962. She passed B.A. and M.A. (Sanskrit) from the Saugar University. Then she topped the list of M.Phil. in 1993, from the Rani Durgavati University in Sanskrit. She was then awarded the Ph.D. from the same University in 1998.

Soon after her M.A. in 1984, she chose the way to asceticism and devoted herself to studies in Logic and Jaina Philosophy, Religion and Culture. She went on Lecturing and preaching and visited the Jaina World Conference on invitation from the Jain Convention United States of America. Then she became the Director of the Brahmi Sundari Prasthashram, Jabalpur in May, 1999. She also took over the charge of administrating the Acharya Shri Vidyasagar Research Institute, Jabalpur, soon after it came under the management of the Prasthashram. Well versed in Computer Techniques, she has been collaborating in publication works, like the INSA projects, of Professor L.C. Jain. She has to her credit, Joint authorship of the Tao of Jaina Sciences, the Labdhisara (vol.1) and a few research papers published in the IJHS and the Arhat Vachan.

She is the Chief editor of the digest magazine, "Rishabh Bharti" devoted for topics on humanities, social sciences, science and technology and Karma theory.

Recently, she has been engaged in organizing the publication of a series of volumes, on the Exact Sciences in the Karma Antiquity. She is also serving as adhoc lecturer in R.D. University, Jabalpur.


SOME GREAT SCIENTISTS OF THE WORLD
तमप्रभ
तमप्रभा
योजन
६००० योजन
८००० यो
— लोकाकाशमें स्वर्ग-नरक विभाग. —