



# THE PURPOSE OF JAINA MATHEMATICS

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## ABSTRACT

*Mathematics signifies accuracy and the lack of arbitrariness. Therefore, a philosophy which is not based on the arbitrary will of any 'Power' would need mathematical sciences to explain various happenings at micro and macro level in this cosmos on the basis of the universal laws of nature. Thus, the mathematics is not a luxury but a necessity in the Jaina philosophy. In general, we see the necessity of mathematics in describing the concepts of non-violence, Karma-theory and the autonomy of the functioning of the universe. In this connection, here we have also noted the importance of modern statistical and quantum mechanical concepts which are present in the Jaina Mathematics.*

## I. Introduction

One may ask - why did Jaina Ācāryas spend their time and energy in developing and describing mathematical concepts in the Jaina Philosophy? When we try to find the answer of this question then we would see that they wanted to convey the concepts useful for good life. They knew that for good life one needs an understanding of the truth, a trust in the truth and to follow the truth. To achieve these goals Jaina Ācāryas might have felt the necessity of mathematics in following ways :

(a) To describe the criteria of leading good life by way of non-violence by disturbing minimum number of lives.

(b) To describe the autonomy of the universe or cosmos to convey the truth that each soul is creator of its own destiny. Further, to lessen the unnecessary fear they wanted to let us know that all small and big events of the universe happen in an orderly and lawful manner, i.e., the universal laws are always obeyed.

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(c) To provide statistical information to support the journey of a traveller on the path of spiritual progress.

(d) To create the accurate framework of logic and to establish the consistency of various concepts and ideas.

In the following sections, we shall illustrate these points by taking some specific examples. During such attempts, we shall also see that various concepts of modern mathematical sciences such as Physics, Statistics, Quantum Mechanics are visible in ancient Jaina Mathematics.

## II. Non-violence and the Mathematical Logic

Many friends ask me, 'Why don't you eat things like potatoes? Potatoes have life but so do other green vegetables' The answer of such a scientific question needs a detailed description of *Sādharaṇa Vanaspati* as described in *Gommaṭasāra*.<sup>1</sup> There it is explained that the number of lives disturbed for the same food value (calorie and nutrients in modern language) is very large in vegetable like potatoes. Therefore, to minimize the violence one should avoid such food. The point is that without quantitative or mathematical words one can not understand this point.

Non-violence does not limit to disturbing the minimum number of lives. Jaina Ācāryas have also classified living beings in various categories (see Ref. 1,2) based on the number of senses possessed. It is expected even from a householder not to eat the food that has higher form of life, i.e., life having two or more than two senses called *Tras-Jīva*. Further, a person is advised not to consume the things which adversely affect the harmony of body and mind. All such criteria lead to the exclusion of things like alcohol, meat, eggs, addictive things, etc. from one's life.

## III. Autonomy and the Universal Laws

No any super being is required to administer this cosmos. The universe is being run by the universal laws. Each constituent of a substance follows definite laws. In modern science every movement of matter and energy of every change is based on the appropriate law of gravitation, the law of conservation of energy, the quantization rules etc. Similarly, Jaina Ācāryas also consider the activities of all constituents of this universe governed by the universal laws. The law of gravitation was operating before the discovery of the law of gravitation. Similarly, even if all the universal laws that govern the universe can not be



described in words but the nature follows these laws. We know very well that when a glass of water falls on a stone then it results into hundreds of its pieces of different size and shape at different locations. A scientist would say that though a computer may not solve the equations of motion to predict this breakage of the glass but every thing took place according to the definite laws. It is almost impossible to solve the equations of motion for approximately  $10^{24}$  glass particles, but the natural computer inherently present with each particle solves such equations in a fraction of a second and the event takes place in an 'orderly' way. To us this event appears as disorder but if you look at the laws of Physics and Chemistry then we would find that no any law has been broken and every thing happened in the 'lawful' way. Jaina Ācāryas also say same for all *Dravya* including *Jīva*. For *Jīva* the applicable laws are called the laws of Karma or Karma Theory. In nutshell, the picture of the universe and the universal laws as provided by Jaina Ācāryas may be described as follows :

(a) The cosmos has six kinds of *Dravyas*<sup>3</sup> :

- (i) *Jīva* (infinite)
- (ii) *Pudgala* (infinite)
- (iii) *Dharma* (one)
- (iv) *Adharma* (one)
- (v) *Ākāśa* or space (one)
- (vi) *Kāla* (innumerable).

The volume of the whole space is infinite but the space that contains *Dravya* other than space is limited and is called *Lokākāśa* ; beyond *Lokākāśa* there is only space (not other five kinds of *Dravya*) and that apart of space is called *Alokākāśa*. *Lokākāśa* has a definite shape and size, its volume is 343 cubic *Rājū* and its height is 14 *Rājū* <sup>4</sup>.

(b) There are definite laws of combination of *Pudgala Paramāṇu*. Following *Sūtra* describe some of these laws<sup>5</sup> :

सिग्ध – रुक्षत्वाद्बन्धः *Snigdha rūkṣatvādbandhaḥ* [33]

न जघन्य – गुणानाम् *Na jaghanya guṇānām* [34]

गुण साम्ये सदृशानाम् *Guṇasāmye sadraśānām* [35]

(d) द्वयधिकदि - गुणानां तु

द्वयधिकदि - गुणानां तु *Dvyādhikādiguṇānāmtu* [36]

बन्धेऽधिकौ परिणामिकौ च *Bandhe adhikau pariṇāmikau ca* [37]

The meaning of these *Sūtra* (not described here) is clear but it is difficult to interpret these *sūtra* in terms of modern scientific concepts due to the fact that *Pudgala Paramāṇu* is the ultimate entity of matter or energy and is not yet realized in modern science. The atom defined in Physics and Chemistry is very big entity and is a combination of many *Pudgala Paramāṇus*. Even Karmic dust of *Kārmāṇa Vargaṇā* is smaller than the atoms and molecules described in Physics/Chemistry. The modern science is progressive and, may be, one day it can reach to a micro-micro level of *Kārmāṇa Vargaṇā* (when? after 50, 100 or 200 ..... years? Nobody knows).

At least one point is clearly conveyed by these *Sūtra* : There are definite laws that govern the matter, i.e., nothing is random or arbitrary.

(c) In the following verse written by *Ācārya Kundakunda*<sup>6</sup> we note that nobody can create or destroy any particle or *Jiva* in absolute sense. Nobody can add any new attribute in any *Dravya*.

द्वयगुरस्स य आदा, ण कुणदि पोगलमयमिह कम्ममिह ।

तं उभयमकुव्वंतो, तमिह कहं तस्स सो कत्ता ॥

*Davyagunassa ya ādā ṇa kuṇadi poggalamayamhi kammamhi*

*Tam ubhayamakunivanto tamhi kaham tassa so kattā.* (104)

This verse makes says that nobody is creator of any thing in absolute sense and, therefore, in this cosmos the number of lives and the number of *Dravya* and *Pudgala Paramāṇu* can neither decrease nor can increase. Its interpretation in the modern scientific language is simple, it is the law of conservation of energy as well as the law of conservation of each kind of *Dravya*.

(d) There are definite Karmic laws. For example the following *Sūtra* describe the cause of influx of *Asātāvedanīya Karma* that brings pain and sufferings<sup>7</sup>

दुःख - शोक - तापाक्रन्दन - वध - परिवेव नान्यात्म - परोभय - स्थानाम्यसद्वेद्यस्य

*Dukha śoka tāpākrandana vadha paridevanatmaparobhayasth-  
ānānysadvedyasya* (6.11).



This *Sūtra* says that activities/thoughts of suffering, sorrow, guilt, destruction (killing), crying and weeping towards others and/or self lead to bondage with *Asātāvedanīya Karma* that results into more pain and sufferings.

Similarly, the following *Sūtra* gives the cause of influx of *Sātāvedanīya Karma* that brings pleasant solutions.<sup>8</sup>

भूत – व्रत्यनुकम्पादान – सरागसंयमादि योगः क्षान्ति शौच मिति सद्देयस्य ।

*Bhutavratyanukampadana saranga sanyamadi yogah ksantih saucamiti sadvedyasya* (6-12)

This *Sūtra* says that the compassion, kindness and charity towards living beings including pious persons, actions of disciplining mind and body, forgiveness, purity, etc. with some motives lead to bondage with *Sātāvedanīya Karma* that results into worldly pleasures and happiness.

For more Kamric laws one can refer to *Gomaṭasāra karmakāṇḍa*.<sup>9</sup>

(e). For the liberation also there is a definite process, In very logical way it is described by *Ācārya Kundkunda* in the following verse.<sup>10</sup>

अहमेको खलु सुद्धो, णिम्ममओ णाणदंसणसमगो ।

ताम्हि ठिदो तच्चित्तो, सव्वे एदे खयणेमि ॥

*Ahamekko khalu sudhdho, nimmamao nāṇadansanasamaggo ।*

*Tamhi thido taccitto savve ede khayam nemi ॥73॥*

All these points illustrate that all events happen according to the definite laws of nature and the mathematics is required to describe and explain such laws.

#### IV Statistics

Statistical information available in the Jain literature shows the level of scientific maturity of Jain *Ācāryas*. For example, consider the following information. The number of souls liberated is 608 in every 6 month and 8 *Samay*. Modern experts of Statistics can digest such concept but an ordinary lay person would say that why this number is same again and again. How is it possible? But in modern era of science, an expert knows that for an ensemble of very large number of constituents under a definite set of conditions various outcomes are almost definite. As an examples, the percentage of molecules evaporated per

second from a liquid pot under given conditions remains same. At this point one can again ask that the process of liberation does not happen same in all *Yuga* or *Kāla*; in *Pañcama Kāla* (*Kali Yuga*) it is almost zero then how is it possible that this number remains 608 even now? To seek the answer of this question and to see the consistency we need to consider all regions (5 *Bharat Kṣetra*, 5 *Erāvat Kṣetra*, etc., see Ref. 11) and need to note that in one region when there is fifth *Kāla* then there can be fourth *Kāla* in an other region and so on such that over all the sum of liberated souls may be same, i.e.,

$$\int_{\text{whole space}} \int_T \text{No. of souls liberated} = 608$$

here T = 6 months and 8 Samay

The purpose of this information is manifold. On one hand, it asserts that in some respects overall the universe is a homogeneous system and is operating under definite laws. On the other hand, it shows that the laws of nature or Karmic laws are always favourable to living beings: favourable in the sense that the net effect is the progress of the living beings; i.e., the direction of flow of the living beings is of spiritual growth. It may be considered as one of the best statements that describe the bright future of all living beings.

In *Gamaṭṣāra* (Ref. 9) we would find a large number of such statements with numbers. There, we would also see various numbers related with the *Bandh*, *Udaya*, *Vyuchiti* of various *Karma Prakṛti* in different *Guṇasthāna*. All such numbers and statements may act as road map and mile stones useful to a traveler on the spiritual path.

## V. Consistency

Number of *Pudgala Parmāṇu* existing in the *Lokākāśa* is infinite whereas the number of *Pradeśa* of space in the *Lokākāśa* is innumerable (not infinite). The space occupied by one *Pudgal Parmāṇu* is equal to one *Pradeśa*. The volume of one *Pradeśa* is very small but not zero. These statements look inconsistent on the first reading. However, the following verse of *Pravacanasāra* resolves this apparent contradiction.

आगासमणुणिविद्धं आगासपदेससण्णया भरिदं ।

सव्वेसिं च अणूणं सक्कदि तं देदुमवगासं ॥

*Āgāsamanuniviththam āgāsapadesasannāyā bhanidam*

*Savvesim ca anūṇaṁ sakkādi taṁ dedumavagāsaṁ 140*



The above verse says that though each *Pudgal Parmāṇu* occupies one *Pradeśa* but one *Pradeśa* is able to accommodate all *Pudgal Parmāṇu*. Those who are familiar with Quantum Mechanics and the concept of Bosons<sup>(13)</sup> can digest this concept very well. For lay persons in this field, a simple example of light may be helpful. In one room the light photons emitted from one lamp resides but in the same room the light photons emitted from two or many lamps can also reside.

In this connection it would be interesting for a quantum physicist to note the existence of concept of Fermions in the Jaina literature. It is well known in Jaina literature that though at one Pradesh of space more than one *Pudgal Parmāṇu* can reside but at one *Pradeśa* only one *Kālāṇu* can reside as if *Kālāṇu* is a Fermion<sup>(13)</sup>.

Again one may ask what is the spiritual purpose of such information? Answer is simple: Such an information is needed for the sake of completeness of the description of cosmos that helps in having the true and basic understanding of the universe and our place in it. However, one can also extrapolate such concepts for other types of spiritual advantage. One can learn to co-exist together. This information reveals that the coexistence of all six kinds of *Dravya* at one place is possible. Even at the same place more than one soul can coexist. In *Siddhālaya* many liberated souls coexist in the same space without interfering each other.

## VI Concluding remarks

We have seen various aspects of the usefulness of Jain Mathematics. All these aspects are helpful in improving our life. It may be important to count the calories and nutrition value of the food. It may be important to know the cost of food at the time of buying. But it is meaningless if the food is not used for eating. In the same way the spiritual knowledge with mathematical details is highly useful but it would be meaningful only when one assimilates the truth and adopts in one's life.

## References:

1. Ācārya Nemicandra, *Gomaṭasāra Jivakāṇḍa*
2. Ācārya Umasvāmi, *Tatvārtha Sūtra*, Chapter 2
3. Ācārya Umasvāmi, *Tatvārtha Sūtra*, Chapter 5
4. Paṇḍit Dyanata Rai, *Carcā Śataka*, Verse No. 12

5. Ref. 2, Sutra 5.33 to 5.37
6. Ācārya Kundakūṇḍa, *Samayasāra*, Verse 104
7. Ref. 2, Sutra 6, 11
8. Ref. 2, Sutra 6.12
9. Ācārya Nemicandra, *Gomaṭasāra Karmakāṇḍa*
10. Ref. 6, Verse 73
11. Ref. 2, *Sūtra* 3.27 and 3.37
12. Ācārya Kundakūṇḍa, *Pravaṇṇasāra*, Verse 140
13. Paras Mal Agrawal, *Quantum Siddhānta* (Rajasthan Hindi Grantha Academy, Tilak Nagar, Jaipur, 1973)