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Sanskrit as a Pure 'Make in India' Knowledge System Harbinger

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Abstract

The primary purpose of the Sanskrit is that of its status as the Store House of Indian Knowledge and Wisdom, as well as, hymns of the Veda. It has healing power maintaining proper harmony with Nature, i.e., manifestation of God. It nurtures an infinite source of theoretical and practical knowledge. The "Rishis", known as the "Seers of reality", recognized the smooth flow of the Vedic hymns in their inner space. They were able to derive very detailed knowledge from the Veda, which they elaborated in complete knowledge system in all domains of life. Furthermore, various other aspects of Vedic knowledge system came about, not only to support certain needs, but also to bring it to the world knowledge stage which matches the understanding capacity of the population as a whole. The complete scope of the Sanskrit is enormous and worth further exploring. Some fields and aspects of Indian Knowledge System (IKS) derived from these language and literature are studied here in this informative/survey article.

Keywords: Sanskrit, Vedas, Bhagwadgita, Make in India, IKS, Mathematics, Physics, Botany, Chemistry, Darshan Shastra (Philosophy), Humanities.

Introduction

1. Sanskrit and Vedas

We start this section with the following:

P. Jha [4] Writes: "Mithila, the northern part of Bihar, has played a noteworthy part in the cultural tradition of ancient India. It has ever remained a seat of Sanskrit learning since time immemorial. Ancient sages and seers, viz., Gautama, Kanada, Jaimini, Kapila, Yajnavalkaya, Janaka, and others were great dispensers of spiritual wisdom and later scholars received highest distinction in the academic field."

The Navya-Nyaya (Neo-Logical darsana) of Indian philosophy was formulated in the 13th century by the Philosopher of Mithila. Ganesas' book Tattvacintamani (Thought Jewel of Reality) was written partly in response to Sriharsas's khandanakhandakhadya. Navya-Nyaya developed a sophisticated language with conceptual scheme that allowed to raise, analyze and solve problems in logic. The Chhedi calendar (594) contains an early use of the modern place-value Hindu–Arabic numeral system now used universally [39].

The integration of practical knowledge with ethical and spiritual principles through the ancient text verses like the Vedas, Upanishads, and Puranas, and also oral traditions is making possible the study of IKS under NEP (2020) relevant to current higher education. It is based on interdisciplinary approach which relates traditional knowledge with modern needs. Furthermore, it offers valuable insights for sustainable development, mental health, and growth in education system.

It is by this way that preserving and applying IKS system in the higher education system basically upgrades the knowledge base of versatile Indian cultural legacy paving the way for inclusive growth and sustainable progress [33]. It has been widely noticed that arrival of colonial powers had a devastating impact on IKS, as indigenous cultures were suppressed marginalizing the Indian Knowledge System. Many traditional practices were lost or forgotten disrupting

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the proper transmission of IKS. The effects of colonization setup are still felt today. Many indigenous com munities continue to struggle in preserving the cultural heritage.

Sanskrit language and literature is as vast as the life of human existence. It is a well-known fact that there are four aims of human life which are called Purusharthas. They are known as Dharma, Artha, Karma and Moksha. One can find that Dharma stands for the duties and responsibilities of man. Artha communicates the monetary necessities whereas Karma stands for the human desires of all types and Moksha is freedom from birth and re-birth and involvement from the world.

The Vedas are, first of all, composed in Sanskrit language and literature are the basis for Dharma. Vedas are considered the root of Dharma. There are four Vedas namely, Rigveda, Yajurveda, Samveda, and Atharvaveda. Brahman granthas give description of the Vedic language and literature and provide the detailed process to perform the Yajnas. Aranyakas and Upanishads discuss the internal meaning of the Vedas and the path of renunciation, i.e., Moksha Purushartha. Pratishakhyas study the grammatical matters of the Vedas. Furthermore, Six Vedangas, i.e., Shiksha, Vyakarana, Kalpa, Chhandas, Nirukta, and Jyotish assist in the comprehension of the Vedas. It is to be noted here that the Veda is not composed by any author and as a fact, in turn, it is the respiration rightfully attributed to God.

Furthermore, Veda has been observed by the seers, and Rishis. Thereafter, Veda was classified into four Samhitas by the great seer Vyasa. Some renowned Scholars see that the Vedas were scripted by different seers. They thought the time of these writings being from 6500 BC to 1500 BC. The rest of the Vedic language and literature might have been completely composed earlier than 600 BC.

Mathematical pieces of work in ancient India started on the Holy Scripture Vedas which took the form of Vedangas, i.e., Anclliaries of the Veda. There are six lines of disciplines of the Vedangas. Mathematics emerged as a section of the last two lines of disciples, ritual and astronomy (astrology). Pieces of instructions included ellipses, technical names, with markers, variables and so on so forth. The remaining pieces of instructions passed on through Guru-Shishya param para. The fire altar domestically in the Vedic period was required for rituals to have square base and be made up of five different layers of bricks with 21 in each layer. There were other methods too.

The earliest surviving script in Indian making use of was kharoshi script in the Gandhara culture of the north-west. Another one, the Brahmi script became the foundation of many scripts in South Asia and South-east Asia.

Valmiki launched the poetry known as Loka–Kavya. He accomplished the task of composing the Ramayana, great-treatise, which having had the enormous impact on the later language and literature. Even now the latest poetry is scripted on the pattern of Valmiki. One can find that the Ramayana was scripted in 500BC. The second one Mahabharata, encyclopedia of Indian Knowledge System, was composed by Krishna Dwaipayana Vyasa.

The Poets like Ashvaghosa, Kalidasa gave ample contribution considerably in the Gupta dynasty. The renowned composers like Bharavi, Bhatti, Kumardasa and Magha wrote Mahakaavyas. Vatsabhatti and Harishena were also well known authors. Some more classification of the lan guage and literature with names of the classical composers are Bilhan and Kalhan in the area of historical Kavyas; Bilhana, Bhartrihari, Jayadeva, Amaruka, Somadeva and many more are known as lyric poets. The Romantic, Brihatkatha, and Educational Fables, champu kavyas, erotic poetry on poetics and anthologies, concise and educational one were formulated on the relevant portion of Sanskrit language and literature.

The literature further studies mathematics, metrics, lexicography, grammar, law, politics, love, philosophy and religion, astronomy, medicine, astrology and etc. Even though Sanskrit literature has been considerably studied but still much more Sanskrit language and literature is out there in the form of drafts/manuscripts awaiting for further study, research and innovation.

These MSS (Manuscripts) are, in general, kept Sanskrit libraries and in store houses of Sanskrit Scholars whose successors may know or may not know the value of the MSS (manuscript). This is a huge pieces of work to be done and to be read again and again but not at the cost of destruct ing, stagnancy, debasing and downgrading the working ones with even more potential and more efficiency and more higher qualification for growth and with more clear vision for the country's visionary leader The Hon'ble Prime Minister of India Modi's idea of making 'Developed India'.

Sanskrit language and literature is not limited to Hindu compositions. It has also been used by Jaina and Buddhist intellectuals, the last mentioned, in essence, Mahayana Buddhists. Furthermore, Sanskrit language and literature is recognized in the constitution of India both as a classical language and an official one. It continues to be studied in scholarly, literary, and technical media, as well as in periodicals, television, radio and movie [6].

2. Bhagwadgita

Gita educates to do service to all without keeping in mind their religion or caste. The truly learned person thinks of all with self-possession, be it a saint, or evil doer or an animal. He desires to be active and not passive and idle one.

Its main message is to work to exploit the potential in human personality. It partly shapes the Bhishma Parva of Mahabharata. It consists of 700 shlokas only with the span of its enormous facts and figures. Gita goes far beyond the ethical question with which it begins with to consider broadly the natural manifestation of God in the ways with which one can know Him. It beautifully coordinates the philosophy of action, faithfulness and knowledge system. A well-known verse contrasts the Upanishad to a cow and Krishna to the milkman who milks the nectar in the character of the Gita with calf Arjuna by the side of him.

Krishna discusses general paths to the divinity such as those of knowledge, meditation, good deeds, renunciation of attachment and love and submission to God. Gita is for the whole mankind. As a matter of fact, Gita is the science in charge of one's self. The prior analysis is that of the great philosopher Shankara. Other important expositions of long ago are those of Bhaskar, Madhva, Ramanuj, Nilkanth, Madhusudan, Shridhar, so on and so forth.

In outstanding modern expositions are those of B.G. Tilak, Gandhi, Aurobindo, and Radhakr ishnan. It has been translated in almost all the languages. As a matter of fact, Gita with its eternal values can assist in service of the mankind as explorer forever.

Systems of obtaining valid knowledge system, as well as expanding and elevating humane responsiveness, can be found in numerous pieces of work on the 6 "Darshanas" namely, "the 6 systems of India philosophy": Nyaya, Vaisheshika, Sankhya, Yoga, Karma Mimansa and Vedanta.

3. IKS Mathematics

It is a well-known fact that Indian mathematics became evident with clear appearance until the end of the 18th century. It is long established fact that the significant contributions were achieved by Indian mathematicians like Aryabhata, Brahmagupta, Bhaskara II, Varahmihira and Madhava. Ancient and medieval pieces of work in mathematics are all composed in Sanskrit language and literature. It consists of Sutras. This was acted in accordance with a second section consisting of a prose exposition.

An achievement in Indian mathematics was the development of series expansions for trigonometric functions performed by Kerala school mathematicians. Furthermore, excavations at Harappa, Mohenjo daro and many places of the Indus Valley civilization have detected proof of the usage of 'practical aspects in mathematics'. They constructed bricks with dimensions in the 4:2:1 proportions. They used weights in regular geometric structures including hexahedra, barrels, cylinders and cones. It is well known that they constructed a ruler known as the Mohenjo-daro ruler with approximate length 1.32 inches or 3.4 centimeters that is divided into ten equal parts. The texts of the Vedic period give enough idea about using large numbers. The solution to partial fraction was in the knowledge of the Rigvedic ethnic group as initiated in the purush Sukta.

The Sulba Sutras in Vedic Sanskrit gives rules for the construction of sacrificial altars. In view of Hayashi, the Sulba Sutras contain the earliest extant verbal expression of the Pythagorean Theorem in the world. They contain Pythagorean triples as particular cases of Diophantine equations. They also contain statements about squaring the circle and "circling the square". Baudhayana composed the Baudhayana Sulba Sutra containing examples of Pythagorean triples as well as the Pythagorean Theorem [44].

The Vedic period studied the pieces of work of Sanskrit grammarian Panini. Among the intellectuals of post-Vedic session, the most noteworthy one is Pingala who authored Chhandas Shastra, a Sanskrit treatise on prosody. His pieces of work also includes the basic ideas of Fibonacci numbers. Katyayana is considered the final of the Vedic mathematicians who presented geometry in his Sulba Sutra construction. Mathematicians of ancient and early medieval India were nearly all Sanskrit Pandits (learned men) who possessed customary knowledge in grammar, interpretation and logic.

Mathematical activity in ancient India started as a part based on the Holy Vedas, which took the form called Vedangas, or, "Ancillaries of the Veda". There were the six disciplines of the Vedangas. Mathematics arose as a part of the last two directions, ritual, astronomy and astrology. Many pieces of instructions were given by applying ellipsis beyond the sufferance of natural language with practical names instead of longer expressive names, and so on so forth. The remaining of pieces of instructions must have been communicated by the Guru Shishya parampara.

The "Nine Signs" of the Indians for constructing numbers were written by the Syrian Bishop, namely, Severus Sebokht in the mid-7th century CE. However, how, when, and where the first decimal place value system was invented is not so clear [41]. The earliest surviving script used in India was the Kharoshi script in the Gandhara culture of the north-west. Another one, the Brahma script, appeared on the sub-continent. It later became the basis of many scripts in South Asia and South-east Asia.

A third decimal representation was employed in a composition manner. It later called Bhuta Sankhya (i.e., Object Numbers) used by early Sanskrit authors of books.

A coppler plate from Gujarat, India mentions the dates 595 CE for the composition of a decimal place value symbol. A third decimal interpretation was employed in a text verse composition called Bhuta-Sankhya employed by prior Sanskrit authors of books. One can find that numbers were usually expressed by objects in the natural, i.e., religious environment. In such a way, the number 4 could be expressed by the word "Veda", the number 32 by the word "teeth", and the number 1 by the word moon.

The important principles of mathematics in 332 shlokas was described by Aryabhata in Aryabhatiya. Aryabhata II wrote an exposition on Shridhara, and an astronomical one Maha-Sidhanta. The Maha Sidhanta consists of 18 chapters.

It has been suggested that Indian contributions in mathematics have not been given due acknowledgement in modern history. Furthermore, many discoveries and inventions by Indian mathematicians are presently, culturally, given to their Western counterparts out of Eurocentrism. The infinite series in calculus for trigonometric functions were already described in India, by mathematicians of the Kerala School, some two centuries prior. It was rediscovered by Taylor, Gregory, and Maclaurin in the late 17th century.

The term used in Sanskrit for mathematics is Ganita. It is derived from the root 'gana', to count or enumerate. It is a well-known fact that mathematics in India has been developed in correlation with Astronomy. Like the various streams of knowledge system, the prior references of mathematics, are also found in the Vedic language and literature. One can find that the word 'Rashividya' is used for mathematics in Chhandogya Upanishad (7.1.2). Furthermore, some hymns of Shukla Yajurveda depict the knowledge of odd numbers and tables (18/24, 25). The Brahmana texts like 'dvabhyam svaha', 'ekaya svaha', 'tribhyah svaha' express the vedic technique of arithmetical progressions. There is a well-known discourse on finding the values of squares and square roots in Pingal Sutra.

The Indians, prior to other nations, became well equipped with the place value system of numerals. As a matter of fact, the Europian enumeration system is of Indian origin. India is the birth place of numerous mathematical concepts including algebra, zero, the decimal system, algorithm, square root and cube root and many more. More than three centuries before Leibnitz and Newton introduced their theorems, the origin of calculus was already achieved in India.

The notion of zero, i.e. shunya, means 'void', is a figure or number to indicate the absence of a thing. It is also a digit in decimal number system. A round figure, symbol for zero, i.e., '0' had come about to express the philosophical idea of void.

Mathematics in India might have started more than five thousand years ago. Since 1000 B.C. nearly for two thousand years, many mathematical pieces of work were produced in India. Since the 5th century A.D., the method of calculation had been introduced in India. By that period of time, the geometric theories were known to the Indians. One may see some exhibitions of motifs constructed on the walls of ancient temples. Those ideally express the patterns available in Indian architecture, as one can see the floral and wall pattern in geometric constructions.

These concept and ideas, were accumulated and further developed by the Indian mathematicians like Aryabhata who flourished in the 5th Century A.D. His marvelous pieces of work "Aryabhatiyam" is equally important for Mathematics as well as for Astronomy. The first section of the book

explains the special system of writing numerals that was introduced by Aryabhata alone. The Second one gives a small anthology of mathematical teachings by Aryabhatta. He studies evolution and revolution, area and volumes, progressions, identities and progressions.
Brahmagupta's pieces of work 'Brahma-Sphuta-Siddhanta' study in brief the arithmetical operations, square and cube roots, interest, progressions, geometry, and algebraic identities.
Bhaskaracharya, the great astronomer, is highly reputed as a mathematician also. His nice pieces of work Lilavati, in which an introductory is communicated and problems set to her, is a famously well-known book on mathematics. The second one Bijaganita, is the fullest and most systematic account of Algebra originated and developed in India. Ganitasarasangraha of Mahaviracharya, Bijaganita of Narayan, Trishati of Shridhara are some prominent Sanskrit treatises on Indian Mathematics.

P. Jha [4] Writes:
"Nilambar Jha, the reputed astronomer and author of fifteen works on different aspects of astronomy and mathematics, wrote a commentary on the Tattva Viveka of Kamalakara as well. In the 20th century too, a considerable number of commentaries on the important Siddhanta works, namely, Aryabhatiya, Brahmasphuta, Sidhanta, Sidhanta Sekhara, Graha Laghava, Sidhanta Tattva Viveka and others were compiled by scholars of Mithila". The First available work on the Ganita Skanda of Hindu astronomy is Surya Sidhanta Bhasya, a commentary on the famous astronomical text, Surya Sidhanta. This Bhasya was written by Candeswaracarya, a native of Mithila in Saka 1107(1185 AD) and is perhaps the earliest commentary on the Surya Sidhanta available so far [4].
It is worthwhile to keep oneself abreast of the fact that it is continued to be studied in the present time in the form of its enormous commentaries and calendrical pieces of work. A subject related to Mathematics and Astronomy, namely, "Spherical Trigonometry and Astronomy" has been taught as a course at Graduate level in L. N. Mithila University and its Constituent Colleges.
All it is not philosophy but active experience in mathematics itself that alone can answer the question: What is Mathematics? by Richard Courant and Herbert Robbins, 1941, What is Mathematics? An adequate presentation of any science cannot consist of detailed information alone, however extensive. It must also provide a proper view of the essential nature of the science as a whole, Aleksandrov, 1956, Mathematics: Its Content, Methods, and Meaning [47].

4. Physics IKS

In this section, we study and review some aspects of Physics originated from Indian Knowledge System (IKS) that is integrated into NEP for modern relevance and further enhancement as well as for exploring the subject.
The Word "Veda" is obtained from Sanskrit word "vid" which means To Know. The foundational outlook of Indian culture and civilization has been greatly emphasized on scientific facts since classical times. The human body and dignity on this Earth are composed of five constituents as follows:

"Kshiti jal paawak gagan sameera, panch rachit yah adham sharira"

In Vedas and puranas, physics has been studied extensively with the term "BHAUTIK SHAS TRAM". Vedas provides deep explanation of nature and natural phenomena. In modern era, classical physics leads to study of motion of macroscopic objects. As the motion is not possible without energy, many years ago, Vedic physics described the concept of energy along with that of motion. Furthermore, the notion of charge was brought to light by American physicist Ben jamin Franklin in the 18th century, which was already discussed in Agastya Samhita, i.e., in Vedic physics.
English physicist and mathematician James Prescott Joule discovered the concept and idea of heat. Sodi Carnot is considered father of thermodynamics. The Yajurveda (i.e., Vedic physics) put forward the concept of heat prior to the Vedic period of Indian history. In the field of Quantum mechanics, Vedas, Puranas, Upanishads had hypothesized many theories about universe and its atomic structure.
Vedanga Jyotica gives detailed discussions on various astronomical characteristics, normally applied for timing social and religious customs and rituals. It has connections with Indian astrology and mentions important aspects of the time and seasons. It include lunar and solar months, and their adjustment by a lunar leap month of Adhimasa. Ritus and Yugas are also further described. Moreover, it describe 27 constellations, eclipses, seven planets and 12 signs of the zodiac known at the time.
One can revisit the relevant language and literature to study Physics progress in the Vedas and Atomic Theory from Bhagavad Gita.

Excerpts from what Acharya Agnivrat writes [22]:
"...both physical and spiritual science are not only far apart, but they are also full of confusion and superstition..."

Furthermore, he [22] writes:
"Modern science, especially physics, is unable to understand the origin and creation of the universe and all of its matter, both subtle and gross, due to its commitment to the limitations of experimentation, observation, testing and mathematics."

"In such darkness, only Vaidic Science (a systematic study of any subject) can show the way for both. This science systematically explains the process of creation from the root cause of creation."
It is said that conscious force is the root origin of all forces. The actions and variations that emanates from force are in the format of sound waves. These sound waves are said to be the Vaidic Mantras. These are present in the structure of variations which are called Rashmi in Vaidic Science. Out of these Vaidic Rashmies, variations begin in the basic matter inducing the ordered appearance of six types of matter. In the seventh phase, the Akasha Tattva (space) arises, then the formation of photons, quarks, electrons, bosons and their antiparticles, along with dark matter and dark energy. It is well known fact that Knowledge of impalpable materiality such as time and direction also comes from Vaidic Science.
The book" Ved Vigyan Alok" describes the methods of creation through oscillations in the format of Vaidic Mantras in Vaidic Rashmi Theory. One can learn to know that no other energy can be brought about in the basic root substance other than sound. The comparison of initial disturbance to the structure of sound as defined in modern science is fairly appropriate. The structures of interference in it will also be varied according to the structure of substance.

The quarks, photons, electrons, bosons and space that modern science considers to be the basic ones are actually an output of Vaidic Mantras. It begins six steps before their origin. The systematic way of understanding the study of action, creation and Ishwar's pieces of work was lost after the Mahabharata. There are some manifestations of this in Rishi Dayanand's exposition on the Ved.

The atomic theory was formulated 2500 years before Dalton got it. The theory was given by an Indian Philosopher and sage known Acharya Kanad. John Dalton, English Meteorologist and Chemist, has been credited to be a pioneer in the growth of atomic theory in the modern sense. From the 19th century to the 21st century nearly each one knows Dalton with the credit for the growth of the theory.

Nowadays few people come to know that the atomic theory was actually originated about 2,600 years ago by an Indian Philosopher and Sage. It is believed that the sage lived between the 6th century to 2nd century BCE. It was Rishi Kanada, an Indian Philosopher who composed the ideas about the atom in a systematic manner. He is popularly named as "Kashyap". Since his childhood, it is said that small things too attracted in the attention of his natural mindset. He is being called the father of the atomism, who propounded the parmanu (atoms), and also gave an approach to Philosophy and Physics in the Sanskrit text "Vaisesika Sutra". Vaiseshikas further clarified that atoms of the same substance combined with each other to create dvyanuka, i.e., diatomic molecules and tryanuka, i.e., triatomic molecules.

It is well known that electricity has become an indispensable part of life. One can see that it is produced from thunder and lightning which has also attracted one since primitive time. It is still being worked upon as how to store safely and make proper use of the enormous electric energy discharged from lightning and thunder. One can search to find the evidence which proves the application of electricity and battery way back around 10000–8000 BCE. People in classical time were well aware about electricity and it utility. One can find that it has been cited in the 5th Mandal of Rig Veda. One can see that the day and night can be spent in comfort, provided electricity and fire, just like the Sun God are applied tactfully.

5. IKS Botany (Biology)

The Indian Knowledge System (IKS) in home remedies is an integral part of India's cultural heritage system since ancient time. It blends traditional wisdom with the natural and readily available materials to solve simple and common health matters. These natural remedies are generated from Siddha, Ayurveda, and citizenry traditions through generations. It keeps up to play a significant role in households in India today that is popularly known as Grandma's pouch (Dadi Ka Batua). Main principles of home remedies in IKS are immunity boosting, healing in a natural process, available in local and efficient plant substances. Furthermore, integration of these natural remedies into cooking, rituals, and lifestyle are done.

Natural, and chemical free solutions are emphasized. These natural remedies are affordable and needs minimal resource materials. It makes up allopathic treatments with the promotion of holistic healing. It is well known that India's AYUSH Ministry are established to promote the encouragement, documentation, and integration of classical practices, including natural remedies at home integrated with mainstream healthcare system. The inclusion of Ayurveda in health and wellness centres are being promoted by Ayushman Bharat. Traditional Knowledge Digital Library (TKDL) makes documentation of ancient plant knowledge system in order to nip in the bud biopiracy.

Medicinal botany points to the study and application of plants for their therapeutic characteristics and properties. Modern relevance of IKS in Medicinal Botany can be integrated with a structured foundation in the following areas which can preserve indigenous medicinal knowledge [34]:

i). Pharmaceutical and Natural Plant based research
ii). Complementary Medicine
iii). Collaborative Projects such as ethnobotanical Database initiatives etc.

The conservation of biodiversity points to the sustainable use, protection and restoration of the diversity of ecosystems, species, and genetic materials. One can see the reference that the knowledge about biodiversity can make a holistic viewpoint in understanding the symbiotic connections between human beings and their environment. It has adapting capability to an ecosystems in localization and helps in knowledge transfer passed on generations orally, rituals, and everyday practices. One of the customary culture is to have Sacred Groves. These groves act as "mini biospheres," taking care of the ecological balance by preserving water sources, preventing from soil erosion, and microclimates regulation [35].

In the area of study in botany, IKS expresses the classical knowledge system and practices based on plants that have been produced in India through generations. This includes the study of the medicinal characteristics of plants, its utility in agriculture sector, and its role in various cultural and spiritual usage as well. Integrating IKS with the concept of modern botany gives rise to a more holistic mechanism to plant science, combining scientific research with ancient Indian wisdom. The making use of Tulsi, Haldi, and Amla for various ailments is an integral part of IKS. Methodologies from ancient India like seed treatment, soil management, and crop rotation are also integral part of IKS.

The task of integrating IKS Botany with modern Botany involves bridging the gap between classical knowledge system and modern systematic research activities. This integration needs an interdisciplinary methodology which can combine botanical knowledge with other areas of study like sociology, anthropology, environmental science, etc. Involving local communities in research and proper efforts in its conservation is vital for the responsible scope and prospects of IKS.

Incorporating IKS into the curriculum of plant sciences, students are supposed to get proper exposure in topics such as indigenous farming, medicinal plants, climate resilient crops, preservation of biodiversity, and natural resource management system. This interdisciplinary study can bridge the gap between contemporary research activities and classical practices. This way, it can foster innovation in areas like drug agroforestry, drug discovery, and phytochemistry. Moreover, it makes emphasis on its conservation, sustainability, and the cultural significance of ancient India practices. It boosts up students to cope with several global challenges like food security, climate disorder and ecological degeneration.

IKS is an extensive, collaborative and timeless repository of ancient India wisdom, practices, and philosophies that have developed over centuries in the Indian subcontinent [31]. The significance of IKS lies in its ability to work out contemporary challenges by providing sustainable solutions in various fields, such as healthcare system in Ayurveda, mental

well-being in Yoga, environmental balance with Vaastu Shastra, and logical reasoning in Nyaya [32].

It is a well-known fact that some holy groves situated in the Western Ghats, a biodiversity hotspot in India, nurture unique biota that are important for ecosystem stability and sustainability like Kalbhairvanatha, Ratanwadi, Kudavale, Udhadavne Holy Groves from the Indian state of 11 Maharashtra, and so on so forth. These hotspots makes protection of threatened, rare and native plants, animals and are also an important countryside in the deforested hill spans situated in the Western Ghats of Maharashtra. One can find that some of the trees that are worshipped in these holy groves are: Peepal tree, Banyan tree, Borassus, Alstonia scholaris, Antiaris toxicaria, Hopea parviflora, Strychnos nux-vomica, and so on so forth.

There is modern relevance of IKS in biodiversity conservation of biodiversity through the change in climate. One can find that this native knowledge system assist communities adapt to variability in climate by drought-resistant crops and ancient India water conservation methods. Ecological indicators are studied to predict environmental variations. Native communities con tribute in the production of wetland restoration, reforestation, and regeneration of soil. It is a well-known fact that the Bishnoi community in India has achieved the conservation of wildlife and forests for over 500 years.

Making blend of the versatile wisdom resource materials of the Indian Knowledge System with modern Botany, i.e., modern plant sciences, one can assist in reaching the development of sustainable solutions for healthcare sector, agriculture sector, and conservation of biodiversity. This harmony honours to India's potent heritage. Furthermore, it can also solves the posing contemporary challenges like climate disorder, food security, and environments related issues.

Zoology (Another Branch of Biology) has been a major field of study in the development of the subject since ages, wherein the researchers ad also man has a enormous contributing potential with his her knowledge system and skill sets. It is pertinent to understand and study ancient zoology by the learners, e.g., for instance gain knowledge of medicinal plants, leech to suck clotted blood, mud, and so on so forth by observing the behaviour and characteristics of the animals, parental care in animals, and so on so forth. The subject related literature in zoology can play a vital role in making people educated, and making them aware also about the development in the disciplines biological subject matters experts.

This archaeological zoology like palaeontology helps one to understand and evolution of organ isms. Many environmentalists play a vital role in the conservation of nature and thus the mother earth. Therefore, in the present an effort should be made to make the learners acquaint oneself about the role of ancient knowledge in zoology and to correlate it with the progress of subject for the betterment of human being. This knowledge is usually engrossed in the language, customs, and rituals of native cultures, making it an important part of the identity.

"Indigenous knowledge is not just about the knowledge itself, but about the relationships between people, their lands, and their cultures." [36]

Economic Botany [38] is the study of the correlation between people and plants. It includes various areas of study like archaeology, agronomy, anthropology, economics, chemistry, ethnology, ethnobotany, geology, horticulture, microbiology, medicine, nutrition and pharmacology. Despite the historical challenges, IKS remains an important aspects of economic botany. The ancient India knowledge system of native communities has been instrumental in the discovery of medicines, new crops and many valuable resource materials. For example, many modern medicines have their roots in traditional remedies, with an estimated 25% of modern medicines derived from plants used in traditional medicine [37].

6. IKS Chemistry

The Indian Knowledge System (IKS) is equipped with enormous knowledge system in the subject of chemistry. It was intimately related to customs and culture in everyday life, like metallurgy, medicine, and alchemy. Ayurvedic medicine, sustainable material science, metallurgical study, and Rasayana Shastra are important areas of review, research and development. The study emphasizes sustainability with creative endeavors. It highlights how ancient Indian researchers created such complex chemical processes that are consistent with modern scientific ideas and discovery.

It is well known that Maharshi Nagarjun was a great ancient scholar in the subject of Indian chemistry and chemical science. His contribution inspires its enthusiasts in the modern era [21] too. Vedic and Post Vedic Period Atharva Veda study metals like gold, silver, and iron. Charaka Samhita (300 BCE–200 CE) and Sushruta Samhita (600 BCE) describe chemical methodology for drug making. Kautilya's Arthashastra (4th century BCE) studies metal testing, dyeing, and poison detection methods. Nagarjuna (8th–9th century CE) prepared documentation of pioneer pieces of his work in Rasayana Shastra. In this period of time, Rasendra Mangala and Rasarnava was authored. Alchemical scriptures like Rasaratnakara and Rasahrdaya Tantra discuss mercury methodologies, metal purification, and bhasma making.

Rasayana Shastra depicts how the ancient Indians developed processing techniques for mercury such as purification, incineration, and calcination. Transmutation efforts, i. e., attempts to convert metals, though not validated, depict prior experimental processing knowledge. Siddha and Ayurvedic Rasayanas expressions like Makardhwaja and Swarna Bhasma utilized nano particle like structures for enhanced production in bio. The Delhi Iron Pillar constructed during the Gupta Empire (4th-5th century CE), is well known for its resistance in corrosion. The pillar is found to contain high phosphorus (0.1–0.25%) and low sulfur/manganese making a protective passive passage of misawite. There is a clear contrasts with modern stainless steel with chromium.

South India produced Wootz Steel around 300 BCE–300 CE. It comes from Tamil "ukku" or Kannada "uruku" was found to be a carbon crucible steel. Produced by melting iron with carbonaceous materials in crucibles that is sealed, it created micro structures that gave Damascus swords the strength with distinctive patterns. Places like Kodumanal and Mel Siruvalur were important centers of production. This steel made Middle Eastern Damascus blades and thereafter, European metallurgy. The Zawar mines in Rajasthan (6th–12th century CE) produced zinc extraction with distillation in downward. For vaporization of zinc, ore was heated in retorts. It was then condensed with avoiding oxidation. This methodology came about before European zinc production by centuries. Zawar Zinc distillation methods were proved to be preproduct for industrial output. One can find that Panchaloha, a five metal alloy, i.e., gold, silver, copper, zinc, iron utilized in sacred idols, was considered to have spiritual and durability benefits. Brass, i.e., copper-zinc and bronze, i.e., copper-tin were found

to be widely applicable. Furthermore, The Chola bronzes (9th–13th century CE), constructed via lost-wax casting, testify metal working processes. Kautilya's Arthashastra (4th century BCE) elaborates state management of mines, metal purification, and alloying.

Nagarjuna's alchemical writings, Rasa Ratnakara (7th–8th century CE) studies mercury usage and metal transmutation. This war, chemistry with metallurgy was blended. Keeping in mind the construction materials, ancient structures employed sustainable stonework and lime mortars. It is a well-known fact that temples like those at Khajuraho applied weathering, i.e., resistant sandstone and intricate masonry Ayurvedic herbo: mineral expressions, known as Rasa Shastra. It combines 13 herbs, metals, minerals, and animal products. These methods have been applied by Indians for centuries to diagnoze and treat chronic diseases, boost immunity, and rejuvenate the body and mind. Important herbo mineral expressions are:

Bhasmas, which was calcined metals/minerals processed via Shodhana and Marana to lessen toxicity. Examples found are Swarna Bhasma, i.e., gold, Tamra Bhasma, i.e., copper and Yashada Bhasma, i.e., zinc. Swarna Bhasma, i.e., Gold ash, was a bio product gold nanoparticles applied in therapy for rejuvenation. Tamra Bhasma was applied for liver dysfunctions. Modern studies confirm its antioxidant properties and characteristics. Rajata Bhasma, a nano particulate silver in Bhasmas illustrates antibacterial characteristics related to colloidal silver. Neuro protective effects like Man dura Bhasma, i. e., iron, was later found to improve cognitive working in iron deficiency through modulating iron homeostasis of brain. Rasayana, was a scintillating expressions like Chyawanprash, i.e., herbs + minerals and Brahma Rasayana. Sindoora was a mercury sulfide based pigment formations e. g., Kajjali, a mercury-sulfide compound. Lauha Kalpas, an Iron-based tonics, e. g., Loha Bhasma for anemia. Asava-Arishta was a fermented medicines which was alcohol- based extractions for increasing potency.

Indian ancient techniques in perfumery, dyeing, and cosmetics are there found in ancient wisdom, sustainability, and cultural heritage. These practices express understanding of natural materials and their applications, blending artistry with chemistry. India was named and famed for cotton textiles and indigo dye. Advanced dyeing methods, including mordant usage, created vibrant, colorfast fabrics went for global trading. Indigo, i.e., Neel, was got extracted from Indigofera tinctoria, applied for blue hues. India was the primary global supplier until synthetic dyes developed. The fermentation methods to extract indigo is practiced in areas like Tamil Nadu and Andhra Pradesh. Its chemical structure was later on recognized as indigotin. Turmeric which was found to contain curcumin, gives output of vibrant yellow shades, applied for ritual garments and Holi celebrations. It is now studied for its anti-inflammatory results. A soot-based eyeliner Kajal waslater found to possess antimicrobial properties and characteristics due to carbon nano particles.

It is a well-known fact that India's native technologies had been much sophisticated. Indian Contributions are in natural air conditioning, complex stone pieces of work and artifacts. One can find that the Indus Valley Civilization was the world's first one to build planned towns with underground drainage, civil sanitation, hydraulic engineering and air cooling architecture mechanism. It is well known that whereas other ancient civilizations and cultures of the world were small towns with one central complex, the Indus Valley Civilization had the trademark of being spread across a wide area that is about half the size of Europe. Weights and linguistic symbols were made standard of measurement across the vast geography, for a period of over 1000 years, from around 3000 BCE to 1500 BCE. Nagarjun presented his important pieces of work and theories in the field of chemistry. Unique knowledge about acids, metals, and substances is found in his text verses. Nagarjun's unique book is "Rasaratnakar", in which he discusses in detail, acids, metals, and chemical.

For IKS Chemistry, one can access online references in International Journal of Science and Research for respective authors, papers on ResearchGate, Online Courses Swayam 2, K.T.H.M College and Moolji Jaitha College for further related study materials as exploring resources.

7. Sanskrit and Humanities

The trace of History in Sanskrit language and literature starts from the Vedas which contain a list of teachers. The biographies, documents, artifacts, currencies and so on so forth are the main source materials of History. There many books are of historical significance and four of them deserve special mention. They are Harshacharitam, Navsahasankcharitam, Rajtarangini and Vikramankadevacharitam.

One can find that the Harshacharita of Banabhatta is the first historical Kavya written in prose in 7th Century A.D. It has eight chapters called 'Uchchhavas'. In the first three chapters, the poet has provided autobiographical details about him/herself. This kavya gives some knowledge about the administration and governance of Harshavardhan who ruled from 606-647 AD. The Historical details given in Harshacharita are similar to those of a Chinese travellor named Hieun Tsang.

Navsahasankcharita is the great historical Kavya written by Padmagupta in 1005 AD. Navsashasankcharita was the alias name of King Sindhuraja the younger brother of Munja the king.

Composed in cantos 18, it relates the winning of Shashiprabha, the daughter of Naga King by Sindhuraja or Navasahsank. In the 12th canto, all the former kings of Parmara have been described in a chronological order. These traces have been declared by the writings on inscriptions. The Vikramankdevacharitam written by a Kashmiri Poet Bilhana in 1085 AD delineates the history of Chalukya Kings. The birth of the founder of Chalukya Dynasty has been traced from the chuluk (kamandala) of Brahma.

The Kavya gives details about the life of Vikramaditya VI who ruled from 1076-1127 AD. It is a well-known fact that the historical description of the Chalukya Kings given by the poet was proved by many other Chalukya compositions also.

The most important pieces of work written on History in Sanskrit language and literature is the Rajatarangini by Kalhana. It was completed by the poet in 1148 AD after a long time research. There are 7826 verses which have been divided into eight books called 'Tarangas'. Rajtarangini itself means 'the river of kings'. In this, the poet has tried to trace the history of Kashmir starting from ancient time upto 12th Century AD. It starts with the description of the kings of Dynasty of Govinda. The first date described here is 813-814 AD.

8. Darshanshastra and Dharmashastra

One can see that "Darshanshastra" is the Hindi word for Philosophy. In this, one can systematically study the

existence, reason, knowledge, mind, values, and language. In the Indian context, it specifically directs to Indian Philosophy with ancient knowledge systems like Nyaya, Vedanta, and Yoga. It is firmly rooted in Vedic language and literature and the Upanishads.

One can find that the there is a method of rational inquiry in the subject of Philosophy for the rational subject matter experts. It aims to be systematic, and tends to critically get reflected on its own methods and presuppositions [42]. It requires attentively thinking long and carefully about the provocative, vexing, and enduring problems central to the human condition [43].

It is well known that Indian Philosophy are classified as Astika (orthodox) and Nastika (heterodox) based on the authority of the Veda. The Upanishads are thought to be a major resource for Indian philosophical analysis. The popularly known six systems of Indian philosophy with Vedic authority and authenticity are: Nyaya, Vaisheshika, Samkhya, Yoga, Mimamsa, Vedanta. Indian philosophy is the combination of the spiritual problem of how to achieve enlightenment by 15 exploring the nature of reality, and the mechanism of arriving at knowledge.

Philosophers make use of a great variety of ways to study philosophical knowledge system. In this, there are conceptual analysis, intuitions, reliance on usual sense, usage of experiments in thinking, description of experience, analysis of ordinary language, and crucial questioning. Philosophy is correlated with many other subjects of study, including mathematics, the sciences, business, law, and journalism. It provides an interdisciplinary perspective for teaching and research activities. It studies the scope and basic concepts of these areas of study. It also studies the methods and ethical implications and characterizations in the relevance subject area.

One can find that the main branches of philosophy are epistemology, ethics, logic, and metaphysics. Epistemology studies knowledge and how to acquire that knowledge. Ethics studies moral principles and what constitutes right code of conduct and behavior. Logic is the study of exact reasoning and tells how good arguments can be distinguished from bad ones. Metaphysics studies the most general characteristics of reality, existence, objects, properties and characteristics. Furthermore, the subareas of study are aesthetics, philosophy of language, philosophy of mind, philosophy of science, philosophy of religion, philosophy of mathematics, philosophy of history, and philosophy of political science.

The rules in Sanskrit language and literature is known by the name of Dharmashastra, i.e., the science of ordinance. As a matter of fact, the scope of Dharmashastra is far more than what is meant by rules/'law'. One can find that the definitions of Dharma can be interpreted as ordinance, duty, right, justice, morality, virtue, religion, good actions, and so on so forth. It is also well known that Kalpasutras are the main parts of 'dharma'. Rules of code of conduct, ritual performance, and duties at various phases of the lives are kept in these Dharmashastra. Furthermore, in these, there are purification rites, methods of hospitality, everyday oblations and judicial process.

The 'dharma' is defined in terms of smrities. There are eighteen smrities described out there. One can find that the Manusmriti compiled by Manu in about 200-300 BC is considered the most reliable and widely known one. It consists of 2694 verses classified into twelve chapters. It discusses various topics of study on cosmogony, dharma, initiation and Vedic study, the eight methods of marriage, hospitality, dietary, law, rights and duties of four castes and four phases of life, and so on so forth. It is interesting to learn that Medhatithi Govindraja and Kulluka Bhatta wrote the famous expositions on Manusmriti.

Then comes the Yajnavalkya Smriti. It is related to the Paraskara Grihya Sutra of white (Shukla) Yajurveda. Furthermore, it consists of 1013 verses which have been classified under the three headings of good conduct (achara), Law (vyavahara) and Repentance (pryashchitta). One can find that it is more progressive in thought processes, and has been written in more systematic manner. Of all the expositions, the exposition Mitakshara of Vignaneshwara written became more recognized.

The smritis of Narada, Brihaspati, Harita, Ushna, Katyayana, Parashara, Gautama and so on so forth are also popularly known ones. It is a well-known fact the Mahabharata is one of the accepted text verses of Dharmashastra. It is to be noted that the Smriti text verses have been binding power for the Indians together till date.

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