

**SCIENCE AND TECHNOLOGY
OF
THE FUTURE
(Indian model of Science & Technology)**

By

Prof.B.Kishor

Professor of Mechanical Engineering (Retd)

Indian Institute of Technology

Banaras Hindu University

VARANASI-221005

2019

SCIENCE AND TECHNOLOGY OF THE FUTURE

PROLOGUE

One of our inputs for the present venture is the following excerpt from an eminent personality (D.Ikeda, founder of Soka University) published in The times of India of January 25, 2005:

United Nations Organization says: For the next 10 years we must focus on education for sustainable development. Development that meets the needs of the present without compromising the ability of future generations to meet their own needs is sustainable. It includes aspects such as peace, environmental integrity and human rights, and requires us to reassess our concept of “progress”. The U.N. Earth Charter says, “..... it is imperative that we, the peoples of Earth, declare our responsibility to one another, to the greater community of life and to future generations”. To achieve sustainability, we will have to draw from the richest veins of human wisdom, both past and present.

Our survival hinges on realizing a profound change within human beings themselves. Only orientation in the inner life of humanity will enable us to meet the daunting challenges that face us. To achieve this, education needs on enhancing and strengthening the following human capacities:

The wisdom to perceive the interconnectedness of life and living; the courage not to fear or deny difference, but to respect and strive to understand people of different cultures, and to grow from encounters with them; the compassion to maintain an imaginative empathy that reaches beyond one’s immediate surroundings and extends to those suffering in distant places.

In the light of the above statement can India become a hub to contribute to the welfare of the world.

For this we use following comments of eminent scientists about the status of our ancient sciences and proceed.

1- Dr. ARNORLD TOYNBEE: It is already becoming clear that a chapter which had a western beginning will have to have an Indian ending, if it is not to end in the self-destruction of the human race. At this supremely dangerous moment in human history, the only way of salvation for mankind is the Indian way.

2- LIN YUTANG: India was China's teacher in religion and imaginative literature, and the world's teacher in trigonometry, quadratic equations, grammar, Phonetics, Arabian nights, animal fables, chess as well as in philosophy.

3- PROF. A.A. MACDONELL: In Science, too the debt of Europe to India has been considerable. There is in the first place, the great fact that Indians invented the numerical figures used all over the world. The influence of the decimal system not only on mathematics but on the progress of civilization in general can hardly be over estimated. During the eighth and ninth centuries the Indians became the teachers in arithmetic and algebra, of the Arabs, and through them of the nations of the west. Thus though we call the latter science by an Arab name, it is a gift that we owe to India."

4- PROF. BRIAN DAVID JOSEPHSON (Youngest Nobel Laureate) : The Vedanta and Sankhya hold the key to the laws of mind and thought process which are co-related to the Quantum Field i.e. the operation and distribution of particles at atomic and molecular levels.

5- PROF. HEISENBERG: After the conversations about Indian philosophy, some of the ideas (of Quantum Physics) that had seemed so crazy suddenly made much more sense.

Besides these comments, let us start our quest to establish the status of indian sciences in the past in a scientific way. For this, we must FOLLOW basics of investigation given below:

- (1) Knowing the global past developments*
- (2) Freeing one from the existing theories and notions*
- (3) Using ones own ingenuity to arrive at new conclusions.*

We must keep the above in mind while assessing contributions of India to the modern sciences. We pose folloeing questions to start with:

- 1. Why is there an advanced scientific language like Sanskrit?***
- 2. Why did the ancients need sub-micro measurements to the level of a trasrenu?***
- 3. Why is there such an advanced Architecture (VASTU SHASTRA)?***
- 4. Why is there such an extra-ordinarily advanced Vedic Ganit?***
- 5. Why is there an advanced life science like Ayurveda?***
- 6. Why is there a superbly efficient science for solving life problems like Yoga?***
- 7. Why are there sciences like Indian Surgery, Metallurgy, numerals, chemistry, agriculture, ecological concepts, time concepts, Ancient aviation science of Hindus, etc.?***

We assert that the combined answer to all the above is: There was an advanced scientific Hindu Society in the remote past. The principles of its sciences are so dvanced that not only these are applicable to-day but these are also suitable for the future base building of modern science. We make an effort to establish this premise.

We shall discuss different aspects of Hindu Sciences in order to arrive at a Hindu science and technology model to be called as

Science and technology of the future (Indian model of science & technology)

Introduction:

Modern miracle inventions and discoveries are transforming man's environment. Age of intelligent machines has begun. Artificial intelligence, robotics, nano-technology, cloning, genome etc. are indicators of an altogether new journey of man. This has become possible due to the application of modern day science and technology. This science and technology which we see to-day has passed through many stages of radical developments. Most important amongst these developments are:

1. The universe of Rene Descartes and Newton (a big machine)
2. Relativity of Einstein
3. Quantum Mechanics
4. Thermodynamics
5. Darwin's Evolutionary Theory
6. Super string theories
7. Recent developments related to the study of consciousness

Influence of these scientific developments has revolutionized the concept of living. Man is seemingly getting drowned in the global consumer culture. He is trying to unify himself with machines. His appetite for collection is crossing all limits. This situation is leading towards destabilization of ecological balance and severe crisis on all fronts of life. What a strange situation it is! On one hand man seems to have obtained most satisfying artifacts for his life and on the other he is terribly afraid of the onslaught of instability in life. In order to provide a stable life environment, it appears, science needs a new base and in its search for one such base it is approaching towards Ancient Indian Sciences. In the past also Ancient Indian Sciences made fundamental contributions to the development of science. Eminent scholars of the world like Shrodinger, Capra, David Bohm, Rhinecourte, Zukov, Talbot are amongst those who have recognized this strength of Indian Ancient Sciences and they consider ancient Indian Sciences as the center for the generation of new waves for the modern scientific thought. Let us analyze and review these two scenarios (modern science spectrum vis-à-vis Ancient Indian Science panorama).

History of Western science:

History of science begins with Thales of Miletus (640 -656 B.C.). The first important land mark is said to be due to Pythagorus (570-497 B.C.). Atomism starts with Democritus (460 -370 B.C.). These are the initial stages of science. Science took a definitive turn with the findings of Copernicus (1473 -1543 A.D.) contained in his *De revolutionibus*. Tycho Brahe (1546 -1601A.D.), Johans Kepler (1571 -1630), Galileo

Galilei (1564 – 1642) appeared on the scene to put this on a firm pedestal. Rene Descarte (1637) provided the analytical geometry and postulated the identity of space and matter which led to the beginning of a new chapter. If we classify the areas of science until then, three lines emerge:

1. **Astronomy** (Main scientists: Copernicus, Tycho Brahe, Kepler, Galileo, Huygens).
2. **Mechanics** (Main scientists: Stevin, Galileo, Huygens) and
3. **Optics** (Main scientists: Galileo, Kepler, Descartes, Huygens).

Journey of the western science is invalidation of one theory and its substitution by another in its place. Galileo invalidated the Aristotles's theory of falling bodies and killed his physics. Newton changed the Copernicus and Galilean theories [Observations of Galileo, Tycho Brahe and Kepler provided Newton induction for his three laws of motion and law of universal gravitation. Descartes was the leading philosophy behind Newtonian Physics].

The two most dominating scientists of the seventeenth century C.Huygens (1629-1695) and Sir Issac Newton (1642-1727) opened gates for further development of western science. Principia Mathematica and Opticks are two most outstanding books of Newton which led to the transformation of seventeenth century science. At that point of time the predominant method of the study of Nature was MECHANISTIC.

A. Einstein (1905) provided Special Theory of Relativity wherein the equivalence of mass and energy was established. Matter dominated science world of that time got completely destroyed. Quantum Mechanics came on the scene and in 1927 Heissenberg brought the final and catastrophic earthquake in science. He showed: *Fundamental particles like electrons will remain eternally unknowable to man. The cause and effect relation do not simply apply in the world of New Physics.*

Works of Einstein, Bohr, Heissenberg and Schrodinger aimed at the quest of the ultimate stuff of the universe, turned research into a wild goose chase.

It is interesting to note at this juncture that the relativity theory which revolutioned science was little understood at that point of time. An observation is worth recording: According to some accounts, a journalist told Eddington in the early 1920s that he heard there were only three people in the world who understood general relativity. Eddington paused, and replied, "I am trying to think who the third person is."

At this time a new dimension was added by Eddington, though not recognized. Eddington said: It is the scientist who admits consciousness as a fact and he is aware that but for knowledge by consciousness, scientific investigation could not begin. Max Plank adds: As a paleontologist reconstructs an extinct monster from its footprints so also a scientist constructs his ideas from the messages from consciousness.

Most important milestones in the journey of science were due to the works of Newton, Einstein, Bohr and Plank. Then Field Theories appeared on the scene with attempts to unify all the four forces of nature. Most recent (2004) is the superstring theory. Noble prize for physics (2004) has been awarded for work on interaction of quarks with reference to superstrings. This is the up-to date history of the modern science.

Bronowski writes: Relativity derives essentially from the philosophical analysis which insists that there is not a fact and an observer, but it is necessary to join the two in an observation. The conclusion is that the event and observer are not separable.

During this entire course of journey of western science and technology spiritual values were devalued and disrespected. As a result of it a new religion has emerged which can be called as *scientific materialism*.

UNSOLVED PROBLEMS OF SCIENCE

Universe remains a mystery. Problems of life are far from basic comprehension. One of the hottest areas of research in physics is the problem of Consciousness. Over and above everything else the fast deteriorating ecological balance of the earth has become a matter of central concern. Stephan Hawking in his book titled A brief history of science, states, “Up to now, most scientists have been too occupied with the development of new theories that describe what the universe is rather than to ask the question why.”

“..... However, if we do discover a complete theory, it should in time be understandable in broad principles by everyone, not just a few scientists. Then we shall all, philosophers, scientists and just ordinary people, be able to take part in the discussion of the question of why it is that we and the universe exist. If we find the answer to that, it would be the ultimate triumph of human reason----- for then we would know the mind of GOD.”

SCIENCE INTENDS TO EXPLORE INDIA FOR FUTURE DIRECTIONS

Shrodingier was the first to fire a salvo when he said that the solution to modern day science problems lie in the Vedantic literature of Hindus. Capra saw Shiv's Tandav Nritya in the solution of problems of interaction of elementary particles. Gary Zukov tried to solve problems related to intellectual entrenchment and intellectual openness in the famous Ramayana.

A basic question, now, must be raised as to what were the basic inputs to the western science of history. A glance at the global scenario, at different periods of time, would reveal that these basic inputs were from India. It is a historical fact that the western science used Bhartiya Gyan as basic inputs for its developments, e.g. numerals, ZERO, decimal system, Shulb Sutras, Surgery etc.

HISTORY OF ANCIENT INDIAN (BHARATIYA) SCIENCES

An account of those past Indian Science Contributions is given below which are available to-day, are still relevant and can also be used by the modern day science and technology for building future bases.

Hindu science history dates back to many millennia past. Science is not new to India. As a matter of fact science is the spirit of India. It is clear that right from the Vedic period science dominated the Indian scene. Indian contributions to the science of life (Ayurveda), mathematics and astronomy were both original and fundamental, and it is these that laid the foundations of modern science in the world. Indians were the first to look upon grammar as a science, and its value is now recognized when one attempts at schemes for machine translation from one language to another. Very fundamental questions on time, matter, energy, consciousness and reality were widely discussed by ancient Indians. Till about 19th century when the British colonized India, there was a well-recognized superiority for Indian Science in the whole world.

A parallel story of superiority and even supremacy could be told about Indian technology as well. It is a fact that one of the prized possessions that Alexander took from India during his raids in 3rd century BC was a ball of Indian steel. From that day to the day of wootz steel and Damascus sword upto 19th Century, metallurgy had been a strong point of Indian technology. Look at some of the technological marvels of India spanning over a period of 5000 years: Taj Mahal (17th Century AD); Brihadeswara Temple at Tanjore and thousands of similar temples (10th Century AD); Ajanta, Ellora, Sanchi, and many Buddhist monuments (5th century BC to 5th Century AD); and Lothal, Mohen Jo Daro and Harappan civilizations (3rd millennium BC). All these and many other technological marvels have no equivalents anywhere in the world.

To appreciate the real strengths of Indian Ancient Sciences, it is necessary to provide an account of our past scientific achievements which are available till to-day. We give below only some of those scientific achievements of the past which modern day science and technology can use to build new bases for their future course.

I. VEDIC GANIT

This branch of Hindu Mathematics has already acquired a status which presents it as the future mathematics of the world. Its unique features are:

- a. It provides algorithm for parallel processing;
- b. Its operations are independent of base (decimal, octal, binary, etc.)
- c. It is possible to solve simultaneous non-linear differential equations (manually).

[10 Ph.D.s have already been completed in Civil Engg. Dept., IIT, Roorkee]

II Hindu Aviation Science

VIMAAN SHASTRA of Hindus is a science on which few foreign scientists can place confidence. Though there are numerous descriptions of this subject which are available in different books yet few could place reliance on the descriptions. It was the pioneering work of Wg.Comdr.M.P.Rao who completed a DRDO project to investigate into Sage Bharadwaj's VIMAAN SHASTRA. He came out with startling conclusions. Some of these conclusions are briefly given below:

1. Many ancient treatises describe about the knowledge of aviation. Maharishi Bharadwaja's 'Vymanika Prakaranam' (Vymanika Shastra), extracts from Vedas, references in Puranic literature such as Bhagawata, Mahabharata, Ramayana, Harivamsha, Samarangana Sutradhara of King Bhoja Raja and other works refer to the availability of aviation knowledge in the remote past.

2. Bharadwaja's Vymanika Shastra is a part of Yantra Sarvaswa (encyclopedia on machines), authored by Rishi Bharadwaja who was the son of Brihaspati and father of Dronacharya. The sage says that this knowledge is culled out from Vedas and is being presented for the benefit of man-kind. Bodhananda (10th Century) provided a commentary of this great work. The treatise became available in written form through Pandit Anekal Subbaraya Shastri from 1895 AD to 1918 AD. The Hindi version called Brihad Vimana Shastra was published by Dayanada Bhavan, Delhi in 1959.

3. Rishi Bharadwaja provided the subject matter in the form of in the form of 'Sutras'.. Other well known Rishis and preceptors such as Atri, Shownaka, Lalacharya, Galava, Agastya and Viswambhara etc. have also contributed through citation of principles. Principles so quoted draw references from certain topic-specific works such as Anshu Bodhini, Valmiki Ganita, Yana Bindu, Loha Kalpa, Kriya Sara, Rahasya Lahari, and over 40 such works. It appears that these reference works provided core research knowledge to applied science in Vymanika Shastra. Leading topics of the treatise are:

1. Definition of Vimana.
2. The pilot (rahasyagnodhikari).
3. Concepts and techniques provided on board Vimana.
4. Season-specific food prescriptions for pilots.
5. Specific operational clothing for pilots.
6. Knowledge of atmosphere for pilots.
7. Function-based parts of Vimana.
8. Core metals and alloys for structural use.
9. Application-specific onboard yantras or contrivances.
10. Property-specific materials, Darapanas or mirrors (in yantras) AND
11. Varieties of Vimanas under Kritaka classification.

4.1 Definition:

Acharyas Nararayan, Lalacharya, Vishwambahara, Shownaka, quoting reference works Vyomayana Tantra, Khetayana pradeepika, Yaana Bindu give definition as

flying machine moving under its own power from place to place, island to island and from one loka to another.

The point of interest to modern science is that bands of atmosphere such as troposphere, stratosphere etc., equate well with this in characteristics as well as in bandwidth. 'Valmiki ganitha' Akasha Kalpa, Anshu Bodhinee, Soundamini Kala are references quoted by preceptors, Lalacharya, Shownaka and Dundhinatha. Deeper studies in this area of science could bring out finer resolutions in equations:

4.2 Function Based Parts of Vimana

Thirty one function based parts are given. These are:

1. Vishwakriyaadapana or Mirror of outside views
2. Shaktyaakarshana or energy attracting mirror
3. Parivesha mechanism above the hood of the Vimana
4. Angopasarnhaara Yantra or folding up yantra
5. Vistritakriyaa or opening out yantra
6. Vyroopya darpana
7. Padmachakramukha
8. Kuntinee-shakti mechanism
9. Pushpinee and Pinjulaa Mirrors
10. Naalapanchaka (or 5 pipes)
11. Guhaagarbha mirror yantra
12. Thamoyantra
13. Pancha-vattaskandha-naala
14. Rowdree Mirror
15. Vaataskandh~ Keelaka
16. Shaktisthaana
17. Shabda-kendra-mukha
18. Vidyuddwaadashaka
19. Praanakundala
20. Shaktyudgama
21. Vakraprasaarana
22. Saktipanjara
23. Shirahkeelaka
24. Shabadaakarshaka yantra
25. Pata-prasaarana
26. Dishaampati yantra
27. Pattikaabhraka
28. Solar power attractor
29. Apasmarra or poison gas
30. Sthambhana Yantra
31. Vyshwaanara-naala

4.3 Core Metals and Alloys

Three core metals and their alloys for constructional requirements of Vimana are prescribed (SOMAKA, SOUNDALIKA and MOURTHWIKA). Basic properties of these materials are lightness, strength and heat absorbent/resistant. Looking at properties prescribed, they are in consonance with stipulations in modern Aeronautics.

The ores are said to be obtained from specified layers of earth's crust. Even geological aspects relating to formation of ores, the causative factors governing the ore formation such as temperature, humidity, centrifugal force of earth, pressure inside earth's crust are given. While these features are known in modern science, the treatise gives additional factors such as intra-planetary forces of attraction in specified ratios and the gravitational force of the centre of universe. Elaborate metallurgical processes include extraction, purification, melting and mixing three core metals, alloying 16 types of alloys. Metallurgical processes explain use of varieties of crucibles, furnaces and bellows of various shapes. These supporting tools themselves reflect on the existence of a high order of material practice.

4.4 Application -Specific Yantras

A chapter named 'Yantradhi Karanam' or chapter on contrivances is very special. One half of the treatise dedicates to description of yantras explaining the arrangements to provide the desired effect. A few of these yantras analysed and explained through interpretational logic are shown in Table given below:

Yantra	Interpretations
Viswakriya Darshana	A telescopic camera arrangement to take Picture of activities
Darpan Yantra	Situated below the craft. (Even constructional Drawings have been made by researchers)
Parivesha Kriya Yantra	Auto guidance device to keep the Vimana in a desired flight path
Prana Kundalini Yantra	Throttle control to regulate the speed of Propulsion power plant
Dikpradarshna Yantra	Direction finder to get warning of Direction of approach of enemy Vimana
Pushpani Yantra	To produce cabin comfort on the lines of Pressurized cabin
Shabadakarshana Yantra	Device to forewarn the presence of birds And quadrupeds in the vicinity to help Pilot in taking deviation
Guha Grabha Yantra	Using Vimana as an aerial plform, Detecting presence of explosive hidden Underground

4.5 Property -Specific Materials

Materials mentioned for construction of yantras form interesting study for specialists of material sciences. These materials are metallic, non-metallic, Acids (Drava), glues (Lepa), Mirrors (Darpanas) etc.. The number of ingredients in these materials is even up to 20. Reports received from some leading laboratories in India confirm that some of the materials, developed in their labs as per formulae given in Vimana shastra and related works (Anshu Bodhinee) are unique in nature. Given a fair chance to the research activists, a new family of materials and parallel generation of material technology could evolve. With the advent of bio-metallurgy in modern science, ancient metallurgical practices should get a new boost. Some of the materials already developed are:

1. Tamogarbha Loha
2. Panchadhara Loha
3. Arara Loha
4. Chumbaka Mani
5. Paragrendka Drava
6. Prakashasthanbhanabida Loha.

4.6 Varieties of Vimanas

The treatise deals with four types of vimans. A few deductions about these four aircraft are cited below:

Shakuna Vimana

Apparently it is one of the early conceptions under Kritaka category. It is propeller-driven; powered by an internal combustion power plant. It derives its name from Shakuna (Bird). It has flapping and feathering control surfaces actuated by powered jacks. Raja loha used for structural constructions. Out of 28 parts mentioned major ones are; floor board, hollow mast, heaters, air suction pipes, steam boiler, vidyut yantra etc.,

Sundara Vimana

Significant feature is its jet propulsion system. A Mixture of three oils forms the energy-developing fuel. Ignition is by electric energy. High energy gases are pushed through flexible metal-impregnated fabric hoses acting as jet nozzles. Flexible jet pipes also provide directional control. Structural material specified is Raja Loha. Main parts of this vimana are - five engines, base plate, electrical generator, wind blower, heater.

Rukma Vimana

It has the appearance of a hover craft Rukma means Golden. The vimana has aesthetic golden appearance. Structural material is Raja Loha Harnessing of Solar Energy is mentioned. Retractable landing gear is indicated Directional control is from three rudder arrangement

.Tripura Vimana

It has a unique three-in-one concept. It can operate under water, on land and in space. Propulsion power is by solar energy. Construction material is Trinetra Loha making the Vimana an extremely light vehicle. It has three-tier construction, one for each flying application. Each tier is functionally equipped. On-board systems include yantras providing safety against air currents and radiations.

5. Other Aspects of Science Unraveled in Vymanika Shastra

Besides aspects of Aviation Science, Vymanika Shastra exposes several other interesting phenomenon of scientific interest.

1. Principles elucidated refer to several core texts hinting that the basis of these texts was on broad based research.
2. While discussing formation of metallic ores in the earth's crust, causative factors governing ore formation are:
3. Force of earth's rotation

4. Temperature and humidity inside earth
5. Gravitational force of earth
6. Gravitational influence of other planets, stars and even the centre of the universe.
7. Material science includes substance of metallic, non-metallic, organic, Inorganic, Botanical and Herbal, Oceanic origins
9. Source-related Classification of Materials
10. Artificial or Synthetic
11. Soil Origin
12. Aquatic Origin
13. Mineral Origin
14. Vegetation origin
15. Vennin based
16. Animal origin
17. Hair Origin
18. Egg born.
19. Mercury as a potent source of energy in a number of applications.
20. Use of Mirrors for Radiation Energy-Control and harnessing
21. **Definite system of units of measurements existed.**
22. **Length -Vitasthi, Angula, Danda, Krosha**
23. **Weight -Mushthi, Linka, Pala**
24. **Temperature -Kakshya**
25. **Speed -Prekhana, Linka**
26. **Time -Ghatika**
27. **Volume -Drona.**
28. Description on special clothing for pilots indicates the extent of knowledge prevailing on fabric technology using silk, cotton, wool, hair, moss and leather.
29. Harnessing of energy from atmospheric source such as solar radiation, cloud energy, energy from air currents seem to be unique.
- 30 Principles of development of electrical energy by different means were conceived.
31. Stipulations of close melting temperatures cited in material production hint at precision in pyrometry.
32. Knowledge on high potency explosives and their detection methods indicate a different kind of warfare, akin to recent centuries.

6. Conclusion: The study has revealed parallels between the most modern concepts of atmospheric layers and those provided in the Vymanic Shastra. These are given in the table drawn below:

TABLE

Troposphere	High Air Densitv	Rekha Patha	Shaktyavarta
Stratosphere	Clear Air Turbulence	MandaI Patha	Vatavarta
Mesosphere	Extreme Cold	Kendra Patha	Shaitva Varta
Thermosphere	Extreme Hot	Sakti Patha	Gharshana Varta
Van-Allen Belt	Radiation Hazards	Kaksha Patha	Kiranavartha

Can there be a greater proof of the existence of an extraordinary Hindu Civilization with outstanding science contributions?

III. CONSTRUCTION & ARCHITECTURE

Excellent examples of superb ancient architecture are available which throw light on not only the past glory but also for use in the modern day context.

IIIa. Sea Ports in Ancient India (5000 years back)

Lothal (Maharashtra): A city uncovered during excavations. It is dated 2400 b.c. There are ample proofs of trade with foreign lands. There was a garland of sea-ports starting from Lothal via Kanya Kumari up to Tamra- Lipti situated in Bangal (Description in PERIPLUS BOOK OF 1ST century). It is described that ships of the size of 754 ft.X 126 ft. used to sail. There was a wall of 1400 ft built for controlling sea waves at Lothal. It was so constructed that even during the period of low tide ships could directly sail right up to the port.

IIIb VASTU-SHASTRA

Science and technology of modern architecture revolves round the main idea that every piece of land designated for some building construction is an independent piece of land. The designer is required to provide all that is needed to fulfill the needs of the owner. This can be in total disregard to other considerations. Modern world is witnessing many problems due to this approach in construction. To find solution to the problems, there is a growing awareness amongst architects to look into the methodology of ancient Indian architecture, called Vaastu Shastra. It is observed that buildings/apartments with good Vaastu have healthy, happy and prosperous owners whereas places with negative Vaastu energy will have losses, ill health, ill repute, hurdles etc.

Marvels of Ancient Indian Architecture can be seen in temples(e.g. Konark, Elephanta caves, Lingraj temple of Bhuvaneshwar, Kharuraho temples, Girnar temples, Dilwara temples of Rajasthan, Rangapatnam temples, Rameshwaram temple, Meenakshi Devi temple, Ajanta and Ellora caves, etc. In some of the temples one can hear the musical notes of various instruments by strikingat properly laid stone sculptures. Marvels of engineering structures are available in Mohan-jo-daro, Dwarika, Lothal, Kanjivaram etc.

Construction activities in ancient India usedto take place in accoradance with sound scientific principles. Some of the literature on this subject is available in books like Kashyap Shilpa Shastra, Vrihat Samhita of Varahmihir, Vishwakarma Vastu Shastra, Samrangan Sutradhara, Vishnu Dharmottara Purana, Aparajita Prachha, Jaya Prachha, Pramana Manjari, Maya Vaastu, Bhrigu Samhita, etc.Important Rishis (scientists) who contributed are: Bhrigu, Brihaspati, Shukra, Kashyap, Vashishtha, Agni, Maya, Vishwakarma, Varahamihir, Bhoj etc.

Basics of this science are contained in Sthapatya Veda which is part of Atharva Veda. One MANTRA from ATHERVA-VEDA is of paramount importance for understanding the Indian Architecture. This mantra is the key to the basics of ancient Indian architecture (Vaastu Shastra).

ये त्रिसप्तताः परियन्ति विश्वा रूपाणि विभ्रतः।
वाचस्पतिर्बला तेषां तन्वो अद्य दधातु मे ॥

Concepts revealed have a remarkable parallel with the most modern ecological considerations and even transcend present day science in some respects so far as building design and construction are concerned. Explanation provided here is perhaps the first ever attempted. The beauty of the explanation is that it leads to automatic unfolding of the meaning of the Mantra. The rishi, the seer, writes about the secret in a highly coded way. As per this mantra there are 21 bio-electro-magnetic fields which are required to be balanced for happy life in a dwelling place. These fields have been named as Deva which an ordinary investigator will translate in conventionally which is not the way with Vedic mantras.

IV. TIME

Time is one of the most complex concepts in modern day sciences.

Modern concept of time can be understood through the writings of Stephan Hawking. He says about it in his book entitled as The History of Time as follows:

Einstein's general theory of relativity, on its own, predicted that space-time began at the big bang singularity and would come to an end either at the big crunch singularity (if the whole universe recollapsed), or at a singularity inside a black hole (if a local region, such as a star, were to collapse).

When a star dies, its fuel gets transformed into light and energy; it starts contracting and reduces to a point. Even light is absorbed, so it cannot be known as to what is there. Absence of light is darkness. These are black holes.

S. Hawking says," The work that Roger Penrose and I did between 1965 and 1970 showed that, according to general relativity, there must be a singularity of infinite density and space-time curvature within a black hole. This is rather like the big bang at the beginning of time, only it would be an end of time for the collapsing body and the astronaut. At this singularity the laws of science and our ability to predict the future would break down. However, any observer who remained outside this black hole would not be affected by this failure of predictability, because neither light nor any other signal could reach him from the singularity. This remarkable fact led Roger Penrose to propose the cosmic censorship hypothesis which might be paraphrased as "God abhors a naked singularity."

"The existence of radiation from black holes seems to imply that gravitational collapse is not as final and irreversible as we once thought. If an astronaut falls into a black hole, its mass will increase, but eventually the energy equivalent of that extra mass will be returned to the universe in the form of radiation. Thus, in a sense, the astronaut will be "recycled". It would be a poor immortality, however, because any

personal concept of time for the astronaut would almost certainly come to an end as he was torn apart inside the black hole!”

S. Hawking mentions three arrows of time. These are:

1. Cosmological time: direction in which universe expands;
2. Psychological time: direction of time in which we remember past;
3. Thermodynamic time: direction in which disorder increases.

S. Hawking says:..... the possibility that space-time was finite but had no boundary, which means that it had no beginning, no moment of creation.”

This is the concept of modern science.

HINDU CONCEPT OF TIME

Hindus explained time in a beautiful manner. In order to understand it from the Hindu view point one is required to understand the concept of Kala (काल). In order to understand it one is required to understand the **Concept of Divine Years. In this connection note the following:**

1 earth year = 1 Divine day

360 Divine days = 1 Divine year

12000 Divine years = 43, 20,000 earth years = 1 cycle of 4-Yugas

1000 cycles of 4-Yugas = 1 Kalpa = 1 day of Brahma

Age of Brahma = 100 years = 360x100 = 36000 Kalpas.

Hindus have conceived Vishnu as the Supreme (infinite). Brahma springs up from the centre (नाभि) of Shri Vishnu. At the moment of the beginning of the day Brahma starts the Creation and in the evening this creation is destroyed. The cycle goes on till Brahma attains the age of 100 years as explained above.

It is significant to note that the calculations with regard to the start of the present creation are more near the latest scientific pronouncements than the carbon dating etc.

There is a unique feature of Hindu time concept which is not available with the modern western concepts. We connected “Our time” with that of the “Universe time”, not only physical time but also solar time and bio-time. In bio-time we connect प्राण (time between one inhalation and exhalation) and कला (duration of movement of earth).

$360 \text{ deg.} \times 60 = 21600 \text{ कला (minutes)}$

In 24 hours प्राण = 21600 कला

Thus time and space are united. Where else do you find this type of correlation?

We should ask a question: Why did they do it?

The accuracy of the calculations of ancient Hindus can be judged from the following:

Ancient Indian astronomers were able to calculate the orbiting periods of planets round the sun. They calculated ratios of their orbiting periods to that of the earth. Modern day astronomers too have done it. Following table gives the comparison:

Planet	Surya Siddhanta	Modern Science
Mercury	0.24	0.24
Venus	0.61	0.68
Earth	1.00	1.00
Mars	1.88	1.88
Jupiter	11.86	11.86
Saturn	29.47	29.46

The above table clearly shows the accuracy with which ancient Indians were making their calculations.

In 1760 Sir John Playfair published an article in the Proc. Royal Soc. (Edinburgh). He says: Indians either knew modern Astronomy or they were observing planets.

The concept of entire gamut of creation is beautifully explained in the following shloka:

अव्यक्तादीनि भूतानि, व्यक्तमधीनि भारतः।

अव्यक्तनिधनीन्येव तत्र का परिदेवना ॥

This means: All the objects (animate and inanimate) normally remain unmanifested; it is only during some period of time that they become manifest. Vishnu is Avyakta and the entire set of the bhutas are contained in him.

V. SPACE, TIME AND CALCULUS

. Bhaskaracharya (12th century A.D.) wrote SIDDHANTA SHIROMANI which has following parts: Lilawati; Bija ganit; Ganitadhyaya and Goladhyaya.

Bhaskaracharya, in his Siddhanta Shiromani, defines two kinds of planetary velocities, viz. Sthula Gati (average velocity) and Suskhama or Tatkalika Gati (instantaneous velocity). Calculation of instantaneous velocity needs the use of differential calculus. There is ample proof to state that Bhaskaracharya did use differential calculus for these calculations in 13th century.

There is ample proof to establish that Hindus had with them their Geometry. Shulba Sutras give a lucid description of the so called Pythagoras Theorem.

Ancient Hindus have their own concepts of Space, Time and have their own geometry and calculus. They have their Vedic Ganit which excels the present day mathematics.

VI. LANGUAGE (Sanskrit)

Ancient Hindus had developed their language (Sanskrit) to such an extent that it is virtually a science. NO other language of the world can match with it. We give below observations of some of the most learned personalities in regard to this language (Sanskrit). It is a bare fact that Sanskrit is one of the most loved languages of India.

(a) SIR MONIER WILLIAMS: The Panini Grammar reflects the wondrous capacity of the human brain which, till today, no other country has been able to produce, except India,"

(b) FORBES 87: Sanskrit is the most convenient language for computer software programming.

VII LIFE SCIENCES

Ayurveda is to-day one of the most important methods of treatment of human diseases. In the remote past also it was a life science and not merely some ad hoc prescription making process. Eminent scientists have said very good words for this ancient life science of Hindus. Some of the comments are given below:

SIR WILLIAM HUNTER: The surgery of the ancient Indian physicians was bold and skillful. They conducted amputation, practiced lithotomy, performed operations in the abdomen and uterus, cured hernia, fistula and piles, and set broken bones and dislocations. A special branch of surgery was devoted to rhinoplasty or operation for improving deformed ears, noses and forming new ones, which European surgeons have now borrowed. The ancient Indian surgeons also mention a cure for neuralgia.

DR. HIRSCHBERG: Shushruta, known as the Father of Surgery practiced his skill as early as 600 B.C. He used cheek skin to perform plastic surgery to restore or reshape the nose, ears and lips with incredible results. Modern plastic surgery acknowledges his contributions by calling this method of rhinoplasty as the Indian method.

The whole surgery in Europe has taken its new light when the devices of the Indian workmen became known to us.

One of the fall outs of the Vedic studies undertaken in the past, with the extensive use of Upanishads, is the emergence of **YOGA VIDYA**. This has been thoroughly tested throughout the world. Yoga is now a universally sought-out medium. It is an interesting fact to consider that spirituality as a subject has become part of the curriculum of leading Business Schools in U.S.A. One of the reasons of this adoption is that yoga explains the process of connection of mind to body which helps tackle today's serious problems of stress at the school, home and the workplace. Vedas provide a comprehensive explanation of consciousness. Modern conceptions about mind and consciousness do not go beyond the ability to perceive through the senses as the result of bio-chemical processes of the brain. But Vedic literature uncovers the super-intelligent energy behind the unconsciousness. The key to achieving higher levels of awareness lies in tapping this latent energy in an individual.

To-day YOGA is occupying the centre stage of the world and it has become a social word rather than a treatment procedure. Its effectiveness is par excellence.

WHAT CAN ANCIENT INDIAN SCIENCE DO FOR MODERN SCIENTIST?

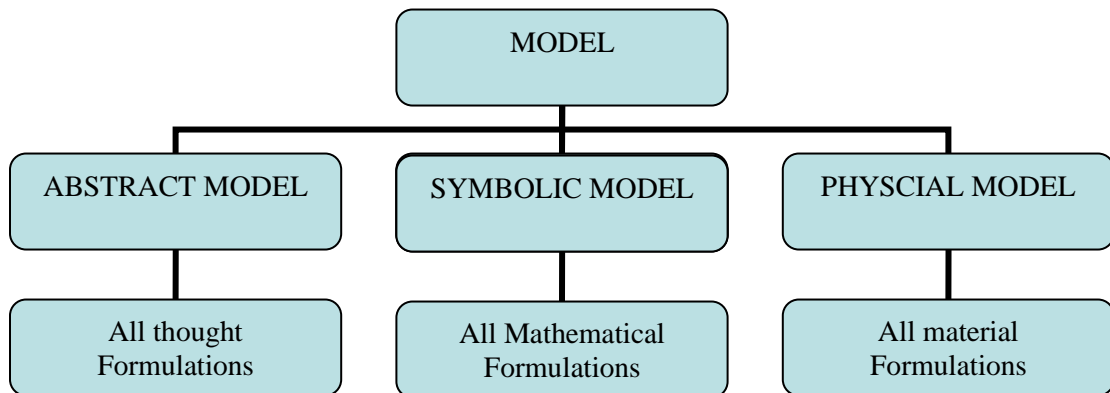
Science aims to explain natural phenomena through many branches (like mechanics, thermodynamics, optics, electromagnetism, astrophysics, zoology, botany, etc) using mathematical framework and experimental findings. Different branches of science take up questions falling within their jurisdiction for providing plausible answers. Experiments are revised to accommodate a theory and a theory is revised to incorporate experimental findings. This cycle of oscillations goes on and on. New concepts emerge and vanish in all branches of science. There is no long lasting theory. Absence of long lasting theory makes life unstable. Man is at a loss to regulate his life. This leads to chaos. We are a witness to it. Is there a way out? YES. Adopt a model which is eternal yet gives all the comforts of life.

Indian models are excellent sources using which present day ailments of social and monetary life can be removed without disturbing the ecology of the planet. Ancient Indian seers provided models using which holistic view of the entire cosmos, animate or inanimate world is taken. The results obtained using these models are valid even to-day. It is interesting to see that some of the observations of ancient Indian seers can be compared with those of the 21st century world.

We must try to understand some basic tenets of Bhartiya Science Model which makes it relevant even to-day. **A model! Is there a model of Bharatiya Science? Let us consider it.**

WHAT IS A MODEL?

Models can be understood and defined in many ways. It depends on the objective in view. The present situation warrants a model using which one is able to describe this universe (macro level and micro level). For such purposes we can classify models in the following categories: 1. Abstract Models, 2. Symbolic Models and 3. Physical models.



First Western Model was given by Aristotle (340 B.C.) and his model guided the destiny of western science for more than 1000 years. This model was concerned with the explanation of apparent physical world and its related phenomena. Aristotle

abhorred experimentation. Philosophy was confined to the analysis of WORDS. It was only in 16th-17th centuries that the western science moved from physical to symbolic models. There is no abstract model with the western science as yet. Science oscillates between physical and symbolic models. This methodology leaves aside a vital link of life and the total neglect of that link is the cause of all the prevailing chaos in life. SCIENTIFIC MATERIALISM is the new dogma.

Science and technology in ancient India did not move according to the western style of modeling. The Indian scientists, who were seers, first saw that missing link in their meditation and created abstract models (Shaiva Model, Vaishnav Model, Shakta Model, Jain Model, Buddha Model, etc.). These abstract models provided the basis for the creation of symbolic models. Then symbolic models were used to arrive at physical models. Seers of the ancient times provided Bharatiya Science model which incorporates all the three types of models in a coherent manner. Bharatiya Science Model travels from unmanifest (अव्यक्त) to manifest (व्यक्त).

We give below one abstract modeling procedure arrived at using Vedantic approach. We must not forget that it is merely an elementary outline of the procedure. A comprehensive modeling will constitute a future project to be worked out in great detail. Present venture is merely to arouse some interest into this aspect of Bharatiya Science which has remained a closely guarded secret.

I. BASIS:

The Basis of Bharatiya Science Model is the philosophy (दर्शन) which is no word-speculation but is the realization in practice. The basic tenet is:

ईशावास्यमिदमसर्वं यत्किञ्च जगत्यां जगत् ।
तेन त्यक्तेन भुञ्जीथा मा गृधः कस्यस्विद्धनम् ॥

In order to realize the above mentioned goal one must follow the following:

कुर्वन्नेवेह कर्माणि जिजीविषेच्छतंसमाः ।
एवं त्वयि नान्यथेतोस्ति न कर्म लिप्यते नरे ॥

To perform actions as stated above, one must remember the following:

अन्धतमः प्रविशन्ति येऽविद्यामुपासते ।
ततो भूय इव ते तमो य उ विद्यायाँ रताः ॥
विद्यां चाविद्यां च यस्तद्वेदोभयँ सह ।
अविद्यया मृत्युं तीर्त्वा विद्ययामृतमश्नुते ॥

Using the basis mentioned above, sages of ancient India lead us to symbolic and physical concepts which are contained in Six Hindu Darshans (षट् दर्शन).

II THEORY (Sankhya Darshan—A Holistic Science)

III LOGIC (Nyaya) and PHYSICAL SCIENCE (Vaisheshika)

IV. PRACTICAL APPLICATION (Yoga Vidya)

There was no automatic acceptance of any statement/theory. It was needed to be subjected to the following processes:

प्रत्यक्ष (Direct perception)-अनुमान (Inference)-आगम (verbal arguments/sacred texts) –प्रमाणानि (proof).

Entire Hindu Science & Technology is developed on the basis and concepts mentioned above.

Is it possible for the modern science to make use of the facts/theories mentioned above? The answer is a BIG YES. It is precisely because of this situation that the modern science is trying to look into these aspects of Hindu Darshan for their possible application in scientific affairs.

Vedic sciences lay emphasis on the holistic view of life whereas the modern concept of life of the man is that of a materialist. This has led to the emergence of the present era in which we find extreme kind of material prosperity but near total chaos. Degradation of the environment, it appears, is beyond repair. It is time to create a new world science in which man is not a humanoid but is a real human who is in complete command of his environment and artifacts rather than their slave. This is possible through the studies of Vedic literature and their implementation

Let us briefly take up following Hindu models for mitigating the present day crisis arising out of the adoption of western science models in our lives.

1. ECOLOGICAL DISASTER

A document was published by eminent scientists of the world on 18 November 1992. This document was signed by 1575 scientists (including 100 Noble Laureates) from all over the world was published in in the Atlanta Journal (U.S.A.). It says: “We want to give an emergency warning to the entire humanity. We are fast approaching a horrible situation. This warning is no exaggeration. Severe global environmental damage is seriously endangering our ecology. If nothing is done to rectify this situation then this planet will not be able to sustain life.”

Warning signals are being felt throughout the world. It appears that we are heading towards an ecological disaster.

Who is responsible for this state of affairs? Our western scientific outlook is directly responsible for it. Is there a remedy? For the remedy we may turn to India and its ancient Vidyas. Let us discuss one such vidya for the cure.

1. Roots of ecology disaster and mechanics of harmonious living with nature as per Hindu scriptures

We are witnessing the greatest ever technological revolution. Technology has reshaped living conditions through different kinds of technical devices. Appliances for routine day-to-day living business, communication, administration, entertainment, education, publishing, etc. have undergone total transformations. Presence of computers is being felt in different walks of life. Present day medical science has made significant advances towards the eradication of human diseases. Mapping of complete genetic code of living beings has been done. This will lead to treatment of diseases by mere gene manipulation.

The cost of these technological changes in terms of consumption of natural resources and degradation has been enormous. Man is adding, everyday, a new source of environmental pollution. (A new form of pollution was reported in world famous U. S. SCIENCE Journal. Mexico City dwellers faced a veil of brown smog. This smog caused stinging of eyes and burning sensation of the throat. For over a decade this smog was attributed to the emissions from automobiles and factories. It has, now, been discovered that this smog was primarily due to the leakage of the liquefied petroleum gas from tanks and cylinders. It is a common knowledge that this gas is commonly used in homes for cooking and heating).

In order to understand the cause of this horrible situation we shall have to go back to the beginnings of industrial revolution. This industrial revolution can be related to the result of one invention: the invention of the Carnot cycle of thermodynamics. It is not the bicycle but a theoretical sequence of events arranged in a cyclic order. The related events executed in order are: process of induction of working fluid; process of compression of working fluid; process of expansion of the working fluid; and the process of the expulsion of used working fluid. Processes of compression and expansion take place inside a hypothetical engine. During the induction process the working fluid is drawn into the cylinder from outside and during the process of exhaust the used working fluid is emptied into the "SINK". This sink is the atmosphere. Sadi Carnot, the inventor of the Carnot cycle, assumed this sink to be of infinite size. It is this sink into which all exhausts are emptied. As the industrial revolution picked up momentum, this concept of infinite sink gained universal acceptance in all technological developments. Thereafter man started using all types of natural places like rivers, wastelands, oceans and what not as infinite sink. It is only, now, that the man has started realizing that the assumed "INFINITE SINK" is in reality a "FINITE SINK". It is this single concept of infinite sink that has been responsible for the pollution of our environment. With the passage

of time the rate of increase of pollution has witnessed an exponential growth resulting in the present day havoc on earth.

Man possesses an insatiable desire to lead a perfectly comfortable living environment. Technology provided means to achieve this state. We have coolers and air-conditioners; heaters and heating systems; automatic kitchen appliances; furnishings for all kinds of situations and for all places; a myriad of entertainment gadgets; various communication systems; a wide variety of modes of transport; enormous variety of dwelling places with all kinds of internal amenities etc. To get these set of things, it is necessary to use natural products and to put them to various kinds of transformations. Since the requirements are enormous, therefore, the demand on natural products is also enormous. To meet these requirements natural resources have been exploited to the maximum possible extent. The result is extreme kind of shortages of natural products. This has led to the development of synthetic products. All along this process, unimaginable quantities of waste are being exhausted into the natural environment. The 'Infinite sink' is gradually becoming 'finite' and the effects are visible in various forms of problems being faced by man. The entire science and technological community of the world is worried at this alarmingly deteriorating situation.

Above mentined scenario depcting horrible ecological imbalances has been caused due to wrong scientific perceptions. The science and technology which aimed at providing comfort through the exploitation of nature will have to revise its philosophy and will have to relearn the method of harmonious living with nature. A solution to this vexed problem is available in the Hindu Darshan of harmonious living with nature. One such vidya and its projections for ecological harmony are outlined below.

To ancient Indian seers there was no idle philosophy. No philosophy had any claim to recognition unless it had some bearing on life. The philosophy must provide 'Darshan' to an ordinary mortal. Students were required to chant Vedic mantras daily. Seers discouraged it as a mechanical process and instead encouraged some reflection in the form of meditational upasna. In regard to achieving a harmonious living with nature one such upasna. is called panchagni-vidya (or the meditation on the five fires) and is worth consideration. According to this PANCHAGNI-VIDYA the whole world, sentient and insentient, is considered to be a homogeneous group of factors in a cosmic sacrifice involving five successive fires arranged in the order of their subtleness. They are all knit together through a spirit of SELF SACRIFICE, so that a new creation may emerge, new life may come into existence, at every stage. The ancients looked on all things and processes from a higher intellectual and spiritual plane. To them all things were agents in a sacrifice bringing new life into existence. IT IS THE SPIRIT OF SACRIFICE AS AN AGENT IN CREATION AND NOT AS A HOMOSAPIEN, THE ENJOYER OF NATURE which lies at the root of this panchagni vidya.

Hindus daily worship and practice harmony with the Cosmos and nature (प्रकृति). One such Vedic mantra is given below:

→ |kS% 'kkfUrjUrfj{ka 'kkfUr% i`Foh 'kkfUrjki% 'kkfUrjks" k/k;% 'kkfUr%A cuLir;% 'kkfUrfoZ'osnsok% 'kkfUrczZã 'kkfUr% loZa 'kkfUr% 'kkUrjso 'kkfUr% lk ek 'kkfUrjs foAA ¼;tqosZn v- 36] ea- 17½

Above mentioned Mantra, when followed in letter and spirit will enable a pollution free world to come in existence.

2. Temporal Hindu worship and chrono-therapy

It is one of the simplest facts of life that the living body shows signs of malfunctioning through various diseases. It is said:

शरीरमाद्यम् खलु धर्म साधनम्

Our rishis evolved a methodology of keeping one's body vehicle in a fit condition through the observance of certain temporal actions. This methodology in modern day terminology is called chrono-therapy. Before we discuss the provisions of that" great old science of India let us discuss modern variants through the terminology of chrono-biology.

The science of rhythmic temporal biological phenomenon in living being is known as chronobiology. It is related to rhythmic temporal patterns of living systems. This phenomenon has been studied for over two centuries. It has been found that various physiological activities show variations during the day time. Some of these variations are listed below:

Daily pattern of sleep and activity is one of the most obvious cyclic patterns of living. One's pulse rate and blood pressure rise sharply early in the morning. Body temperatures rise during day time and fall off sharply at night. Number of hormones essential for the control of life's processes, are secreted with faithful circadian regularity. The number of white blood cells in the immune system also fluctuates regularly with a normal variation of as much as 50% in a day. Why do all living organisms do virtually everything cyclically?

Daily cycles of life as well as seasonal and monthly ones arise because life evolved on this planet. The waxing and waning of light, heat and electromagnetic and gravitational forces cause rhythmic changes both in the availability of and in the physical medium in which the evolution was unfolding. It is very important to realize that the rhythmic organization of temporal processes maximizes the stability of living things and ensures that they not waste precious energy. For a stable life it is absolutely necessary that there is a continuous readjustment of internal and external dynamic requirements. This adjustment is cyclical, viz. a phase of production followed by an assessment of stability; then a midcourse correction based on feedback and then a return to the beginning of the cycle. The breakdown of this cyclical temporal ordering has lethal consequences for the organism.

One of the most important practical applications of the understanding of the role of cycles in biology is the treatment of diseases. The treatment of diseases according to daily rhythms is referred to as CHRONO-THERAPY. Scientists, the world over have tried to unravel the mystery of nature with respect to temporal response of drugs

in the cure of ailments. Let us consider the case of a cardiovascular disease called myocardial ischemia. It is a disease which is caused due to partial blockage of coronary arteries. It means that some part of the heart muscle does not get enough blood supply. Several large scale studies have shown that ischemia is severe during the first four to six hours after people arise in the morning than it is at other times of the day. It is mainly influenced by circadian rhythms in pulse rate, blood pressure and interactions with the nervous system controlling involuntary functions. Many studies have shown that heart attacks strike twice as often in the morning as they do during the rest of the day. The severe heart attacks also result from a lack of blood supply to the heart muscle. Blood pressure is strongly circadian. The damage of the blood vessels is caused by severe shear stresses caused by the forces exerted on them through the flow of blood cells. The most pronounced increase in shear stress takes place when one gets up in the morning. Both the shear stresses and the blood pressure are responsible for the damage of blood vessels. To-day we know that the cardiovascular diseases are amongst very important sources of premature deaths of adults. Medical experts have realized that in the morning the heart's need of oxygen should be decreased. They have been trying to solve this problem through, the administration of different kinds of drugs.

Throughout the world, very intensive and extensive research studies are being pursued to control cardiovascular diseases. But there appears to be no stable solution. Hindu saints long back having realized the importance of the cyclical variations of various (internal and external) body functions evolved a methodology using which occurrence of these ailments could be prevented-this course of prevention is contained in the method of worship. Our saints devised a method of slowing down the pulse rate and blood pressure coupled with the control of involuntary nervous system functions through YOGIC PRACTICE and that too during very early hours of the day. This set of actions performed during the early hours of the morning, the time of most probable onset of heart attacks virtually eliminates the chances of failure of cardiovascular system and ensures longevity. Discussion on the technology of all this is not possible here. This hint is suggestive of the enormous potential available for handling various kinds of ills (physical and psychological) through the methodologies of Hindu worship.

As a result of the use of Hindu models ancient sages were able to have science which is not only relevant to-Day but can also be used by modern day science. Name of few areas for possible future use by science are:

Hindu aviation science; inter-planetary voyages; cold fusion; gold making (transmutation of elements); many Indian Technologies; holistic science of living and non-living; matter and consciousness; discovery of underlying unity behind the universe.

Eddington, Shrodinger, Capra, Zukov, David Bohm, Rhinecourte, Talbot, Penrose, (even Hawking could not escape the use of the word GOD) and others seek the God of Vedanta for the solution of modern day science problems.

3- oSfnd n'kZu ,oa vk/kqfud HkkSfrdh

fofo/krkvksa ,oa tfVyrkvksa ls ;qDr izd`fr dh ekSfyd lefevr ,oa ,drk dh [kkst esa oSfnd _f''k;ksa us ,fdd fl)kar (Unified field theory) dh vo/kkj.kk dh Fkha blesa fo'o ,oa bldh oLrq,sa fo'oT;skfr (Cosmic Energy) uked /kukRed ÅtkZ dk iqf''Vdj.k gS rFkk buds xrh; i{k ,oa vU; fl)kar ^^;K** ls lacaf/kr gSA vusd euhf''k;ksa us fo'o ds inkFkZ ?kVdksa ds :i esa fofHkUu rRoksa ¼Hkwrksa½ dh ladYiuk,a izLrqr dh Fkha ftuds vk/kkj ij ykSfdd fodkl ds :i esa oSfnd n'kZu ds lka[;&ra= dk izknqHkkZo gqv k Fkk ftlesa lkarR;d (Continuum) ,oa ifjfer (Quantum) nksuksa fl)karks dk lekos'k gSA ¼2.1½ lka[; n'kZu ¼egf''kZ dfiy dk l`f''V jpuK foKku½ Hkkjr ds vR;ar izkphu ,oa egRoiw.kZ lka[; n'kZu ds izorZd egf''kZ dfiy FksA mifu''kn dkyhu lka[; osnkar ds lkFk fefJr n'kZu dks i`Fkd dj Lora= n'kZu esa izfr''Br djus dk Js; egf''kZ dfiy dks gSA lka[; dk izHkko izkphu fopkj/kkj ij cgqr vf/kd iM+k Fkk ftlds dkj.k blds izorZd egf''kZ dfiy dks izFke nk'kZfud ekuk tkrk gSA ;g oLrqr% }Sroknh n'kZu gS D;ksafd ;s fo'o l`tu esa nks gh ekSfyd rRoksa ¼izd`fr rFkk iq#''k½ ds vLrRo dks Lohdkj djrk gSA lka[; inkFkZ dh Lora= lRrk lc izdkj ls Lohdkjrk gS rFkk blus rRo ehekal dks ml LFkku rd igqap fn;k Fkk tgka ls osnkUr us bls xzg.k fd;k ,oa loZrksHkkos.k iw.kZ dj fy;kA bl n'kZu esa dkj.k rFkk izHkko ls lacaf/kr vk/kqfud dkj.krk fl)kar (Theory of causality) iw.kZr% fufgr gSA bl n'kZu ds vuqlkj l`f''V izkjaHk ls iwoZ vfoHksfnr vuar lkarR;d izd`fr loZ= O;klr Fkh] ftlesa l`f''V l`tu ds le; izR;{k foHksfnr inkFkZ izdV gqvka izd`fr dks fujkdj] vfoHksfnr] vlhe] vfouk'kh ,oa vfu;af=r ekuk x;k gS ftlesa larqyu dh voLFkk esa rhu vfr lw{e xq.kksa lRo] jt ,oa re dk lkeatl; jgrk gSA ;s izd`fr ds Lo;a ds xq.k ugha gS oju~ l`f''V ds la?kVd fl)kar gSaA iq#''k dh n`f''V ls izd`fr vlarqfyr gks tkrh gS rFkk bu xq.kksa esa lkeatl; ugha jgrk ,oa fdlh xq.k ds vU; xq.kksa dh vis{kk vf/kd gksus ij izd`fr esa vkfoHkkZo izkjaHk gks tkrk gSA rRi'pkr~ bu xq.kksa esa la;ksx fQj fo;ksx ,oa iqu%la;ksx gksus ls lrsxq.k vkf/kD; ds dkj.k egr dk izknqHkkZo gksrk gS] jtsxq.k ds vkf/kD; gksus ij vgdakj dk izknqHkkZo gksrk gS] ,oa reksxq.k ds vkf/kD; gksus ls vgdakj dh ikap rUe=kvksa ¼'kCn] Li'kZ] :i] ,l] ,oa xa/k½ dks mRiUu djrk gSA ftuds la;ksx ls fo'o l`f''V ds la?kVd vLrRo esa vkrs gSaA lka[; esa fnd~ ,oa dky esa fdlh izdkj dk varj ugha fd;k x;kgS rFkk izdk'k dks d.kkas ds :i esa Lohdkj fd;k x;k gSA ftuesa osx ,oa ÅtkZ gksrh gSA lka[; esa izHkko dk izknqHkkZo gksrk gSA ftlds QyLo:i ÅtkZ laj{k.k tSlS fu;eksa ds varxZr l`tu vkjaHk gskrk gSA l`tu es lr] jt ,oa re xq.kksa dk ;ksx fLFkr jgrk gSA fouk'k izØe esa l`tu ds foijhr fØ;k gksrh gS ,oa vvar% lc dqN ewy izd`fr esa yhu gksdj larqyu mRiUu gks tkrk gSA ,oa iqu% iq#''k dh vfoth; n`f''V izHkko ls u;k l`f''V pØ izkajHk gks tkrk gS rFkk bl izdkj l`tu ,oa fouk'k ,d Øfed y; ds lkFk gksus yxrs gSa ftlls xfreku fo'o dk ogh Lo:i iznf'kZr gksrk gS tSlk ekSfyd d.kksa dh fofHkUu vU;ksU; fØ;kvksa ds vk/kkj ij vk/kqfud izknqHkkZo fl)karksa ls izdV gksrk gSA

(3.2) oS'ksf''kd n'kZu ¼egf''kZ d.kkn½

izd`fr ds lHkh ewy xq.k /keksZa dh ekSfyd Lrj ij oS'ksf''kd n'kZu esa cgqoknh&fu:i.k (Plural representation) ds :i esa O;k[k dh xbZ gSA ;g oSfnd n'kZu ds fo[kr N% n'kZuksa esa ls ,d gSA bl n'kZu ds HkkSfrd fo'o ds rRo Kku dks izklr djus esa egRoiw.kZ ;ksxnku fn;k gSA blds izorZd egf''kZ d.kkn us lHkh izsf{kr oLrqvksa dks

ewyr% nks Jsf.k;ksa% vflRro ,oa vflRoghu esa foHkkftr fd;k Fkk ftuesa izFke
^vflRro** ds xq.kksa dks oxhZd`r fd;k x;k gS (1. nzO; 2. xq.k 3. deZ 4. lkekU; 5.
fo'ks"k 6. leok;)

buesa ls nzO;] xq.k ,oa deZ dks iqu% Øe'k% ukS] pkSchl ,oa ikap oxksZa esa
foHkkftr fd;k x;k gSA oS'ksf"kd ds vuqlkj nzO; esa deZ ,oa xq.k fufgr gksrs gSA rFkk
;sla;ksxh dkj.k ugha gksrk gSA

fØ;kxq.kor~ leokfj;dk.kfefe nrO;&y{k.ke~AA 14AA

vFkok

dkj.kfefe nrO;s dk;Zleok;kr~AA 15AA

nzO; varr% vfoHkkftr ijek.kq dh Hkkafr vukfn gS rFkk izsf{kr oLrqvksa dh
Hkkafr uk'koku Hkh gSA vukfn :i esa oginkFkZ gS tks ijek.kfd ,oa loZO;kih nks :iksa esa
gksrk gSA oS'ksf"kd n'kZu esa inkFkZ dks ukS oxksZa esa oxhZd`r fd;k x;k gSA f{kfr
vi] rst] ok;q] vkdk'k] fnd] dky] ekul] vkReuA

ftuesa ls izFke ikap HkkSfrd rRo gS rFkk vUp pkj vHkkSfrd gSA vkdk'k] fnd ,oa dky
izFke okLrfodr,a gSA tks l`tu izfØ;k dh vukfn lkarR;d i`BHkwfe fufeZr djrh gSA ekul
,oa l`ftr inkFkZ la;qDr :i ls ml ljapuk ds fuekZ.k esa lgk;d gksrs gSA vkReu ds la;ksx ls
lq[k rFkk nq[k dk vuqHko gksrk gSA bu lHkh rRoksa esa la[;k] foHkk] Hksn] la;qXeu ,oa
fo;kstu lekfg jgrs gSA l=goha 'krkCnh ds e/; rd csdu ,oa MsdkVsZ tSls nk'kZfud dh
ekU;rk ;gh Fkh fd inkFkZ dh jpuk bUgh izFke ikap rRoksa ls gksrh gSA rRi'pkr~ ikap
rRoksa ds bl fl)kar dks udjk tkus yxk Fkk rFkk vk/kqfudre ijek.kq (Atom) ds vusd
?kVdksa esa foHkkftr dj fy;s tkus ij vk/kqfud oSKkfudksa }kjk inkFkZ&la?kVdksa ds :i
esa cM+h la;k esa jpuk [kaMdksa dh igpku dh xbZ ,oa vusd ifjdYiuk,a izLqr dh xbZA
vk/kqfudre ,ve ds ?kVdksa ds :i esa bysDV^aku] izksV^aku] U;wV^akWu rFkk felkUI ls
izkajHk djds vk/kqfud HkkSfrd fonksa us vusd foy{k.k d.kksa (Strange Particles) rFkk
vusd vU; jgL;iw.kZ izcy vU;ksU; fØ;k'khy d.kksa dh [kkst dh gSA cM+h la;k esa bu
dfFkr ewy d.kksa ½jpuk&[kaMdksa½ dh HkwyHkwyS;k esa Hkzfer ,oa iw.kZr% {kqC/k
vk/qkfud mPp ÅtkZ HkkSfrd fonksa esa bulHkh d.kksa dks laxzfFkr (Composite) ekurs
gq,s mUgsa fuEufyf[kr nks oxksZa esa foHkDr fd;k gS %

1. ySIVkUI % bysDV^akUI] felku] rFkk U;qVfjukst

2. gSM^akUI % izcy vU;ksU; fØ;kdkjh d.k

gSM^akUI ds la?kVdksa ds :i esa ¼iz;ksxkRed dkj.kksa ls ikap ,oa lefefe gsrq
N%½ dh ifjdYiuk izLqr dhA la?kVdksa dh la[;k dh n`f"V ls bl ikap dqvkDIZ ekWMy ,oa
oS'ksf"kd n'kZu ds ikap rRo fl)kar esa lkn`'; izrhr gksrk gSA dqvkDIZ dh bl ifjdYiuk ds
vuqlkj gSM^akUI ds la?kVdksa dh la[;k rhl vFkok NRrhl gksuh pkfg, D;ksafd izR;sd
dqvkDIZ rhu xq.kksa ¼dyLZ½ esa vius lkFkh izfr dqvkDZ ds lkFk mifLFkr jguk pkfg,A
jpuk [kaMdksa ¼ewy d.kksa½ ds :i esa rhl ¼vFkok NÙkhl½ la?kVdksa dh la[;k
vfo'oluh; :i esa cgqr vf/kd izrhr gksrh gS D;ksafd izd`fr gekjh dYiuk ls dgha vf/kd lefer
,oa Øec) gS ,oa blus vius vusd jgL; gekjs vfrlw{e fnd dky ds ekiu esa l{ke vusd lqzxgh
,oa laosnu'khy midj.kksa ls Nqik j[ks gSA vr% LokHkkfod :i ls ;g vU; uohu vo/kkj.kk
cyorh gksrh tk jgh gS fd ;s dqvkDIZ Hkh laxzfFkr gS ,oa buesa ls izR;sd mu nks
la?kVdksa ls ;qDr gS ftUgsa fnddky eas fuf'pr var% Lokra=;~; dksfV;ksa ds izdVhdj.k ds
:i esa fu:fir fd;k tk ldsA ;g vko/kkj.kk lk[a; n'kZu ds }Sroknh fu:i.k ds gh leku gSA

oS'ksf"kd bl vo/kkj.kk ls Hkh dgha vkxs tkdj mu xq.kksa ij cy nsrk gS ftudk viuk Loar= vfLrRo u gksrs gq, Hkh ;s inkFkZ ¼vFkok vf/kd O;kid :i esa nzO;½ esa lekfgr jgrs gSaA oS'ksf"kd ds vuqlkj dksbZ xq.k la;qXeu ,oa fo;kstu dk Lora= dkj.k ugha gksrk gSA

**:i&jl&xa/k Li'kkZ% la[;k% ifj.kkfu
i`FkDRoa la;ksxfoHkkxkS ijRokijRos cq);%
lq[k&nq[ks bPNk}s"kkS iz;Ru'p xq.kk%AA 16AA**

bu xq.kksa dh la[;k pkSchl gksrh gS ,oa buds ek;/e ls fuEufyf[kr ikap rUek=kvksa }kjk lkarR;d esa ls inkFkZ ¼ijek.kq½ dk l`tu fd;k tkrk gSa% daiu ¼Jo.k½] laosx ¼Li'kZ½] ÅtkZ ¼n`½] 'ku&vkd"k.kZ ¼Lokn½] laltZd&vkd"k.kZ ¼xa/k½ tks ekuo dh n`f"V lhek esa vn`f"Vxkspj ,oa yqir jgrs gSaA

nzO; dh nwljh mijs.kh deZ gS ftlesa xq.k fufgr ugha gksrs gSa rFkk tks la;qXeu ,oa fo;kstu dk ,d Lora= dkj.k gksrk gSA deZ ds fuEukafdr ikap izdkj gksrs gS mR{ksi.k] vo{ksi.k] vkdqapu] izlkj.k]xeuA

(3-3) oS'ksf"kd ,oa lka[; esa dkj.krk fl)kar (Principle of Causality)

laHkor% ekuo fparu dh lokZf/kd egRoiw.kZ miyfC/k dkj.k&izHkko laca/k cks/k dh jgh gSaA dkj.krk fu;e esa vVwV fo'okl ds vk/kkj ij gh vk/kqfud foKku dk fodkl gqvk gSA Hkkjrh; fparu ds bfrgkl esa egf"kZ d.kkn us bl lca/k dks LFkkfir djus esa izFke iz;kl fd;k Fkka ;g izekf.kr fd;kFkk fd lHkh lkoZHkksSfed izfdz;kvksa esa dkj.krk fl)kar dk ikyu fd;k tkrk gSA rRi'pkr~ bl fl)kar dks lk[a; rFkk ckS) fparu ,oa osnkUr esa fodflr fd;k x;kA oS'ksf"kd ds vusd lw=ksa esa dkj.k dh izd`fr dk mYys[k feyrk gSA ,d lw= esa foorhZ rhu izdkj ds dkj.kksa dks lanfHkZr djrh gS&

dkj.ka f=fo/ka leokf;dkj.k&leok;Zdkj.kfufeRr dkj.k&Hksnkr~ AA 17AA

izHkko ds lkFk dkj.k fdl izdkj lacaf/kr gS \ ;g vk/kqfud foKku ds fy, Hkh ,d tfVy iz'u gSA bl ds lanHkZ esa d.kkn us oS'ksf"kd lw=ksa ds :i esa fuEufyf[kr fl)kar izfrikfnr fd;s gSA

u nzO;a dk;;Z~ dkj.kp ck/kfrAA 18AA

vFkkZr inkFkZ u rks Lo;a gh vkSj u gh fdlh fufgr dkj.k }kjk u"V gks ldrk gSA

fdz; xq.kor~ leokf;dkjf.kfeRr nzOy{k.ke~AA 19AA

vFkkZr~ inkFkZ dks fØ;k rFkk xq.k }kjk vfHkykf{kr fd;k tkrk gS rFkk blesa dkj.k fufgr gksrk gSA

dkj.kkHkkokr~ dk;Z~;kZHkko% AA 20AA

vFkkZr~ izHkko dh vfLrRoghurk dk vFkZ dkj.k dh vfLrRoghurk ugha gksrkA

dkj.kxq.kiwoZd% dk;~;Zxq.kksn`"V%AA 21AA

vFkkZr~ izHkko ds xq.k dkj.k ds xq.k ls ihNs ugha jgrs gSaA
oS'ksf"kd ds bu fl)akrksa ls fu"d"kZ fudyrk gS fd inkFkZ esa dkj.krk fufgr gksrh
gS ftlds dkj.k inkFkZ&laj{k.k ds fu;e dk ikyu gksrk gSA
egf"kZ O;kl dk osnkar n'kZu vkjaHkokn dks vLohdkj djrs gq, dkj.krk&fl)kar ds :i
esa foorZokn dk vLrRo ekurk gSA

One Definition of ancient Hindu Science:

Matter (द्रव्य):

“Matter occupies space” is the definition provided by Modern Science. It is worthwhile to know the definition provided by Ancient Hindus. The definition of matter as contained in the Vaisheshika is given below:

पृथिव्यापस्तेजो वायुराकाशं कालोदिगात्मा मन इति द्रव्याणि ॥

It is a remarkable definition. It includes energy, space and time as matter. Science has come to the conclusion that matter and energy are two forms of the same thing. It has yet to understand space and time as matter. Space-time continuum is an established concept. Let us wait to see the future shaped as per the above definition

द्रव्य सदैव स्थायी नहीं है और उसकी विभिन्न अवस्थाएँ एवम् गुण हैं।

धर्म विशेष प्रसूतात द्रव्य गुण कर्म.....(वै.द. 1.4)

(It means that in special circumstances Dravya, Guna etc. are produced or destroyed)

HOW TO UNDERSTAND VEDIC SCIENCES (वेद विज्ञान):

Vedas occupy supreme position of respect in Hindu Society. They provide instructions and directions for a happy and prosperous life. This ancient Hindu Encyclopedia contains a very high level of philosophical & spiritual knowledge and important vidyas (sciences), viz. Ayurveda (आयुर्वेद) (the science of life); Sthapatyaveda (स्थापत्य वेद) (the science of architecture); Gandharvaveda (गन्धर्व वेद) (the science of music, dance, drama); Dhanurveda (धनुर्वेद) (the science of warfare); Shulba-sutras(शुल्ब सूत्र)(science of geometry), etc.. These Vedas are rightly termed as the storehouse of knowledge for the entire humanity. This knowledge is devoid of any dogma. This is not a belief but is fully corroborated by facts.. It is a great misfortune that some of the western scholars treated Vedas as merely religious or cultural books. To term Vedas so is to limit their importance. During the recent past, there has been a sea change in the concept about Vedas. More and more scholars are trying to understand their real purport. Studies of these Vedas are being carried out throughout the world to understand their meanings related to modern sciences, technology, music, philosophy, philology, etc. Some of the studies relate to most

modern principles of environmental conservation. Several Suktas of Rigveda (e.g. Purusha Sukta (पुरुष सूक्त), Nasadiya Sukta (नासदीय सूक्त), Hirandyagarbha Sukta (हिरण्यगर्भ सूक्त), etc.) have acquired importance because of their contents. We quote an example from Nasadiya Sukta. This Sukta discusses one of the theories of creation. This Sukta has used Salilam (सलिलम्), Apah (आपः), ambh (अम्भः) words. All these words have an apparent meaning of water (जल). A careful analysis of contents would reveal that this is not so. Instead they refer to three different kinds of fluids (!). Once this argument augers well with the translators, the Sukta starts unfolding its richness of contents. It tells that these fluids which were in extreme heated states (Tapasa (तपसा (!))) originated from Maya (माया) (!!). These fluids are plasmas. An extraordinary explosion took place which led to the creation of our cosmos (Brahmand (ब्रह्माण्ड)) and further expansion took place like that of atmospheric electricity or sun rays.

Vedas provide many clues to the ancient sciences which were in use in India but are not available to the present science. One such example is the attraction of negative particles (ऋणाणु) of the sun. It is an example of an ancient Hindu science which must be investigated, probably using the Parjanya Vidya (पर्जन्य विद्या) of the Vedas. We quote two shlokas from the famous Hindu sacred book (Gita) which mentions about this vidya (vide Gita chapter III, shloka 14-15):

अन्नाद्भवन्ति भूतानि पर्जन्यादन्नसम्भवः ।
यज्ञाद्भवति पर्जन्यो यज्ञः कर्मसमुद्भवः ॥
कर्म ब्रह्मोद्भवं विद्धि ब्रह्माक्षरसमुद्भवम् ।
तस्मात्सर्वगतं ब्रह्म नित्यं यज्ञे प्रतिष्ठितम् ॥

These shlokas say that all Bhutas (भूत) are created out of Anna (अन्न) and the Anna is created out of Parjanya (पर्जन्य). If the conventional meaning is adopted then we do not go beyond the words. These words as technical and codified and we must decode them. Once we are able to do that, this vidya will start unfolding itself. This is a very potent example to prove or disprove the assertions of Vedas. One very famous saint of Varanasi (Swami Vishuddhananda Ji) used to invoke this science of attracting sun's energy for materializing physical objects.

Vedas have been studied and used in India for religious, philosophical, cultural and scientific enquiry. Bhartiya rishis and munis provided the sight (Drishti (द्रष्टि)) to understand this literature. They did intense sadhana to acquire competence in this direction.. Interpretation of Vedic hymns is an extraordinarily difficult task. Any effort to understand Veda-Vijnana will be unsuccessful if the study is not coupled with that of the Samhita (संहिता), Aranyak (आरण्यक), Brahmins (ब्राह्मण) and

Upnishads (उपनिषद्) besides the use of Nirukta (निरुक्त) and other instruments. Different Vedas are required to be studied with the help of different instruments. It has to be noted very carefully: “वेद भाषा बहुमुखी है.” कृष्ण यजुर्वेद orders for its understanding simultaneous use of अधिभूत, अधिदैव, आध्यत्म, अधिलोक, अधिज्योतिष तथा अधियज. Use of grammar alone for the interpretation of Vedas will result in unintelligible outcomes. It is evidenced by such interpretations produced by some of the learned scholars.

Vedic sciences lay emphasis on the holistic view of life whereas the modern concept of life of the man is that of a materialist. This has led to the emergence of the present era in which we find extreme kind of material prosperity but near total chaos. Degradation of the environment, it appears, is beyond repair. It is time to create a new world science in which man is not a humanoid but is a real human who is in complete command of his environment and artifacts rather than their slave. This is possible through the studies of Vedic literature and their implementation. It is worthwhile to quote the following Mantra from Ishavasyopanishad (ईशावास्योपनिषद्):

अन्धं तमः प्रविशन्ति येऽविद्यामुपासते ।
ततो भूय इव ते तमो य उ विद्यायाँरताः ॥9॥
विद्यां चाविद्यां च यस्तद्वेदोभयँसह ।
अविद्यया मृत्युं तीर्त्वा विद्ययाऽमृतमश्नुते ॥11॥

Above mentioned Mantras of the famous upnishad provide us an exceedingly important message. According to mantra(9) one who devotes only to physical sciences falls into blinding darkness; but into greater darkness than that enter they who are engaged only in meditation (adhyatma). AND according to mantra (11): Overcome the causes of death through the physical sciences and attain higher consciousness (immortality) through spiritual sciences. These two mantras together give us a glimpse of the basic philosophy life of Vedic seers. Either material or Spiritual practices adopted all alone will be harmful but the two practiced together will lead to extreme kind of happiness, the goal of every human being. In a nutshell this tells us to adopt a holistic view of life for alleviating pain and achieving happiness.

lq/kh tu Hkkjrh; _f"ksa }kjk iz.khr foKku dh egÙkk dk voyksdu fuEufyf[kr lw= esa fufgr Hkkoksa ls dj izkphu Hkkjrh; foKku&;k=k esa izo`Ùk gksaxs] ,slh izHkq ls izkFkZuk gS %&

**foKku ukoa ifjx`á df'pÙkjs|nKkue;a HkokfC/ke~A
Kkukfluk ;ks fg fofPN| r`".kka fo".kks% ina ;kfr l ,o /kU;%AA**

¼tks foKku&uko dk ifjxzg.k dj vKku :ih HkokfC/k dks rj tkrk gS vkSj Kku&ryokj ls r`".kk dks dkV dj fo".kq ds in dks izklr djrk gS] og /kU; gS½

REFERENCES

- 1- D.M. Bose, S.N. Sinha & B.V. Subbarayappa: A concise history of science in india. Indian National Academy, N. Delhi, 1971.
2. A. Rehman : Science and technology in Indian culture. Natl. Institute of Science Tech. & Dev. Studies, N. Delhi, 1984
3. S. Sharma : Vigyan Bharti Pradeepika. vol2, No.2, Jabalpur, 1996
- 4- fc'ku fd'kksj% Hkkjrh; foKku oSHko] foKku Hkkjrh dsUnz] dk'kh] 2003
- 5- lqjs'k lksuh% Hkkjr esa foKku dh mTtor ijEijk] vpZuk izdk'ku] Hkksiky] 2003
- 6- vP;qrkuUn ljLorh%prqosZn 'krde~] vk;Z izdk'ku] ubZ fnYyh] 1996