



**Syllabus for**

**Value Added Course  
Studies on Ancient Indian Science**

**VIDYASAGAR UNIVERSITY**  
Midnapore -721102,

Syllabus for Value Added Course in Indian Knowledge System, Science Faculty, Vidyasagar University

## **Indian Science Studies in Ancient India**

### **Preamble**

The NEP 2020 recommends the incorporation of the Indian Knowledge Systems (IKS) into curriculums at all levels of education. The success of the policy relies heavily on the shoulders of inspired teachers. Most of the faculty in Higher Education Institutions (HEIs) across the country, although experts in their respective fields, may require additional familiarization efforts for the Indian Knowledge Systems.

The IKS aims to contribute to the second and third aspects of “PanchPran” resolutions i.e. “Erase all traces of servitude” and “Be proud of India’s heritage and legacy” by the Hon’ble Prime Minister in his Independence Day speech.

The purpose of these guidelines for teacher during the program is to provide a roadmap to familiarize and enthuse students about the IKS in such a way that each and every student can acquire the knowledge of science taught in ancient India.

**Course Structure: Indian Science Studies in Ancient India****Duration: 30 Hours (1 hour Induction Meeting +28 hours Lectures + 1 hour Examination)**

Unit Number	Unit Title	Lecture Hours
<b>IKS-I</b>	<b>Physics in India</b>	<b>4H</b>
<b>IKS-II</b>	<b>Chemistry in India</b>	<b>4H</b>
<b>IKS-III</b>	<b>Mathematics in India</b>	<b>4H</b>
<b>IKS-IV</b>	<b>Astronomy in India</b>	<b>4H</b>
<b>IKS-V</b>	<b>Economy in India</b>	<b>4H</b>
<b>IKS-VI</b>	<b>Life, Environment, Ecology and Health in India</b>	<b>4H</b>
<b>IKS-VII</b>	<b>Geography in India</b>	<b>4H</b>

**Detailed Syllabus:****IKS-I: Physics in India**

Theoretical framework for the practice of science in ancient India , Concept of Matter, Sāṅkhya-Pātañjala system, Evolution of different forms of matter (Pañcīkaraṇa) from the Vedāntic view, The atomic theory of the Buddhists and Jains, Gravity, Sage Agastya's Model of Battery, Velocity of Light, Vimana: Aeronautics, Vedic Cosmology and modern Concept, An overview of Indian contributions to technology, Technological Innovations.

**IKS- II: Chemistry in India**

The atomic theory of the Buddhists and Jains, Nyāya- Vaiseśika chemical theory, Chemistry in practice as gleaned from the medical schools of ancient India, Qualities of compounds; formation of molecular properties in chemical compounds, Chemistry of colors, measures of weight and capacity, size of the minimum visible, Ideas of chemistry as in bṛhatsamhitā Metallurgical heritage: Arthaśāstra as the earliest text describing gold, silver, and other metals; Processing of gold, silver, copper, iron, tin, mercury, and lead as mentioned in the Indian texts in the ancient and Medieval Period, Zinc distillation as mentioned in Rasārṇava and Rasaratnasamukāyā. Concepts of acid and bases in Indian chemistry from organic fruit, vegetable-based. Acids, plant-ash-based bases to mineral acids of the medieval period.

**IKS- III: Mathematics in India**

Mathematics in the Vedas and Śulva Sūtras: Mathematical references in Vedas. The extant Śulbasūtra texts & their commentaries. The meaning of the word Śulbasūtra. Qualities of a Śulbakāra. Finding the cardinal directions. Methods for obtaining perpendicular bisector. Bodhāyana's method of constructing a square. The Bodhāyana Theorem (so-called Pythagoras Theorem) Applications of Bodhāyana Theorem. Constructing a square that is the difference of two squares. Transforming a rectangle into a square. To construct a square that is n times a given square. Transforming a square into a circle (approximately measure preserving). Rational approximation for  $\sqrt{2}$ . Construction of Cities. Details of fabrication of bricks, etc. Pāṇini's Aṣṭādhyāyī, Piṅgala's Chandaḥśāstra & Mathematics in the Jaina Texts Āryabhaṭa, his period and his work Āryabhaṭīya, Area of a circle, trapezium, and other planar figures. Approximate value of  $\pi$ . Computation of tabular Rsines (geometric and difference equation methods), Ekavarṇa-samikaraṇa and anekavarṇa-samikaraṇa. Development of Combinatorics Līlāvātī of Bhāskara-cārya, Bījagaṇita of Bhāskara-cārya & Gaṇitakaumudī of Nārāyaṇa Paṇḍita Magic Squares, Trigonometry and Spherical Trigonometry.

#### **IKS- IV: Astronomy in India**

The science of Astronomy and the different units of time discussed in the texts, Systems employed for representing numbers, Spherical trigonometry & Celestial Sphere Division of the celestial sphere/ecliptic, significance by pointing out their basis, five elements that constitute Pañcāṅga – and their astronomical significance, computation of elements in a Pañcāṅga. Key concepts pertaining to planetary computations and Computation of the true longitudes of planets Precession of equinoxes – sāyana and nirayaṇa longitude Finding the cardinal directions and the latitude of a place. Determination of the variation of the duration of the day at a given location Lagna and its computation, Eclipses and their computation.

#### **IKS- V: Economy in India**

History of Indian Economy Thoughts, New Indian Economic Model & Sectorial Contribution Past vs Present History of Indian Economy Thoughts: Context from Dharmashastras, Shukraniti, Mahabharata, and Arthashastra. Kautilya's Economic thoughts in specific. India and Global GDP: Ancient India Beyond Capitalism and Communalism, Dharmic, Caste as Social Capital, Black Money, and Tax Heaven. Agriculture: Ancient India, Manufacturing: Ancient India, Education in India, Wealth in India, Governance, and Business in India, Where India Stands Globally. Indian Business Model: Based on 10-point formula: Family Base, High Level of savings, Self-Employment, Highly Entrepreneurial Nature, Non-corporate Sector as the Core of the Economy, Community Orientation and Higher Social Capital, Faith and Relationship in Economic Affairs, A Society-driven Economy, Driven by Norms and Values.

#### **IKS- VI: Life, Environment, Ecology and Health in India**

Ethnic Studies, Life Science in Plants, Anatomy, Physiology, Agriculture, Ecology, Environment, Ayurveda, Integrated Approach to Healthcare, Medicine, Microbiology, Surgery and Yogo.

#### **IKS-VII: Geography in India**

Geography of Bharatvarsh and Civilizational Journey, Origin of Sthapatyaveda, Concept of Space and Time, Vedic Yajna: Recreating the microcosmos, Vastu Purusha, Six Limbs of Indian Art and Architecture Harappan Town Planning, Early Historical Cities and Early Text (Arthashastra), Mud Forts of Chhattisgarh, Concept of Sacred and Profane, Techno-Typological Evolution & Regional Variations in Temple Architecture, Rock Cut Architecture, Structural Temple Architecture, Tirthkshetra- Kashi, Dwarka, Kanchi, Avantika, Ayodhya, Prabhas-kshetra etc., Continuity of Traditional Town Planning: Jaipur, Madurai, Srirangam etc. Functional Aspects of Temples Sacred Forest (Naimisaranya, Panchvati, Dandkaranya etc.), Sacred Groves (Aaramika,

Devkunj, etc.), Rainwater Harvesting System: Vav, Kund, Talavetc, Sacred Hills and Mountains (Kailash, Vindhyaachal, Sahyadri, Satrunjay, Goverdhan), Kumbha: assimilation of ritual, myth, symbology, and cosmology. Anand K. Coomaraswamy, Patrick Geddes, Alice Boner, Kapila Vatsayayan, Stella Kramrisch and Adam Hardy Forest Management and Urban Planning: Agroforestry, Tank, Lakes, and Stepwells.

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