

IK3002D INTRODUCTION TO INDIAN KNOWLEDGE SYSTEM

Pre-requisites: Nil

Total Hours: 39

L	T	P	C
3	0	0	3

Introduction

India is a country with a long-surviving civilisational history and practice known to mankind. Even conservative estimates date the civilisation to at least 5000 – 8000 years. Therefore, it is not surprising that a rich repository of knowledge accumulated in the Indian subcontinent and manifested in terms of traditions and practices. Unfortunately, due to major changes in the educational system introduced in India about 200 years back, there was a great disruption to the process of knowledge transmission and the continuity is mostly lost. This course is an effort to bring snippets of the Indian Knowledge System (IKS) by providing a fresh relook at the corpus and culling out relevant portions that may generate renewed interest in the subject and motivate several to engage in a deeper study of the knowledge repository of India.

Mathematics, referred to as Gaṇita is an integral part of Indians from very ancient times. What started perhaps at an early stage as a tool to compute planetary positions precisely continued through the post-Vedic period as an uninterrupted tradition and many useful contributions to the field of mathematics including the discovery of infinite series were made throughout Indian history. A culture of Science, Engineering, and Technology ought to have been part of the ancient Indian society as evident from archaeological excavations, and remains of metalworking mines and furnaces that were in use long ago.

The course aims to provide an appreciation of IKS and its relevance to contemporary society requires a two-part study of IKS. The first is to develop an overall understanding of some key components of IKS. This is important before we explore the nature of applications. Therefore, module one of the course provides a quick introduction to the key components of IKS. The second aspect is the application of IKS for some gainful use. The rest of the course presents these aspects in two modules.

Course Objectives

- Explain the historicity of Indian Knowledge System
- Understand the broad classification of Indian philosophical systems
- Appreciate the potential of Sanskrit in natural language processing
- Explain the key features of Indian Numeral System and appreciate the key role it has played in the advancement of Science & Technology
- Understand the basic elements of the Indian calendar and the components of Indian Pañcāṅga
- Develop familiarity with the science, engineering & technology heritage of ancient and medieval India

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Course Outcomes:

CO1: Explain the historicity of Indian Knowledge System and the broad classification of Indian philosophical systems

CO2: Explain the potential of Sanskrit in natural language processing

CO3: Explain the features of Indian numeral system and its role in science & technology advancement

CO4: Illustrate the basic elements of the Indian calendar and the components of Indian Panchanga

CO5: Outline the science, engineering & technology heritage of ancient and medieval India

Module 1: (16 hours)

An overview of Indian Knowledge System (IKS): Importance of Ancient Knowledge - Definition of IKS - Classification framework of IKS - Unique aspects of IKS.

The vedic corpus: Vedas and Vedangas - Distinctive features of vedic life.

Indian philosophical systems: Different schools of philosophy.

Wisdom through the ages: Puranas – Ithihasas - Niti shastras - Subhasitas.

Linguistics: Components of a language - Paṇini's work on Sanskrit grammar - Phonetics in Sanskrit and the role of Sanskrit in natural language processing.

The knowledge triangle: Prameya, Pramaṇa, Saṃsaya - Framework for establishing valid knowledge - Potential fallacies in the reasoning process.

Module 2: (11 hours)

Salient features of the Indian numeral system - Importance of decimal representation - The discovery of zero and its importance - Unique approaches to represent numbers.

Unique aspects of Indian mathematics - Great mathematicians and their significant contributions in the area of arithmetic, algebra, geometry, trigonometry, combinatorial problems in Chandaḥ-sastra of Pingala, binary mathematics and Magic squares in India.

Highlights of Indian Astronomy: Historical development of astronomy in India - The Celestial Coordinate System - Astronomical terminologies - Equinotical points, precession of equinoxes, movable and fixed zodiac - Elements of the Indian Calendar - Panchanga.

Module 3: (12 hours)

Indian science and technology heritage - Metals and metalworking - Mining and ore extraction - Extraction of iron from Biotite by indigenous techniques - Manufacture of steel - Lost wax casting of idols and artefacts - Tools employed for extraction of metallic components.

Physical structures in India - Irrigation and water management - Dyes and painting technology - Surgical Techniques - Shipbuilding - Sixty-four art forms (64 Kalas) - Status of indigenous science and technology.

References:

1. A. K. Bag, *History of Technology in India, Vol. I*, Indian National Science Academy, New Delhi, 1997.
2. D.N. Bose, S.N. Sen and B. V. Subbarayappa, *A Concise History of Science in India*, Indian National Science Academy, New Delhi, 2009.
3. B. Datta and A. N. Singh, *History of Hindu Mathematics: Parts I and II*, Asia Publishing House, Bombay, 1962.
4. M. Hiriyanna, M., *Outlines of Indian Philosophy*, Motilal Banarsidass, New Delhi, 1994.
5. B. Mahadevan, Vinayak Rajat Bhat, and R.N. Nagendra Pavana, *Introduction to Indian Knowledge System: Concepts and Applications*, PHI Learning Private Limited, New Delhi, 2022.
6. S. N. Sen and K. S. Shukla, *History of Astronomy in India*, Indian National Science Academy, 2nd edition, New Delhi, 2000.

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Brief Syllabus:

An overview of Indian Knowledge System (IKS) - Classification framework of IKS - The vedic corpus: Vedas and Vedangas - Indian philosophical systems - Wisdom through the ages - Role of Sanskrit in natural language processing - Framework for establishing valid knowledge - Salient features of the Indian numeral system - Great mathematicians and their significant contributions in the area of arithmetic, algebra, geometry, trigonometry, combinatorial problems in Chandaḥ-sastra of Pingala, binary mathematics and Magic squares in India - Highlights of Indian Astronomy - Elements of the Indian Calendar - Indian science and technology heritage - Metalworking - Mining - Manufacture of steel - Physical structures in India - Irrigation and water management - Dyes and painting technology - Surgical techniques - Shipbuilding.