

Syllabus for the UG Elective Courses
Offered by the Centre for Indian Knowledge Systems, NIT Calicut
(Applicable from 2023 Admission onwards)



Centre for Indian Knowledge Systems
NATIONAL INSTITUTE OF TECHNOLOGY CALICUT
NIT Campus P.O., Calicut - 673601, Kerala

LIST OF COURSES

The following courses may be credited under the categories mentioned in the Table below:

Sl. No.	Course Code	Course Title	L	T	P	O	Credits	Categories			
								OE	EI	DA	HM
1	IK2001E	Mathematics in India: From Vedic Period to Modern Times	3	0	0	6	3	✓			
2	IK2002E	Indian Knowledge Systems in Environmental Conservation	3	0	0	3	3	✓			✓
3	IK3001E	Basic Sanskrit	3	0	0	6	3	✓			✓
4	IK3002E	Introduction to Indian Knowledge System	3	0	0	6	3	✓			✓
5	IK3003E	Indian Ethos and Values In Management	3	0	0	6	3	✓			✓
6	IK3004E	Indian Perspectives on Health and Lifestyle Management	3	0	0	6	3	✓			✓
7	IK3005E	Introduction to Ancient Indian Technology	3	0	0	6	3	✓			✓
8	IK3006E	Managing Social Organisations	3	0	0	6	3	✓			✓
9	IK3007E	Introduction to Traditional Indian Architectural Engineering	3	0	0	6	3	✓			✓
10	IK6001E	Values and Human Excellence	3	0	0	6	3	✓			✓

Open Elective (OE); Entrepreneurship Innovation (EI); Digital / Automation Technologies (DA); Humanities, Social Science, Management (HM).

IK2001E MATHEMATICS IN INDIA: FROM VEDIC PERIOD TO MODERN TIMES

Category		
OE	EI	HM
√		

Pre-requisites: NIL

L	T	P	O	C
3	0	0	6	3

Total Lecture Sessions: 39

Course outcomes:

CO1: Illustrate Sulba sutras

CO2: Explain Panini's Astadhyayi, Pingala's Chandasastra and Aryabhata's method for area computation

CO3: Outline contributions of Madhava School of Mathematics

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

Mathematics in Śulba Sūtras

Finding the cardinal directions. Methods for obtaining a perpendicular bisector. Bodhāyana's method of constructing a square. The Bodhāyana Theorem (also known as 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.

Mathematics in/of Aṣṭādhyāyī, Chandaḥśāstra, Āryabhaṭīya

Pāṇini's Aṣṭādhyāyī, Piṅgala's Chandaḥśāstra. Development of Vyākaraṇa or Śabadaśāstra. Method of Pāṇini's Aṣṭādhyāyī. Śiva-sūtras and Pratyāhāras, Overview and development of Prosody or Chandaḥśāstra. Āryabhaṭīya of Āryabhaṭa Āryabhaṭa, his period and his work Āryabhaṭīya, Area of a circle, trapezium, and other planar figures. Approximate value of π . Computation of tabular Rsines (geometric and difference equation methods), Ekavarṇa - samikaraṇa and anekavarṇa - samikaraṇa.

Mathematical contributions of Madhava school of Mathematics

Introduction to the works of Madhava, including the approximate value of π . Preliminary understanding of a few ideas from Gaṇitayuktibhāṣā of Jyeṣṭhadeva, Tantrasaṅgraha of Nīlakaṇṭha Somayājī, Karaṇapaddhati of Putumana Somayājī, Sadratnamala of Shankaravarman.

Mathematics of modern times

A brief outline of the life and mathematical career of Srinvasa Ramanujan, Some highlights of the published work of Ramanujan and its impact on current trends of mathematics.

Basics of Indian Astronomy

Introduction to Indian astronomy, Panchanga prakaranam, jyachapadi prakaranam, panchabodha prakaranam, ganitaparishkarana prakaranam based on the work Sadratnamala of Sankaravarman.

References:

B. Datta and A. N. Singh, History of Hindu Mathematics, 2 Parts, Lahore 1935, 1938; Reprint, Asia Publishing House, Bombay 1962; Reprint, Bharatiya Kala Prakashan, Delhi 2004.

C. N. Srinivas Iyengar, History of Indian Mathematics, The World Press, Calcutta 1967.

T. A. Saraswati Amma, Geometry in Ancient and Medieval India, Motilal Banarsidass, Varanasi 1979.

S. Balachandra Rao, Indian Mathematics and Astronomy: Some Landmarks, 3rd Ed. Bhavan's Gandhi Centre, Bangalore 2004.

G. G. Emch, M. D. Srinivas and R. Sridharan, Eds., Contributions to the History of Mathematics in India, Hindustan Book Agency, Delhi, 2005.

C. S. Seshadri, Ed., Studies in History of Indian Mathematics, Hindustan Book Agency, Delhi 2010.

G. G. Joseph, Indian Mathematics Engaging the World from Ancient to Modern Times, World Scientific, London 2016.

P. P. Divakaran, The Mathematics of India Concepts Methods Connections, Hindustan Book Agency 2018. Rep Springer New York 2018.

Gaṇitayuktibhāṣā (c.1530) of Jyeṣṭhadeva (in Malayalam), Ed. with Tr. by K. V. Sarma with Explanatory Notes by K. Ramasubramanian, M. D. Srinivas and M. S. Sriram, 2 Volumes, Hindustan Book Agency, Delhi 2008.

Sadratnamala of Shankaravarman (with english translation and notes by S. Madhavan), Kuppuswami Sastri Research Institute, Chennai 2011.

Ramasubramanian K, Sriram MS. Tantrasaṅgraha of Nīlakaṇṭha Somayājī. Springer Science & Business Media; 2011 Jun 16.

Pai V, Ramasubramanian K, Sriram MS, Srinivas MD. Karaṇapaddhati of Putumana Somayājī. Springer; 2018 Mar 14.

Mahadevan, B., Bhat, V. R. and Pavana, R. N. N. 2022, Introduction to Indian Knowledge System: Concepts and Applications, PHI Learning Private Limited, New Delhi.

IK2002E INDIAN KNOWLEDGE SYSTEMS IN ENVIRONMENTAL CONSERVATION

PREAMBLE

The living heritage of the Indian sub-continent hinges on a harmony within, with the environment and the cosmos. The relationship with the environment is one of reverence, as opposed to the anthropocentric, dichotomous nature culture paradigms that have resulted in current environmental issues. This continuous knowledge tradition has resulted in various ways of nature conservation that is systematic and eco-centric. Understanding these principles and analysing them to find the underlying patterns and processes can result in unique culture- based perspectives that can propel us towards sustainability. This course intends to introduce students to Indian Knowledge Systems pertaining to environmental protection and sustainable development.

IK2002E INDIAN KNOWLEDGE SYSTEMS IN ENVIRONMENTAL CONSERVATION

Category		
OE	EI	HM
√		√

L	T	P	C
3	0	0	3

Pre-requisites: NIL

Total Lecture Sessions: 39

Course Outcomes

CO1: Explain Indian Knowledge Systems pertaining to the environment and sustainability

CO2: Illustrate different IKS principles in environmental conservation

CO3: Undertake independent studies in a chosen area of interest

CO4: Outline and explain the linkages between Indian Knowledge Systems and Sustainable Development Goals

Philosophical Foundations and Environmental Ethics in Indian Knowledge Systems

Human Ecology and the Nature-Culture Paradigm: Historical perspectives on human-environment relationships-environmental psychology-anthropocentrism and biocentrism- Bioregionalism and its application in Indian Contexts-Shallow vs. deep ecology in IKS. Modern Relevance of IKS: Ecosystem services, ecological footprint, and the Anthropocene-relevance of IKS in climate change era- Environmental justice- multi-scalar approach to environmental conservation and sustainable development-lessons from IKS.

Resource Management in Indian Knowledge Systems

Soil Conservation: Indigenous agricultural techniques-Sustainable land-use practices and their ecological impacts. Water Conservation Practices: Traditional water harvesting systems (Johads, kund, zabo, bawari, surangam)-Evolution of water practices during Mauryan, Gupta, Chola, and Pandya eras-disuse of traditional water harvesting practices- colonial water management-Air Conservation Practices: Indigenous knowledge of air-purifying trees-Community approaches to reducing air pollution. Forest Management and Conservation: Community forest management systems- colonial forestry-Agroforestry practices and their benefits-agricultural calendar-cropping patterns- architecture- artifact design-arts and crafts.

Biocultural Conservation and Sacred Natural Sites

Sacred geography of India- distribution of Sacred Natural Sites (SNS) - typology of SNS-Sacred groves (Devrai, Kavau, Kan): Biodiversity and hydrological significance- cultural significance- terrain attributes-SNS and Nature based Solutions; Sacred water bodies (Pushkarini, Sarovar). Cultural Traditions and Biodiversity Conservation: Community conservation practices linked to traditional festivals-Oral traditions and ecological awareness. Biocultural Conservation Challenges: Threats to sacred groves and other conservation traditions (urbanization, invasive species)-cultural homogenization-Revival strategies for biocultural practices.

Integrating Indian Knowledge Systems with Modern Sustainability Goals

IKS and the Global Sustainability Agenda

Role of IKS in achieving SDGs related to water, soil, biodiversity, and climate resilience-Contributions of IKS to social, economic, and ecological sustainability-Case Studies of Successful Integration-Revival of traditional water systems for urban and rural needs-Community-led forest conservation and agroforestry models-Challenges and Future Directions.

References

1. R. Jain, *Environmental Ethics in Indian Tradition*. Jaipur, India: Rawat Publications, 2014.
2. N. Paranjape, *In Harmony with Nature: The Traditional Wisdom of Sustainable Living*. New Delhi, India: CSE Publications, 2007.
3. M. Gadgil and P. S. Ramakrishnan, *Conserving the Sacred: For Biodiversity Management*. New Delhi, India: Oxford & IBH Publishing Co., 1998.
4. A. Agarwal and S. Narain, *Dying Wisdom: Rise, Fall and Potential of India's Traditional Water Harvesting Systems*. New Delhi, India: Centre for Science and Environment, 1997.
5. P. S. Ramakrishnan, U. M. Chandrashekhara, C. Elouard, and C. Zerah, *Mountain Biodiversity, Land Use Dynamics, and Traditional Ecological Knowledge*. New Delhi, India: Oxford & IBH Publishing, 2000
6. Gadgil, M., & Thapar, R. (1990). Human ecology in India some historical perspectives. *Interdisciplinary Science Reviews*.
7. Fisher, M. H. (2018). *An environmental history of India: from earliest times to the twenty-first century* (Vol. 18). Cambridge University Press.
8. Gadgil, M., & Guha, R. (1993). *This fissured land: an ecological history of India*. Univ of california Press.
9. Krishna, N. (2014). *Sacred plants of India*. Penguin UK.

IK3001E BASIC SANSKRIT

Pre-requisites: NIL

L	T	P	O	C
3	0	0	6	3

Total Lecture Sessions: 39

Introduction

Of late, there has been a great interest both in India and among the International community in the Sanskrit language. This has been primarily due to the fact that a vast amount of Ancient Indian Wisdom remains buried in various texts that are written in Sanskrit. Increasingly it is felt that the knowledge contained in these texts is very valuable and has potential for contemporary applications. Moreover, the structure and the syntax of this language as brought out by Panini has baffled the modern day computer scientists and linguistic researchers.

Most part of the knowledge tradition in India, be it in science, art, music, logic, ethics, medicine or philosophy is preserved in Sanskrit and therefore gaining a basic knowledge of Sanskrit may prove to be not only inevitable but also valuable. This course addresses the above aspects and is primarily designed to take the first step to gain in roads into the knowledge tradition by developing a first level understanding of the language.

Pedagogical Approach

A good way to dip into this treasure house is to develop a basic working knowledge of the language, which can provide the necessary foundation to start reading ancient texts and their translations and make greater sense of the ideas expressed therein. Traditionally Sanskrit was taught using a grammar - translation approach. In contrast to this approach, this course will introduce the language primarily through a conversational approach. The focus is on lively conversations leading the learner progressively to some of the important grammatical structures and their usages. In a nutshell, the pedagogical approach is to teach - learn Sanskrit through Sanskrit.

Course Objectives:

- Develop a practical working knowledge of Sanskrit language
- Acquire Sanskrit language skills - Speaking, Reading and Writing
- Develop an appreciation of the overall beauty of Sanskrit language
- Acquire a general awareness of the vast corpus of Sanskrit literature

IK3001E BASIC SANSKRIT

L	T	P	O	C
3	0	0	6	3

Total Lecture Sessions: 39

Course Outcomes:

- CO1: Develop a practical working knowledge of Sanskrit language
- CO2: Demonstrate Sanskrit language skills - Speaking, Reading and Writing
- CO3: Explain the structure of Sanskrit grammar
- CO4: Outline the vastness of Sanskrit literature
- CO5: Explain the characteristics of Sanskrit prose

Developing basic Sanskrit language familiarization through conversation

A brief historical perspective to the language and its origin - The overall organization of the language - Beginning conversation - The first and the sixth case - Gender - Nouns: usage and applications - Gender and number - Present tense - Introducing time and seventh case - Verb structures - Past tense and second case - Future tense and fifth case - Additional variations of verb forms (tvā-anta prayogaḥ) - Additional variations of verb forms (tumun-anta prayogaḥ) - Handling situations and developing thematic conversations.

Building rudimentary grammatical foundations of Sanskrit

Panini's work on Sanskrit grammar - Phonetics in Sanskrit – Patterns in Sanskrit vocabulary - The science of sound and pronunciation: Varnamālā system in Sanskrit - The Science of combining letters: Sandhi - The Science of combining words: Samāsa - The Science of making sense of sentences: Kāraṅgas - An introduction to the Sanskrit grammatical and linguistic tradition.

Developing appreciation for the Sanskrit literature

Categories of Sanskrit literary works: Drishya and Sravya - Padyam, Gadyam and Champu - Pancha Mahakavyas and excerpts from them - Examples of well-known Gadyam from Bhanabhatta (Shukanasopadesa) - Exercises on padacheda, Samasa and Anvaya for a portion from identified Sanskrit works.

References:

1. Chaitanya, K., 2011, *A New History of Sanskrit Literature*, Asia Publishing House.
2. Filliozat, P-S., 2002, *The Sanskrit Language: An Overview - History and Structure, Linguistic and Philosophical Representations, Uses and Users*, Indica Books.
3. Kale, M. R., 2010, *Higher Sanskrit Grammar*, 2nd ed, Bharatiya Kala Prakashan.
4. Ram, K., 2010, *The Laghu-siddhānta-kaumudī of Varadaraja: A primer on Pāṇini's Grammar, Volumes I – III*, Motilal Banarsidass Publishers (P) Ltd. Delhi.
5. Sampad, M. and Vijay, P., 2017, *The Wonder that is Sanskrit*, 5th ed., Auro Publications, Sri Aurobindo Society, Pondicherry.
6. Samskrita Bharati, 2015, *Bhasha Pravesaha: Prathama Bhagaha*, Samskrita Bharati, New Delhi.

IK3002E INTRODUCTION TO INDIAN KNOWLEDGE SYSTEM

Pre-requisites: NIL

L	T	P	O	C
3	0	0	6	3

Total Lecture Sessions: 39

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

IK3002E INTRODUCTION TO INDIAN KNOWLEDGE SYSTEM

L	T	P	O	C
3	0	0	6	3

Total Lecture Sessions: 39

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

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; Yoga darśana & universal ideas from Patanjali's Yoga Sūtras on mind & mental health - Philosophy and Practice; Wisdom through the ages: Puranas – Itihasas - 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.

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-saṣṭra 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 - Equinoctial points, precession of equinoxes, movable and fixed zodiac - Elements of the Indian Calendar - Panchanga.

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).

Town planning and architecture: A historical perspective of Indian architecture - Vastu sastra - Town planning - Unitary buildings - Temple architecture.

References:

1. Bag, A. K., 1997, *History of Technology in India, Vol. I*, Indian National Science Academy, New Delhi.
2. Bose, D.N., Sen, S.N. and Subbarayappa, B. V., 2009, *A Concise History of Science in India*, Indian National Science Academy, New Delhi.
3. Hiriyanna, M., 1994, *Outlines of Indian Philosophy*, Motilal Banarsidass, New Delhi.
4. Mahadevan, B., Bhat, V.R. and Nagendra Pavana, R.N., 2022, *Introduction to Indian Knowledge System: Concepts and Applications*, PHI Learning Private Limited, New Delhi.
5. Pole, P., 2021, *Treasure Trove of Indian Knowledge*, Prabhat Paperbacks, New Delhi.
6. Samskrita Bharati, 2006, *Pride of India: A Glimpse into India's Scientific Heritage*, Samskrita Bharati, New Delhi.
7. Sen, S. N. and Shukla, K. S., 2000, *History of Astronomy in India*, Indian National Science Academy, 2nd edition, New Delhi.

IK3003E INDIAN ETHOS AND VALUES IN MANAGEMENT

Pre-requisites: NIL

L	T	P	O	C
3	0	0	6	3

Total Lecture Sessions: 39

Introduction

The journey towards the zenith of human potential was a much discussed and practiced aspect in ancient India. Pure knowledge was conveyed not just in the serene environs of the Himalayan Mountains or in an atmosphere of quietude in a gurukula, but also in the context of stress and fury, and confusion and agitation, as in the war fields of Kurukshetra. It was conveyed not just between a teacher and a pupil, in the conventional sense of the word, but also among people playing other roles — a son conveying this knowledge to his mother (Kapila to Devahuti), between friends (Lord Krishna's Gitopadesa to Arjuna, Lord Krishna's Uddhava Gita to Uddava), Between brothers (Lord Rama to Bharata), from a father to son (Uddalaka to Svetaketu) and from a husband to a wife (Yajnavalkya to Maitreyi). Spirituality at work has been a growing phenomenon through the past thirty years.

An organisation is a subset of the world, and thus there is a need for students to connect to universal beliefs and values. Religious scriptures also offer insights into the secular and spiritual world. Many a time, we find that intellectual debates and discussions are only information, and no transformation. In contrast, ethos and spirituality have much to do with the assimilation of positive values, transformation of personalities and cultivation of character. Attributes such as compassion, truthfulness, honesty, trustworthiness, willingness to trust, etc. have been considered as virtues or desirable qualities in every human. Virtues have to be reinforced throughout the organization as they are indispensable for eternity and this truth has been preached by the various enlightened souls like Vivekananda, Mahatma Gandhi, Kautilya and Aristotle etc. Corporations need to reinforce among every individual the feeling of oneness through the path of practicing virtues.

This course enables the study of universal spiritual concepts and its application to the practice of management.

Course Objectives:

Understand the principles and basis of Indian work ethos

Explain the guidelines offered by Vedic literature towards a value-driven life

Identify the factors that influence the formation of values

Understand the connection between man, nature and God

Develop the capability to discern between Sreyas (that which is good) and Preyas (that which seems good).

IK3003E INDIAN ETHOS AND VALUES IN MANAGEMENT

L	T	P	O	C
3	0	0	6	3

Total Lecture Sessions: 39

Course Outcomes:

- CO1: Explain Indian work ethos and Principles of Indian Management
CO2: Outline the concept and the measures of gross national happiness
CO3: Appraise values as specified in Universal values framework
CO4: Illustrate values from Indian Itihasas and Constitution

Indian Ethos in Management

Indian Ethos - The Meaning of 'Bharat', The Relevance of Indian Ethos; Spirituality at Work - Model of Management in the Indian Socio-Political Environment, Indian Work Ethos and Principles of Indian Management; Indian Heritage in Business and Management - Goals of Life, Exploring Quality in the Indian Context, Quotations from Spiritual Leaders/Scriptures on Wealth Creation; Distribution and Consumption - The Economics of Giving, Enforcing a Work Ethic that is Alien to the Ethos of the Land - Non-violent Economy: Buddhist Economics and Gross National Happiness - Western Economic Systems - Systemic Flaws Driving Unsustainability - Developing and Implementing Gross National Happiness (GNH) - Establishing Goals, Developing GNH Metrics, Developing a Strategy to Achieve GNH Goals.

Values and Vedanta

Universal Values Framework 1: Source and Function; Twenty values of an enlightened mind – Absence of conceit (Amanitvam), Absence of pretence (Adambhitvam), Not hurting (Ahimsa), Glad acceptance (Kshanthi), Striaghtforwardness (Arjavam), Service to the teacher (acaryopasanam), Inner and outer purity (Saucam), Staedfastness (Sthairyam), Mastery over the mind (Atmavinigraha), Disposition towards sense objects (Indriyarthesu vairagyam), Absence of self importance (Anahankaraha), Reflections on the limitations of birth, death, old age, sickness and pain (Janma-mrutyu-jara-vyadhi-dukha-dosanudarsanam), Absence of a sense of ownership (Asakti), Absence of obsession toward son/daughter, wife, house and so on (Anabhisvangah putra-dara-grhdisu), Contact equianimity (Nitya samacittatvam), Unswerving devotion to God (Mayi Ananya-yogena Bhaktih Avyabharini), Preference for a secluded place (Vivikta-desa-sevitvam), Absence of craving for social interaction (Atarihi jana samsadi), Commitment to self-knowledge (Tattva-jnanartha-darsanam), Undersatnding the ultimate validity of self-knowledge (Adyatma-jnana-nityatvam); Values: Preparation for listening, reflection and contemplation.

Towards A World Ethos

Universal Values Framework 2: Concepts of Samanya Dharma (Universal Value), Vissha Dharma (Special contextual values), and Apat dharma (Values for Emergency); Brotherly and fatherly values, roles and responsibilities as depicted in Ramayana; Values from Niti shataka, Vidura niti, Chankaya Niti, Sukra Niti, Thirukkural; Methods to alter one's guna composition in the positive direction - Pancha koshas and human values; The Bhagavad Gita - Ratha kalpana; Practical session on practice of Karma yoga and Pancamaha yagna; Earth as the mother - The Role of Water - 'Freedom of' and 'Freedom from' - The Indian Ethos and Corporate Governance - The Indian constitution and Unity in Diversity.

References:

1. Chaitanya Charan, 2021, *10 Leadership Sutras from Bhagavad Gita*, Voice Publication, Pune.
2. Chakraborty, S.K., 2001, *The Management and Ethics Omnibus: Management by Values, Ethics in Management, Values and Ethics for Organizations*, OUP India.
3. Dave, A.J. and Dutta, S. and Patel, M., 2022, *Business and Management Cases Based on Indian Ethos and Scriptures*, Bharti Publications, New Delhi, 2022.
4. Nandagopal, R. and Ajith Sankar, R. N., 2011, *Indian Ethos and Values in Management*, Tata McGraw Hill Education Private Limited, New Delhi.
5. Swami Bhoomananda Tirtha, *Vedantic Way of Living*, 2004, Narayanashrama Tapovanam, Thrissur.
6. Swami Sivananada, 1995, *Practice of Karma Yoga*, Divine Life Society, Uttaranchal.
7. Swami Dayananda Saraswati, 2022, *Value of Values*, Arsha Vidya Research and Publication Trust, Chennai.

IK3004E Indian Perspectives on Health and Lifestyle Management

Pre-requisites: NIL

L	T	P	O	C
3	0	0	6	3

Total Lecture Sessions: 39

Introduction and Objectives

One of the visionary aims through this course is to enable students to develop the knowledge on Philosophy of Indian Health Systems and science of life, dietetics and clinical nutrition and behavioural sciences which form the basis for life management. During the course, the students will develop the ability to identify, critically analyses and appreciate ayurvedic philosophy of managing life of the individual and in the society. Students will also develop the ability to independently initiate and propose improvements with respect to aspects of food consumption, culture, social, psychology, environment and economy. Furthermore, students develop the working ability to, based on the physiological and clinical picture, investigate, propose, monitor and document the proper diet and nutrition therapy for preventive health care based on research and proven experience. At the same time, students will be able to create good relationships with fellow human beings and to understand the mechanisms that influence our behaviour and our desire for change.

Course Objectives:

- Explain the significance of the philosophy of Ayurveda on preventive measures on routine living
- Distinguish between daily and seasonal practices on healthy living
- Develop an ability to critically analyse, evaluate and use relevant information and discuss new facts and its contribution to the development of living.
- Demonstrate the ability to plan and manage the nutritional needs of different groups in society and the ability to educate and inform about diet and health,
- Illustrate the indigenous healthcare systems and home remedies

IK3004E INDIAN PERSPECTIVES ON HEALTH AND LIFESTYLE MANAGEMENT

L	T	P	O	C
3	0	0	6	3

Total Lecture Sessions: 39

Course Outcomes

CO1: Explain the significance of the philosophy of Ayurveda, Siddha and Yoga on preventive measures on routine living

CO2: Distinguish between daily and seasonal practices on healthy living

CO3: Develop an ability to critically analyse, evaluate and use relevant information and discuss new facts and its contribution to the development of living.

CO4: Illustrate the indigenous healthcare systems and home remedies

Introduction to Indian health systems: Philosophy of Ayurveda - Definition of Health, Concept of Tridosha, Seven Dhatus, Six Rasas; Introduction to other health systems such as Siddha and Yoga.

Dinacharya: Challenges for Modern Managers - Sustaining the quality of executive work life, Career stages and daily routines, Gender issues, Biological clock, Disruptions, Happiness expanded; Relevance of yoga and meditation.

Ritucharya: Guidelines for Ritucharya (Seasonal practices.) - Different climates and Ritucharya; Geographies - Climate-Charyas; Local community development; Psychiatric health and wellness issues; Role of Community health care policies.

Healthy behaviours: Physical, Verbal, and psychological.

Bhojanavidhi and Science of habits: Bhojanavidhi - Fundamentals. Mahaanasa (Megakitchen); Food emphasis - Introduction to Dietetics, nutrition sciences; Science of food and living; Personalization of routines and sustaining health promotion - Impact of fasting on health; Science of habits: Concept of water, the Importance of sleep, Suppression of urges, Nutraceuticals and their promotion; Conventions on indigenous healthcare systems; Home remedies - Useful first aid medicines.

Drugs and health management in the Indian way

Chemistry of drugs - Extraction of metallic components – Bhasma – Rasayana; Patient examination and management practices; Surgical practices, and tools employed; Overall health management - life style, Panca karma and other chikitsa practices.

References

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IK3005E Introduction to Ancient Indian Technology

Pre-requisites: NIL

L	T	P	O	C
3	0	0	6	3

Total Lecture Sessions: 39

There is a wealth of knowledge and wisdom in ancient literature, that if tapped, can lead to higher levels of learning. Self-esteem is one of the important factors in the development of an individual, community or a nation. Enhancement of self-esteem of a nation happens by understanding its past as well as the present achievements and by transmission of the experience down the generation. Ancient India's contributions to mining, metalworking, metallurgy, material science, town planning, architecture, water conservation, irrigation systems, and ship building are noteworthy. It has been found that ancient Indian technology is sustainable and nature-friendly.

Archaeological excavations have revealed functional town-planning; dwelling houses built of standardized burnt bricks, tiled flooring, drainage systems, utilitarian as well as decorated pottery, agricultural operations, ship-building, copper-bronze working, intricate bead-making and jewellery craft. Further, living examples of monuments, and literary sources provide ample evidence of the use of science and technology in ancient India. Throughout its history, ancient India had cultural and commercial contacts with the outside world.

This course provides an introduction to ancient science and technology that can be adapted in the modern world. Students undergoing this course will be able to appreciate the scientific ideas and technical skills of ancient Indians, thereby explore new paradigms.

Course Objectives:

CO1: Outline the relevance of ancient Indian science and technology.

CO2: Explain the methods of mining and manufacturing of materials in ancient India.

CO3: Illustrate the traditional farming practices, town planning and transportation in ancient India.

IK3005E INTRODUCTION TO ANCIENT INDIAN TECHNOLOGY

L	T	P	O	C
3	0	0	6	3

Total Lecture Sessions: 39

Course Outcomes:

- CO1: Outline the relevance of ancient Indian science and technology
- CO2: Explain the methods of mining and manufacturing of materials in ancient India
- CO3: Illustrate the water harvesting technology and traditional farming practices in ancient India
- CO4: Explain town planning and Indian architecture practices
- CO5: Outline the textile technology and transportation engineering in ancient India

Introduction: Relevance of ancient Indian science and technology - Difference between science and technology - Philosophy of ancient Indian technology – Difference between ancient technology and modern technology - Ancient Indian Scientific methods - Glimpses of ancient Indian science and technology.

Mining and ore extraction: Time-line of the Evolution of Materials - Metals and metallurgy - Alchemy, gold extraction process, extraction of zinc, copper mining and extraction process, production of mercury, lead and silver; Iron making and craftsmanship – Smelting of iron, extraction of iron by Ayurvedic method, manufacture of steel, Wootz steel technology, metals for aircraft, apparatuses used for extraction of metallic components.

Non-metals manufacturing: Glass making, Bead making Techniques, Ceramic Technology, Paper manufacturing process, Dyes and painting technology, Binders and glues.

Water harvesting technology and agriculture: Methods of conserving rain water - Irrigation systems; Historical Overview of Ancient Indian Agriculture - Kṛṣiḥ Pārāśaraḥ - Traditional farming practices in India - Maintenance of soil productivity - Indigenous seed conservation and preservation - Examples of traditional knowledge and practices.

Town planning and Indian architecture: Alternative designs for town planning - Unitary buildings - bund constructions, General roads, Ghat roads, Law for housing by Kautilya, Building construction, Sanitation; Historical perspective of Indian architecture - Vastu shastra - Temple architecture.

Textile technology and transportation engineering in ancient India: Literary and archaeological sources – Methods of spinning and weaving; Surface Transport - Ratha-shastra; Water transport - Nauka-shastra; Air-Space transport - Agniyan-shastra.

References:

1. Bhattacharjee, A., Majumdar, S., Ghorui, D. and Routray, A., 2023, *Ancient Indian Science, Technologies & Culture: Decoding the Vedas from Engineering to Consciousness*, Garuda Prakashan Pvt. Ltd.
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IK3006E MANAGING SOCIAL ORGANISATIONS

Pre-requisites: Nil

L	T	P	O	C
3	0	0	6	3

Total Lecture Sessions: 39

Introduction

In social organisations / Not-for-Profit Organisations (NPO), it is not clear as who is the real owner. But every member of the governing board as well as other stakeholders is a custodian of the organisation. Many a times, social organisations are neither for-profit-organisation or not-for-profit organisations. Balancing the interest of multiple stakeholders is the key requirement for managing the affairs of social organization / NPOs. These organisations may also be governed by state government Act and accountability is important. This course deals with some of these aspects and also points out potential areas for improvement in terms of structure, span of control, leadership, staff training requirement, process automation and process improvement, use of quantitative models, etc. This course tries to highlight the importance and application of management principles, technology, analytical models in managing social organisations in the Indian context. It covers under managed/under represented sectors of management. This course is based on the best practices followed at world's largest pilgrimage center in India. This helps the students to understand the best practices followed in social organisations which can be adapted in business organisations.

Course Objectives

- Understand the importance of social organisations in economic development in the society
- Understand the role of governing board in managing various stakeholders
- Identify managerial and administrative challenges in large social organisations
- Application of ICT and digital transformation in improving the service delivery in social organisations
- Application of value chain approach for service delivery
- Application of analytical models for managing large scale operations
- Managing environmental issues

IK3006E MANAGING SOCIAL ORGANISATIONS

L	T	P	O	C
3	0	0	6	3

Total Lecture Sessions: 39

Course Outcomes

CO1: Explain the importance of social organisations in economic development in the society

CO2: Explain the role of governing board in managing various stakeholders

CO3: Identify managerial and administrative challenges in large social organisations

CO4: Illustrate the application of ICT and digital transformation in improving the service delivery in social organisations

CO5: Explain the application of value chain approach for service delivery

CO6: Explain the application of analytical models for managing large scale operations

Evolution of Social Organisations and Frameworks

Introduction to social organisations and organisation theory, Role of religious/social organisations in the economic development of the society, Frameworks for governance and management of social organisations, Government Acts, Amendments and reforms, Constitution of board and its functions, Organisation development and welfare activities, Environmental issues.

Value Chain Management and digital transformation

Elements of value chain in social organisations, crowd management, waiting time management, role of ICT and digital transformation, Safety and Security, Resource management, outsourcing, Voice of customer and its interface.

Societal Interface and transformation to social organisation

Stakeholders and their interfaces, Trusts and social welfare projects, managing social projects, transformation challenges and transformation to social organisation

Governance and Administration in Social Organisations

Organisation structure, Role of government and governing body/trust, funds management, welfare schemes, environment management, sourcing and procurement, pricing decisions, management audit, transformational decisions.

References:

1. Chatterjee, D., Sethi, D. and Pati, S.P., 2022, *Globalizing Indian Thought: Insights from Indian Knowledge Systems*, SAGE Publications Pvt. Ltd.
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IK3007E Introduction to Traditional Indian Architectural Engineering

PREAMBLE

This course explores Vastuvidya, the traditional Indian architectural science, tracing its origins from the Rig Veda (7.54, 55) and examining its evolution alongside contemporary advancements. It defines Vastu as both an art and a science, detailing its classifications, the role and training of Silpis (traditional architects and artisans), and key resource materials. The course introduces the vastumandala grid system, dimensional frameworks based on grain size and human scale, and the principles of orientation and modular standardization. It also covers traditional building materials and techniques, including brick, timber, stone, and sudha mortar, along with insights into temple architecture, settlement planning, residential layouts, and theatre design. Additionally, the course examines the aesthetics of Silpa (sculptural arts), iconography, and graphic arts (Citra), highlighting symbolic and iconic representations in Vedic traditions. By integrating these traditional concepts with modern architectural discourse, the course underscores the enduring relevance of Vastuvidya in contemporary practice.

IK3007E Introduction to Traditional Architectural Engineering

Pre-requisites: NIL

L	T	P	O	C
3	0	0	6	3

Total Lecture Sessions: 39

CO1 : To outline the basic concepts of creation of artifacts from pre-Vedic times to the modern era of engineering and architecture.

CO2 : To trace the art and science of planning settlement system and building construction, from textual sources, extant monuments and tradition of Silpins (craftsmen).

CO3 : To understand the process of town and country planning, design and construction of building, materials and techniques of construction , ancillary facilities and aesthetics.

Introduction to historic development of traditional architectural engineering: Source of vastuvidya, Reference to Rig Veda 7.54, 55, the myth of Aryan Invasion: current advancements - definition and classification of vastu, the art and science of vastuvidya; Classification of silpis - Education and training of silpis; Resource materials; Relevance of vastuvidya in modern times. Dimensional system in vastuvidya - Dimensional unit based on grain size dimensions based on human scale-unifying the dimensional systems; Scale in vastuvidya - Concept of vastumandala attributes of form - Importance of orientation in vastuvidya - a modular approach to standardization, canons of yoni application, method of determination.

Analysis of vastumandala grid system - Vithi concept - Vastupurusa concept, the diagonals and intersections in vastumandala, planning significance of vastupurusa mandala, the concept of prakara; Importance of sites and environmental considerations - Procedure for site selection, classification of site. Traditional systems of site analysis and planning - Settlement planning according to vastuvidya-models for settlement planning, general principles of vastuvidhana. Residential architecture - Residential architecture - plan types c

Traditional materials and construction techniques - Brick, timber, stone, mortar (sudha), vertical proportion of building, construction techniques- Introduction to temple architecture - Temple form, types of temples, plan composition, the vertical composition, temple as purusa; altar geometry and the sky dome matrix- Architecture of theatres the mandapa as the stage, sabha as the theatre, preksagraha according to bhārata; Design of theatres - Layout of rectangular theatres, square shaped theatres, triangular theatre, general features of classical theatres. Introduction to transportation vehicles (yana and sayana): Yana - Sibika and syandana, plavaka (floating vessels), materials for yana, sayana.

Introduction to aesthetics in architecture (silpa) materials used in sculpture, symbolic and iconic representation, proportions in iconography, iconometric module, -iconography- Vedic swastika, Yogic symbols, Sapta Chhandas, Vedic knowledge tree- Sapta-Matrikas, Nava-graha mandala- adornment of sculptures; Introduction to graphic arts (citra) - Six elements of citra, classification of citra, preparation of base for sudhacitra, paint technology.

References

1. Acharya P.K., An Encyclopedia of Hindu Architecture, Manasara Series Vol. VII, Oriental Books Reprint Corporation, New Delhi, 1979.
2. Bruno Dagens (Tr.) Mayamata, Sitaram Bhartiya Institute of Scientific Research New Delhi, 1985.
3. Ramakrishna Bhat. M., (Ed.) Varahamihra's Brhatsamhita, Part I & II Motilal Banarsidass, Delhi, 1987.
4. Dr. Balagopal T.S. Prabhu and Dr. A. Achyuthan, Vastuvidyapravesika - A Text Book of Vastuvidya, Vastuvidyapratisthanam, Calicut, 1997.
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IK6001E VALUES AND HUMAN EXCELLENCE

Pre-requisites: NIL

L	T	P	O	C
3	0	0	6	3

Total Lecture Sessions: 39

Course Outcomes:

CO1: Explain values, skills, work-ethics and ethics-in-work for human excellence

CO2: Outline the value of values

CO3: Explain the distinctive aspects of Indian psychology, workplace spirituality and organizational performance

CO4: Illustrate values from Indian literature

Work and Human Excellence

Values and skills - Value system in Indian organizations - Science and technology vs ethics and morals - Ethics and morals: Intellect or emotion - Ethico-moral interface between organization and organizational members - Employee-organization transactions - Foundations of work culture: the Indian perspective - Detached involvement: Work-ethic and ethics-in-work for human excellence - Human values and economic prosperity: reconciliation via Indian insights - Total quality of mind for total quality management: the imperative of human values - Indian culture and the Vedantic Indian ethos - Sacred simplicity: the keynote of Vedantic ethics - Case studies.

Values and Indian Philosophy

Concepts of Samanya Dharma (Universal Value), Vishesha Dharma (Special contextual values), and Apat dharma (Values for Emergency) - Some episodes from Ramayana and Mahabharata to explain the nuances of Vishesha Dharma and the consequences of falling away from Dharma.

Twenty values of an enlightened mind: Absence of conceit - Absence of pretense - Not hurting - Glad acceptance - Straightforwardness - Service to the teacher - Inner and outer purity - Steadfastness - Mastery over the mind - Disposition towards sense objects - Absence of self-importance - Reflections on the limitations of birth, death, old age, sickness and pain - Absence of a sense of ownership - Absence of obsession toward son/daughter, wife, house and so on - Equanimity - Unswerving devotion to God - Preference for a secluded place - Absence of craving for social interaction - Commitment to self-knowledge - Understanding the ultimate validity of self-knowledge - Case studies.

Indian Approach to Psychology

Social values and individual attitudes - Distinctive aspects of Indian psychology - The tri-guna system - The body-mind-intellect-consciousness complex - The five layered consciousness of an individual - The four states of existence - Afflictions of the mind - The power of habits - The role of intellect in controlling the mind - Positive self-talk and affirmation - meditation - Case studies.

Workplace Spirituality and Organizational Performance

Workplace spirituality framework: intuition and creativity, honesty, trust, love, compassion, humility, personal fulfillment, commitment, and organizational performance - Organizational citizenship behaviour - The interplay of spiritual quotient and organizational growth - Wisdom leadership: leading self by the SELF - Case studies.

References:

1. Chakraborty, S.K., 2001, *The Management and Ethics Omnibus*, Oxford University Press, New Delhi.
2. Chakraborty, S.K., 1998, *Foundations of Managerial Work*, Himalaya Publishing House Pvt. Ltd., Mumbai.
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7. Swami Dayananda Saraswati, 2022, *Value of Values*, Arsha Vidya Research and Publication Trust, Chennai.

8. Swami Mukundananda, 2020, *The Science of Mind Management*, Rupa Publications India Pvt. Ltd., New Delhi.
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