# Knowledge Traditions and Practices of India

# Part I

TEXTBOOK FOR CLASS XI





राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद् NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

#### First Edition

October 2020 Ashwina 1942

#### PD 2T BS

© National Council of Educational Research and Training, 2020

₹ 220.00

#### Printed on 80 GSM paper

Published at the Publication Division by the Secretary, National Council of Educational Research and Training, Sri Aurobindo Marg, New Delhi 110 016 and printed at Pushpak Press Private Limited, B-3/1, Okhla Industrial Area, Phase-II, New Delhi - 110 020

#### ISBN 978-93-5292-345-8

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# FOREWORD

India is a culturally rich country and known for its civilisation and cultural diversity all over the world. This diversity is reflected in the philosophies, customs, literatures, art forms, crafts and health related practices all over India. In India, people's beliefs, ways of life and their understanding of social relationships are quite distinct from one another. Yet they all have equal rights to coexist and flourish, and the education system is expected to respond to the cultural pluralism inherent in our society.

The *National Curriculum Framework*-2005 brought out by the NCERT emphasises upon strengthening of our cultural heritage and national identity. It clearly states that the curriculum should enable the younger generation to reinterpret and reevaluate the past with reference to new priorities and emerging outlooks of a changing societal context. Understanding human evolution should make it clear that the existence of distinctness in our country is a tribute to the special spirit of our country, which allowed it to flourish. The cultural diversity of this land should continue to be treasured as our special attribute.

In consonance with this perspective of NCF-2005, the NCERT has provided ample space to cultural and knowledge practices of our country in an integrated manner across textbooks of different subject areas and classes. However, while reviewing its textbooks in 2017–18 as per the suggestions received from the teachers through online mode, we at NCERT, felt that there is a huge expectation of stakeholders from the NCERT for providing more and more space to the Indian culture and practices for students at the higher stages of school education. This expectation led NCERT to explore a new subject area for Knowledge, Traditions and Practices of India for developing its curricular material. I must acknowledge the vision and continuous guidance of our then Hon'ble Human Resource Development Minister and President, NCERT, Shri Prakash Javadekar, because of him, NCERT could develop this learner-friendly material based on scientific evidences.

It is necessary to mention here, this subject has already been introduced by the Central Board of Secondary Education in 2012 at the Higher Secondary Stage as an elective subject. To avoid any confusion among students regarding the very title of the subject, NCERT has initiated the process of development of textbooks for Higher Secondary Stage with the title 'Knowledge, Traditions and Practices of India'.

This textbook for Class XI contains nine chapters on nine different knowledge traditions and practices — Literature, Crafts, Mathematics, Metallurgy, Ayurveda, Yoga, Philosophy, Astronomy and Performing Arts with a brief introduction of all of these aspects.

The textbook has been developed keeping all the five guiding principles of the NCF-2005 in view. It provides space for students to share their experiences, critical thinking, reflection and decision-making. It has inbuilt evaluation exercises and it presents content in a manner which creates curiosity and interest among children and encourage understanding within their own context, rather than focusing on rote methods.

This textbook is a result of team work of the faculty members of the NCERT, who have worked very hard to use authentic sources for the writing of this textbook under the able guidance of the Review Committee set up to review the textbooks developed by the NCERT. This textbook has also gone through a massive review by the experts in the specific knowledge areas from various other institutions and took the present shape. I acknowledge the support of all who have contributed towards the development of this textbook.

NCERT would welcome suggestions from students, teachers and parents, which will help us to further improve the quality of the material in subsequent editions.

New Delhi September, 2019 HRUSHIKESH SENAPATY

Director

National Council of Educational

Research and Training

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# An Introduction to Knowledge Traditions and Practices of India

India has a rich variegated history and an extraordinarily complex cultural diversity. If we look closely at our multiple cultures spread across the different regions of the country, we feel proud of the rich repository of our ancient systems of knowledge and traditions in different and diverse fields. This adds to our rich cultural heritage that has translated into practices for survival, sustenance and for leading a healthy and purposeful life. The knowledge and traditions have been handed down to us mainly in the form of oral traditions, textual materials, inscriptions, numismatics, tangible and intangible forms of art and architecture.

Ancient systems of knowledge in India, basically consist of understanding the mysteries of the universe, human interactions with environment, philosophy of life, importance of conservation and preservation of environment, development of art and aesthetic sensitivities and inculcation of just and humane qualities among all. The glimpses of our past have been woven in fields like — philosophy, grammar, literature, economy, agriculture, polity, medicine, yoga, astronomy, astrology, life-sciences, arts and crafts, architecture, metallurgy, mining, gemology, shipbuilding, trade, commerce and many other fields.

In order to provide scope to young learners to reflect upon the rich cultural past of our country, and to link with present cultural practices, a 2-year course on Knowledge, Traditions and Practices has been created. The course is presented in two parts. This textbook is the first part of the course, which acquaints the young learners with the contribution made by India to the knowledge system of the entire world creating landmarks in the area of Mathematics, Astronomy, Metallurgy, Philosophy, Ayurveda, Arts, Yoga, and Language Education. The textbook part II for Class XII students will elaborate more upon arts and crafts of India, language and grammar and will also focus on India's contributions in fields like agriculture, architecture, dance, education system and practices, ethics, martial arts and traditions, technologies, society, state and polity, and commerce. These textbooks will be helpful in developing pride and sense of appreciation for India's culture and heritage, while getting acquainted with the indigenous knowledge.

A brief summary of various chapters covered in this textbook is given here to summarise how various knowledge, traditions and practices evolved in India and how they are being passed from generation to generation.

Language is one of the most beautiful and intriguing phenomenon in the world. Languages represent multitude of people and their lived experiences. This diversity is an outcome of many factors that shape life on the subcontinent. Its territorial space is marked by mountains, river basins, coastlines, dense forests and deserts. This wide topographical range harbours a variety of environmental conditions which influence the language and cultures of people living in these regions. Thus, India houses maximum number of written and orally alive languages in the world. It is home to five major language families. These language families are: Indo-Aryan, Dravidian, Austro-Asiatic, Tibeto-Burmese and Semito-Hamitic. Sanskrit language belongs to Indo-European

scientific grammar by Panini, the great grammarian, in about fifth century B.C. Around that time, the people spoke a number of dialects which are called Prakrits. Gautam Buddha also preached in the language of the people, i.e., Pali, one of the Prakrits. The spoken languages of ancient India formed the basis of modern Indian language developed in various regions of India during the medieval period. Language manifests in literature aesthetically taking care of knowledge, traditions and practices. The history of Indian literatures is ancient and vast. It has been an instrument of education since antiquity. Shruti and Smriti literature, Sutra literature, Jataka tales, Panchtantras, Kathasaritsagara, Thirukural, Athichudi and Vachanas are examples of traditions of literature which have enriched human life encouraging them to follow human values, and living in harmony with nature. Language diversity, as a strong resource, has been contributing to formal and informal education in India since ancient time. Language as a medium of education has contributed for the transmitting of knowledge to other generations. The formal education structures that transmitted traditional knowledge were the Pathshalas for primary education and Tols and Chatuspathis for Higher education. The medium of education was Sanskrit in higher centers of learning. The Tols were cosmopolitan in nature and welcomed scholars and teachers from different parts of the country. These centers were mainly located in important towns and villages. The students were given education in Vyakarana (grammar), Sahitya (literature), Jyotisha (astrology), Ganita (mathematics), Smriti (law) and Ayurveda (medicine).

group of languages and was gradually standardised and given a highly

Human being from time immemorial has been thinking about the nature, its veracity, its source and destination. This tendency of enquiry backed with logic takes us to a systematic study which is called philosophy, literally means 'love of wisdom'. Indian culture is an amalgamation of different philosophical and religious sects. Following different faiths, the Indians have been living together with peace and harmony for around three thousand years since there is an inherent harmony among most of the schools of Indian philosophy.

Indian Philosophical thoughts have been traced in perhaps the earliest available literature of the world, i.e., the <code>Rgveda</code>. It has primarily two sects known as <code>Āstika</code> and <code>Nāstika</code>, i.e., believer and non-believer of the <code>Vedas</code> respectively. <code>Sānkhya</code>, Yoga, <code>Nyāya</code>, <code>Vaiśeṣika</code>, <code>Mīmāmsā</code> and <code>Vedānta</code> come under the first category since the views of these schools get authenticated by the verbal testimony of the <code>Vedas</code>. <code>Cārvāka</code>, Buddha and Jaina are the main three proponents of Indian philosophical schools that do not accept Vedic verbal testimony.

There can be no doubt about the fact that the art forms, be it Performing or Visual reflect the thinking process of the society which comprises its people, their habitat, ethos, emotions, the uniqueness of communities, immediate surrounding or environment and the effects of the historical background. It is evident, all art forms are refined expression of its people. Research studies on the lives of people before the Christain Era (BCE) during the ancient Mohenjo-Daro and Harappan Civilisation, have evidence depicting the different types of arts practiced in varied forms and styles. As human beings started exploring life each day, it gave way to creative expressions in daily lives. They danced, sang, enacted stories related to life, painted pictures to celebrate victories or occasions like birth, marriages, etc., created many types of utensils to store food, clothes to cover the body, shelter to live, decorative items to beautify

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lifestyle, etc. To fulfill the basic needs and desires, all tangible and intangible expressions have been refined with the passage of time. These were the expressions that gave birth to varied artistic traditions.

Indian art and architecture is a confluence of different knowledge evolved over the last several thousand years — of mathematics and sciences, technology and philosophy of aesthetics, which also reflects the society, economics and political conditions and architectural designs and motifs of people through ages. Art and architecture are tangible forms of creativity by human race reflected through various paintings, sculptures, monuments and varieties of buildings.

Astronomy is an ancient science, dating back, perhaps to the time when humans came out of caves to live in the open and felt a sense of wonder and awe as they looked at the sky and observed celestial phenomena like the phases of moon, eclipses and appearance of different stars in the sky. In the absence of real understanding, humans wrapped these phenomena in mystery and incorporated them in their myths and religions. India, being a very old civilisation, had a strong tradition of astronomy. Vedas and other religious texts speculated upon many important questions of astronomy and cosmology. These included questions related to the origin of the universe, though the discussion was couched in philosophical terms. At the same time there was a lot of activity in practical astronomy which people needed to conduct in their lives in an orderly fashion. For example, people needed to know when rains would come, and they could sow their crops. They also needed to know when they could celebrate marriages, and other ceremonies and festivals. Besides, phenomena like the eclipses and appearance of comets and shooting stars in the sky were believed to bring misfortune to rulers and destruction from wars, natural disasters like floods and earthquakes. Many kings had, in fact, appointed astronomers to keep an eye on the sky and report to them the occurrence of any such astronomical events. Moreover, most people believed in astrology which held that the motion of heavenly bodies and the occurrence of natural phenomena had profound influence on their destiny. So, it was necessary to follow the motion of heavenly bodies and to track events like eclipses.

Thus, the main preoccupations of the astronomers was—(a) devising calendars and reliable time-keeping devices for measuring time; (b) predicting the time of occurrence and duration of astronomical events such as eclipses; (c) noting the time of appearance of certain stars in the sky, and (d) observing the Sun, moon and planets. It is important to note that all these activities required reliable estimates of the distances of the Sun, moon and other astronomical objects, as well as the ability to undertake tedious mathematical calculations. Many important contributions were made in these fields for which due credit has perhaps not been given to Indian astronomers by the Western historians of science.

A look at the works done in mathematics by Indians in the ancient period makes one wonder about these achievements. The discoveries at Mohenjo-Daro reveal that as early as 3,000 B.C., the inhabitants of the land of the Sindhu lived a highly organised life. In fact, they were far advanced than other people of that period. The *Brahmana* literature (2,000 B.C.), which follows the *Vedas*, is partly ritualistic and partly philosophical. We can find in these works, the origins of most of the sciences and arts which have helped to make up the modern civilisation. The culture of the science of mathematics or of any other

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branch of secular knowledge, was not considered to be a hindrance to spiritual knowledge. Importance to the culture of *Ganita* (mathematics) is also given by the Jainas. Their religious literature includes *ganita anuyoga* (the exposition of the principles of mathematics). The knowledge of *Sańkhyāna* (literally, 'the science of numbers,' meaning arithmetic and astronomy) is stated to be one of the principal accomplishments of the Jaina priest. In Buddhist literature too, arithmetic (*gaṇana saṅkhyāna*) is regarded as the first and the noblest of the arts. All these will give a fair idea of the importance and value set upon the culture of *ganita* in ancient India.

India's contribution to the world of science is not only the discovery of 'zero' and the decimal system, but also the science of Ayurveda, a truly holistic health system encompassing all the aspects of well-being — from physical, physiological and psychological to environmental and ecological health. Literally meaning 'science of life', Ayurveda is a vast treasure house of interesting and contemporarily relevant scientific concepts dealing with health and disease. It is a science which helps optimise one's health enabling a healthy, productive, happy and satisfactory lifespan. While Ayurveda emphasises greatly on preventive and promotive health, its comprehensive approach to treatment is in tune with the increasing interest in systemic approach to disease in modern medicine. Codified ayurveda would be atleast 4000 years old or 1500 years prior to Hippocrates, the father of Western medicine. Ayurveda has its roots in the vedas, considered the oldest written-down literature in the world and from which many theories and philosophies have sprung. The systematised science of Ayurveda has resulted from the amalgamation and practical application of these various concepts and doctrines.

Further, India had its own alchemical traditions. This included the knowledge of chemical processes and techniques. Archaeological findings of Harappa and Saraswati sites provide ample proof in favour of advanced knowledge in the field of agriculture, irrigation, architecture, production of metals and their use and trade. The hymns of *Yajurveda* and *Rgveda* are unsurpassable proof of the antiquity of India's progress in science. These *Vedas* mention the extraction and processing of metals such as gold, silver, copper, tin, lead, iron and their alloys.

In ancient India, chemistry had various names, i.e., *Rasāyana Śāstra*, *Rasatantra*, *Rasakriyā* or *Rasavidyā*. It included metallurgy, medicine, manufacture of cosmetics, glass, dyes, inks etc. Ancient Indians applied that knowledge of chemistry in various walks of life.

Originated in India, Yoga is a science of spiritual evolution. It has now gained its popularity in the west and practice of Yoga is well accepted by the world at large. It encompasses the different fields of our existence such as physical, psychological, social and spiritual. Yoga is understood as <code>Anuśāsana</code> (discipline), and it brings discipline in the health habits of human beings by practicing it regularly and following its rules.

After going through this textbook, the students will be able to recognise and retrieve information on knowledge traditions and practices of India from various primary and secondary sources. They will also be able to compare and analyse the developments taking place in India and different parts of the world, create projects, audio-video materials and other resources, and appreciate our contributions.

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## **A**CKNOWLEDGEMENTS

The National Council of Educational Research and Training is grateful to Kapil Kapoor, *Professor* of English and *Chancellor*, International Hindi University, Vardha, Gujarat; Jagbir Singh, *Professor* and *Former Head*, Department of Punjabi, Delhi University, New Delhi and Chand Kiran Saluja, *Director*, Sanskrit Samwardhan Pratishthanam, New Delhi, for their suggestions and feedback on the manuscript of this textbook, which helped the authors to improve the content of their chapters.

The Council acknowledges the support and contribution of Pankaj Kumar Mishra, Associate Professor, St. Stephen's College, New Delhi; Anamika, Associate Professor, Department of English, Satyawati College, New Delhi; Ashish Kumar Ghosh, Theatre Expert, New Delhi; Madhu Bala Saxena, Retd. Professor, Faculty of Music and Fine Arts, Delhi University, New Delhi; Ramesh C. Bhardwaj, *Professor*, Department of Sanskrit Delhi University, New Delhi; I.V. Basavaraddi, Director, NDNIY, Ministry of AYUSH, Government of India, New Delhi; Virendra Kumar, Retd. Lecturer in Maths, M.L. Inter College, Hathras; Rajesh Kumar Thakur, TGT (Maths) Government Boys Sr. Secondary School, New Delhi; M. Jaya Krishnan, Professor, Department of Education, Shri Lal Bahadur Rashtriya Sanskrit Vidyapeeth, New Delhi; Satyamurti, Professor, School of Sanskrit and Indic Studies, Jawaharlal Nehru University, New Delhi; Om Nath Bimali, Associate Professor, Delhi University, New Delhi; V.B. Bhatia, Retd. Professor, Delhi University, New Delhi; R. Joshi, Retd. Professor, NCERT; Alka Tyagi, Satyawati College, Delhi University; Ananya Pathak, Freelancer and Journalist, Delhi; Vikash Sharma, Freelancer and Journalist, Delhi; Ishwar V. Basavareddy, Director, MDNIY, New Delhi; Rabindra Mohan Acharya, Deputy Director, Adm. SYASA, Bangaluru; C.G. Shinde, Kaivalyadhama, S.M.Y.M. Samiti, Launavala, Pune; Sanjib Kumar Patra, Associate Professor, S-VYASA, Bangaluru, for the vetting and editing of the content of the chapters in this textbook.

The Council also acknowledges the guidance and feedback of the Review Committee consisting of Anjum Sibia, *Professor*, A.K. Srivastava, *Professor*, Saroj Yadav, *Chairperson*, Gauri Srivastava, *Professor*, Dinesh Kumar, *Professor*, Ranjana Arora, *Professor* and Sandhya Singh, *Professor*, NCERT, in the review of this textbook.

The Council also acknowledges the support of Rama Jaysundar, *Professor*, Department of NMR, AIIMS, New Delhi; Sathya N. Dornala, *Panchakarma Specialist*, Swami Vivekananda Ayurvedic Panchakarma Hospital, New Delhi and Reena Arora, *Ayurvedic Doctor*, New Delhi.

Thanks are also due to Madhuree M. Shahane, Pune, *Member*, Executive Committee, NCERT, for her feedback on the manuscript of the textbook.

The efforts of Girish Goyal, *DTP Operator* (Contractual), DCS, Hari Darshan Lodhi and Nitin Kumar Gupta, *DTP Operators* (Contractual), Publication Division, NCERT, are to be highly acknowledged for layout and design. The Council also acknowledges the efforts of Chanchal Chauhan, *Proofreader* (Contractual), C. Thangminlal Doungel, *Editorial Assistant* (Contractual) and Aishwarya Bhattacharya, *Assistant Editor* (Contractual), Publication Division, NCERT, for proofreading and copyediting the manuscript.

# ROMANISATION OF INDIAN SOUNDS

# (Diacritical Marks)

Devanāgarī	Roman	Example	
अ	a	असत्य	asatya
आ(1)	ā	आकाश	ākāśa
इ(ऻ)	i	इच्छा	icchā
<del>ई</del> (1)	ī	ईश्वर	īsvara
3 (~)	u	उन्नति	unnati
<u>a</u> (°)	ū	ऊर्जा	ūrjā
汞(。)	ŗ	ऋषि	ŗși
ए() प्र	e	एक	eka
ऐ(ै)	ai	ऐक्य	aikya
ओ(ो)	0	ओषधि	oṣadhi
औ(ौ)	au	औषध	auṣadha
अं()	ṁ	संसार	saṁsāra
अः (ः)	ķ	दु:ख	duḥkha
क	ka	कर्म	karma
ख	kha	खल	khala
ग	ga	गहन	gahana
घ	gha	घर	ghara
ङ	'n	वाङ्मय	vāṅmaya
<b>ਚ</b>	ca	चक्र	cakra
छ	cha	छत्र	chatra
ज	ja	जगत्	jagat
झ	jha	झर	jhara
স	ña	ज्ञान (ज् +ञ +आन)	jñāna
ट	ţa	कीट	kiṭa
ਰ	ṭha	ਸਰ	maṭha
ड	ḍа	गरुड़	garuḍa
ढ	ḍha	गूढ़	gūḍha

ण	ņa	गुण	guṇa			
त	ta	तट	taṭa			
थ	tha	तथा	tathā			
द	da	दान	dāna			
ध	dha	धन	dhana			
न	na	नाम	nāma			
Ч	pa	पशु	paśu			
फ	pha	फल	phala			
ब	ba	बल	bala			
भ	bha	भक्ति	bhakti			
म	ma	ममता	mamatā			
य	ya	यथा	yathā			
ŧ	ra	रात्रि	rātri			
ल	la	लघु	laghu			
а	va	वस्तु	vastu			
য	śa	शान्ति	śānti			
ष	șa	मेष	meșa			
स	sa	सुख	sukha			
ह	ha 🙀	हास	hāsa			
E ha EIH hasa						

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Cherish cultural diversities end gender disparities