Knowledge Traditions and Practices of India

Part I

TEXTBOOK FOR CLASS XI

विद्यया ऽ मृतमश्नुते

एन सी ई आर टी
NCERT

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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.

HRUSHIKESH SENAPATY
Director
National Council of Educational
Research and Training

New Delhi
September, 2019

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

group of languages and was gradually standardised and given a highly 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).

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 *Ṛgveda*. It has primarily two sects known as *Āstika* and *Nāstika*, i.e., believer and non-believer of the *Vedas* respectively. *Sāṅkhya*, Yoga, *Nyāya*, *Vaiśeṣika, Mīmāmsā* and *Vedānta* come under the first category since the views of these schools get authenticated by the verbal testimony of the *Vedas*. *Cārvāka*, 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

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

branch of secular knowledge, was not considered to be a hindrance to spiritual knowledge. Importance to the culture of *Gaṇita* (mathematics) is also given by the Jainas. Their religious literature includes *gaṇita anuyoga* (the exposition of the principles of mathematics). The knowledge of *Saṁkhyāna* (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 saṁkhyāna*) 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 *gaṇita* 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 *Ṛgveda* 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 *Anuśāsana* (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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ROMANISATION OF INDIAN SOUNDS

(Diacritical Marks)

Devanāgarī	Roman	Example
अ	a	असत्य asatya
आ (ा)	ā	आकाश ākāśa
इ (ि)	i	इच्छा icchā
ई (ी)	ī	ईश्वर īsvara
उ (ु)	u	उन्नति unnati
ऊ (ू)	ū	ऊर्जा ūrjā
ऋ (ृ)	ṛ	ऋषि ṛṣi
ए (े)	e	एक eka
ऐ (ै)	ai	ऐक्य aikya
ओ (ो)	o	ओषधि oṣadhi
औ (ौ)	au	औषध auṣadha
अं (ं)	ṁ	संसार saṁsāra
अः (ः)	ḥ	दुःख duḥkha
क	ka	कर्म karma
ख	kha	खल khala
ग	ga	गहन gahana
घ	gha	घर ghara
ङ	ṅ	वाङ्मय vāṅmaya
च	ca	चक्र cakra
छ	cha	छत्र chatra
ज	ja	जगत् jagat
झ	jha	झर jhara
ञ	ña	ज्ञान (ज् +ञ +आन) jñāna
ट	ṭa	कीट kiṭa
ठ	ṭha	मठ maṭha
ड	ḍa	गरुड़ garuḍa
ढ	ḍha	गूढ़ gūḍha

ण	ṇa	गुण guṇa
त	ta	तट taṭa
थ	tha	तथा tathā
द	da	दान dāna
ध	dha	धन dhana
न	na	नाम nāma
प	pa	पशु paśu
फ	pha	फल phala
ब	ba	बल bala
भ	bha	भक्ति bhakti
म	ma	ममता mamatā
य	ya	यथा yathā
र	ra	रात्रि rātri
ल	la	लघु laghu
व	va	वस्तु vastu
श	śa	शान्ति śānti
ष	ṣa	मेष meṣa
स	sa	सुख sukha
ह	ha	हास hāsa

CONTENTS

Foreword *iii*

An Introduction to Knowledge Traditions and Practices of India *v*

Romanisation of Indian Sounds (Diacritical Marks) *xi*

Chapter 1 — Language and Literature of India 1

Chapter 2 — Indian Philosophical Systems 19

Chapter 3 — Performing Art Traditions in India 37

Chapter 4 — Indian Art and Architecture 61

Chapter 5 — Astronomy in India 79

Chapter 6 — Mathematics in India 99

Chapter 7 — Introducing Ayurveda: the Science of Health and Disease 117

Chapter 8 — Chemistry and Metallurgy in India 137

Chapter 9 — Yoga 155

Cherish cultural diversities
end gender disparities