

Bhāratīya-jñāna-suśruta-kāryakramā

भारतीयज्ञान सुश्रुत कार्यक्रमः

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A Document for Understanding
IKS Minor Themes

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Introduction

The taxonomy of Indic knowledge systems has evolved over millennia to accommodate a wide variety of subjects with some broad equivalents to those we see in the contemporary university system. However, the taxonomy of IKS exhibits notable differences from the current division we are familiar with. The tree of IKS provides vital clues to the design philosophy of IKS and the value system enconced within it.

Taxonomy of IKS: Vidya & Kala

At its core there were only two kinds of subjects - the parā and aparā¹. The former is experiential and leads to a direct experience of the highest states of bliss - brahman. The latter devolves this bliss into the material world and allows one to lead a life of material prosperity and happiness while still keeping the experience of Brahman at the core. Quite often IKS explicitly mentions only the aparā, while the parā is implicit. This aparā vidyā is further classified into the four Vedas and the six vedāngas.

Vidya

A Systematic taxonomy of the vidyās is first found in the pariśiṣṭā (appendices)² of the Atharvaveda where the lists of Vedas, their appendices, their śākhās, aṅgas, upavedas are described. The smritis formalises this system of classification as the system of caturdaśa vidyās or fourteen vidyās³. The fourteen comprise

- 4 Vedas - the ṛg, Yajus, Sāma and Atharva Vedas.
- 6 Vedāngas- śikṣā, Vyākaraṇam, Chandas, Nirukta, Jyotiṣā and Kalpa
- 4 upāngas
 - the itihāsas and purāṇas,
 - dharma śāstras,
 - Nyāya and
 - Mīmāṃsā philosophies

¹ Muṇḍakopaniṣad: 1.1.4:

dve vidye veditavye iti ha sma
yadbrahmavido vadanti parā caivāparā ca

² Atharva pariśiṣṭā: 49.1.1:

³ yājñavalkyasmṛtiḥ: 1.3:

purāṇanyāyamīmāṃsā dharmasāstrāṅgamiśritāḥ |
vedāḥ sthānāni vidyānāṃ dharmasya ca caturdaśa | |

Sometimes 4 upavedas or auxiliary disciplines, 1 each for each of the 4 Vedas are also added to make the count eighteen. The āyurveda from the ṛgveda, dhanurveda⁴ from the Yajur Veda, Gandharva⁵ Veda from SāmaVeda, and Arthaśāstra⁶ from the Atharva Veda^{7 8}.

The Mahābhārata⁹ and the Arthaśāstra¹⁰ of Kauṭilya say the vidyās are fourfold. However, the scope of this fourfold classification is much more expansive than the ones described above and seems to include skills that may be grouped under the kalās. The Arthaśāstra of Kauṭilya describes the categories of the vidyās as follows.

ānvikṣikī - The self-reflective philosophies like the sām̐khya and yoga¹¹ that allow us to ‘see’ or discriminate between dharma-adharma; that allows one's thoughts, words and deeds to be on the path of dharma¹².

trayī - The Vedas and their subsidiaries; including the fourth Veda - Atharva Veda and the itihāsa as well; trayī also includes the attendant yajñās, their performances, subjects such as phonetics, grammar, prosody, mathematics, astronomy and probably medicine and martial arts as well¹³. The primary function of the *trayī* vidyās was the maintenance of dharma, at the level of an individual; where individuals learn to perform actions that keep intact, their experience of and connection with the Akshara brahman..

⁴ Not limited to archery. Includes all of the knowledge of weapons and martial warfare.

⁵ Includes music, dance, instruments

⁶ Economics, statecraft, political science

⁷ viṣṇu purāṇa: 3.6.28- 29:

aṅgāni caturo vedā mīmāṃsā nyāyavistarāḥ |
purāṇaṃ dharmasāstraṇca vidyā hyaṣṭādaśaiva tāḥ||
āyurvedo dhanurvedo gāndharvaścaiva te trayāḥ |
arthaśāstra caturthantu vidyā hmaṣṭādaśaiva tāḥ ||

⁸ In some versions, Arthaśāstra is a upaveda of ṛgveda, and āyurveda of the atharva veda; sukrāniti considers the tantras to be the upaveda of Atharvaveda.

⁹ mahābhārata:12.58.33:

trayī cānvīkṣikī caiva vārtā ca bhāratarṣabha|
daṇḍanītiśca vipulā vidyāstatra nidarśitāḥ||

¹⁰ arthaśāstram: 1.2.1:

ānvīkṣikī trayī vārtā daṇḍa-nītiścaiti vidyāḥ

¹¹ arthaśāstram: 1.2.10:

sām̐khyaṃ yogo lokāyataṃ caityānvīkṣikī

¹² arthaśāstram: 1.2.11:

dharma-adharmau trayyāṃ artha-anarthau vārtāyāṃ naya-anayau daṇḍa-nītyāṃ bala-abale ca etāsāṃ
hetubhiranvīkṣamāṇā lokasya upakaroti vyasaneabhyudaye ca buddhiṃ avasthāpayati prajñā-vākya-
kriyā-vaiśāradyaṃ ca karoti ||

¹³ arthaśāstram: 1.3.1-1.3.3:

sāma-rg-yajur-vedāstrayastrayī ||
atharva-veda-itihāsa-vedau ca vedāḥ ||
śikṣā kalpo vyākaraṇaṃ niruktaṃ chando-vicitirjyotiṣaṃ iti cāṅgāni ||

vārtā (that which concerns vṛtti-professions) - The professional skills such as agriculture, cattle-rearing, and commerce. It likely also included the skills and know-how related to the production, processing and distribution of various goods. The common link binding all these skills is that these professions constitute the backbone of the economy and are responsible for the wealth creation of a state. Wealth included grain, kine, gold, forest produce and human resources¹⁴.

daṇḍanīti - *daṇḍa* is the protective rule of law and the science of wielding it is *daṇḍanīti*; in essence statecraft¹⁵. In its fourfold characterisation as, acquisition of resources, their protection, growth and utilisation for emancipation, it resembles what we call today as economics.

Sometimes these different types of vidyās are counted separately to obtain a count of thirty-two vidyās. This enumeration includes the 4 Vedas, 4 upavedas, 6 Vedāngas, 6 darśanas, itihāsa, purāṇa, smṛti, nāstika, arthaśāstra, kāmaśāstra, śilpaśāstra, alaṅkāra śāstra, kāvyā, deśabhāṣā, avasarokti, yāvanamata¹⁶.

Kalā

The kalās are largely skill-based, as against the oral nature of vidyās¹⁷. The kalās are popularly known to be 16 or 64 in number. The list of 64 Kalās varies from text to text. The most commonly seen lists occur in the commentary of Srimadbhagavatam¹⁸

¹⁴ arthaśāstram: 1.4.1:

kr̥ṣi-pāśupālye vaṇijyā ca vārtā | dhānya-paśu-hiraṇya-kupya-viṣṭi-pradānādaupakārikī |

¹⁵ arthaśāstram: 1.4.3:

ānvīkṣikī trayī vārttānam yoga-kṣema-sādhano daṇḍaḥ | tasya nīrtidaṇḍa nītiḥ | alabdha-lābha-arthā labdha-parirakṣaṇī rakṣita-vivardhanī vṛddhasya tīrthe pratipādanī ca ||

¹⁶ śukranīti: 4.67-70

¹⁷ śukranīti: 4.65:

yadyat syāt vācikaṁ saṁyakkarma vidyābhisamjñakam

śakto mūkopiyatkartuṁ kalā samjñamtu tatsmṛtam ||

¹⁸ śrīmad bhāgavatam, 10.45.35: bhāvārtha dīpikā commentary of śrīdhara svāmin lists the following kalās

(1) gītām, singing; (2) vādyam, playing on musical instruments; (3) nrityam, dancing; (4) nāthyam, drama; (5) ālekhyaṁ, painting; (6) viś'eshaka-cchedyam, painting the face and body with colored unguents and cosmetics; (7) tandula-kusuma-bali-vikārāḥ, preparing auspicious designs on the floor with rice and flowers; (8) pushpāstaranam, making a bed of flowers; (9) das'ana-vasanānga-rāgāḥ, coloring one's teeth, clothes and limbs; (10) mani-bhūmikā-karma, inlaying a floor with jewels; (11) s'ayyā-racanam, covering a bed; (12) udaka-vādyam, ringing waterpots; (13) udaka-ghātaḥ, splashing with water; (14) citra-yogāḥ, mixing colors; (15) mālya-grathana-vikalpāḥ, preparing wreaths; (16) s'ekharāpīda-yojanam, setting a helmet on the head; (17) nepathya-yogāḥ, putting on apparel in a dressing room; (18) karna-patra-bhangāḥ, decorating the earlobe; (19) sugandha-yuktih, applying aromatics; (20) bhūshana-yojanam, decorating with jewelry; (21) aindrajalām, jugglery; (22) kaucumāra-yogah, the art of disguise; (23) hasta-lāghavam, sleight of hand; (24) citra-s'ākāpūpa-bhākshya- vikāra-kriyah, preparing varieties of salad, bread, cake and other delicious food; (25) pānaka-rasa-rāgāsava-yojanam, preparing palatable drinks and tinging draughts with red color; (26) sūcī-vāya-karma, needlework and weaving; (27) sūtra-kṛidā, making puppets dance by manipulating thin threads; (28) vīnā-damarukavādyāni, playing on a lute and a small X-shaped drum; (29) prahelikā, making and solving riddles; (29a) pratimāḥ, capping verses,

and śukranīti¹⁹ as given in the footnotes below.

or reciting poems verse for verse as a trial of memory or skill; (30) durvacaka-yogâh, uttering statements difficult for others to answer; (31) pustaka-vâcanam, reciting books; and (32) nâthikâkhyâyikâ-dars'anam, enacting short plays and writing anecdotes. (33) kâvya-samasyâ-pûranam, solving enigmatic verses; (34) paththikâ-vetra-bâna-vikalpâh, making a bow from a strip of cloth and a stick; (35) tarku-karma, spinning with a spindle; (36) takshanam, carpentry; (37) vâstu-vidyâ, architecture; (38) raupya-ratna- parîkshâ, testing silver and jewels; (39) dhâtu-vâdah, metallurgy; (40) mani- raga-jñânânam, tinging jewels with various colors; (41) âkara-jñânânam, mineralogy; (42) vrikshâyur-veda-yogâh, herbal medicine; (43) mesha-kukkutha- lāvaka-yuddha-vidhih, the art of training and engaging rams, cocks and quails in fighting; (44) s'uka-s'ârikâ-pralâpanam, knowledge of how to train male and female parrots to speak and to answer the questions of human beings; (45) utsâdanam, healing a person with ointments; (46) kes'a-mârjana-kaus'alam, hairdressing; (47) akshara-mushtikâ-kathanam, telling what is written in a book without seeing it, and telling what is hidden in another's fist; (48) mlecchita-kutarka-vikalpâh, fabricating barbarous or foreign sophistry; (49) des'a-bhâshâ-jñânânam, knowledge of provincial dialects; (50) pushpa-s'akathikâ-nirmiti-jñânânam, knowledge of how to build toy carts with flowers; (51) yantra-mâtrikâ, composing magic squares, arrangements of numbers adding up to the same total in all directions; (52) dhârana-mâtrikâ, the use of amulets; (53) samvâcyam, conversation; (54) mânasî-kâvya-kriyâ, composing verses mentally; (55) kriyâ-vikalpâh, designing a literary work or a medical remedy; (56) chalitaka-yogâh, building shrines; (57) abhidhâna-kosha-cchando-jñânânam, lexicography and the knowledge of poetic meters; (58) vastra-gopanam, disguising one kind of cloth to look like another; (59) dyûta-vis'esham, knowledge of various forms of gambling; (so) âkarsha-krîda, playing dice; (61) bâlaka-krîdanakam, playing with children's toys; (62) vainâyikî vidyâ, enforcing discipline by mystic power; (63) vaijayikî vidyâ, gaining victory; and (64) vaitâlikî vidyâ, awakening one's master with music at dawn.

¹⁹ Śukranīti, 4.3.133-198: English Translation of Benoy Kumar Sarkar lists the following kalās

Nartan or dancing with appropriate gestures and movements is an art.

Vādana or playing on musical instruments is also an art.

The decoration of men and women by dress and ornaments is an art.

The performance and knowledge of the sundry mimicry and antics is an art.

The laying out of beds and furniture and the weaving of garlands, &c., constitute an art.

The entertainment of people by gambling and various tricks of magic is an art. The (knowledge of) different aspects of giving pleasure is an art.

These seven arts are called Gāndharva.

The distillation of wines and spirituous liquors from flowers, &c., is an art.

The extrication of thorns and the relieving of pain by operating on the wounds of a vein constitute an art.

The cooking of food by intermixtures of various tastes is an art.

The planting, grafting and preservation of plants constitute an art

The melting and powdering of stones and metals constitute an art.

The act of using preparations from sugar canes is known to be an art

The knowledge of mixtures of metals and medicinal plants constitutes an art.

The knowledge of the analysis and synthesis of metals constitute an art.

The preparation of new substances (alloys) out of metals by combinations is an art.

The preparation of salts constitutes an art.

These ten Kalās are mentioned in Āyurveda and other (medical) sciences.

The use and employment of arms by the proper arrangement of legs constitutes an art.

Duelling by the various artifices is an art.

A Bāhuyuddha or hand to hand fight is the combat between duellers without weapons.

The man who dies thereby does not attain heaven nor fame in this world.

The Niyuddha is meant for fame only, destruction of the enemy's power and vanity. A hand to hand fight should not lead to anybody's death.

An attack by duellers, that which is made by various dangerous artifices of hands, and by throwing down the opponent in various ways, &c.

And Pratikriyā is the method of extricating oneself from these.

The throwing of arms and implements towards some fixed point is an art.

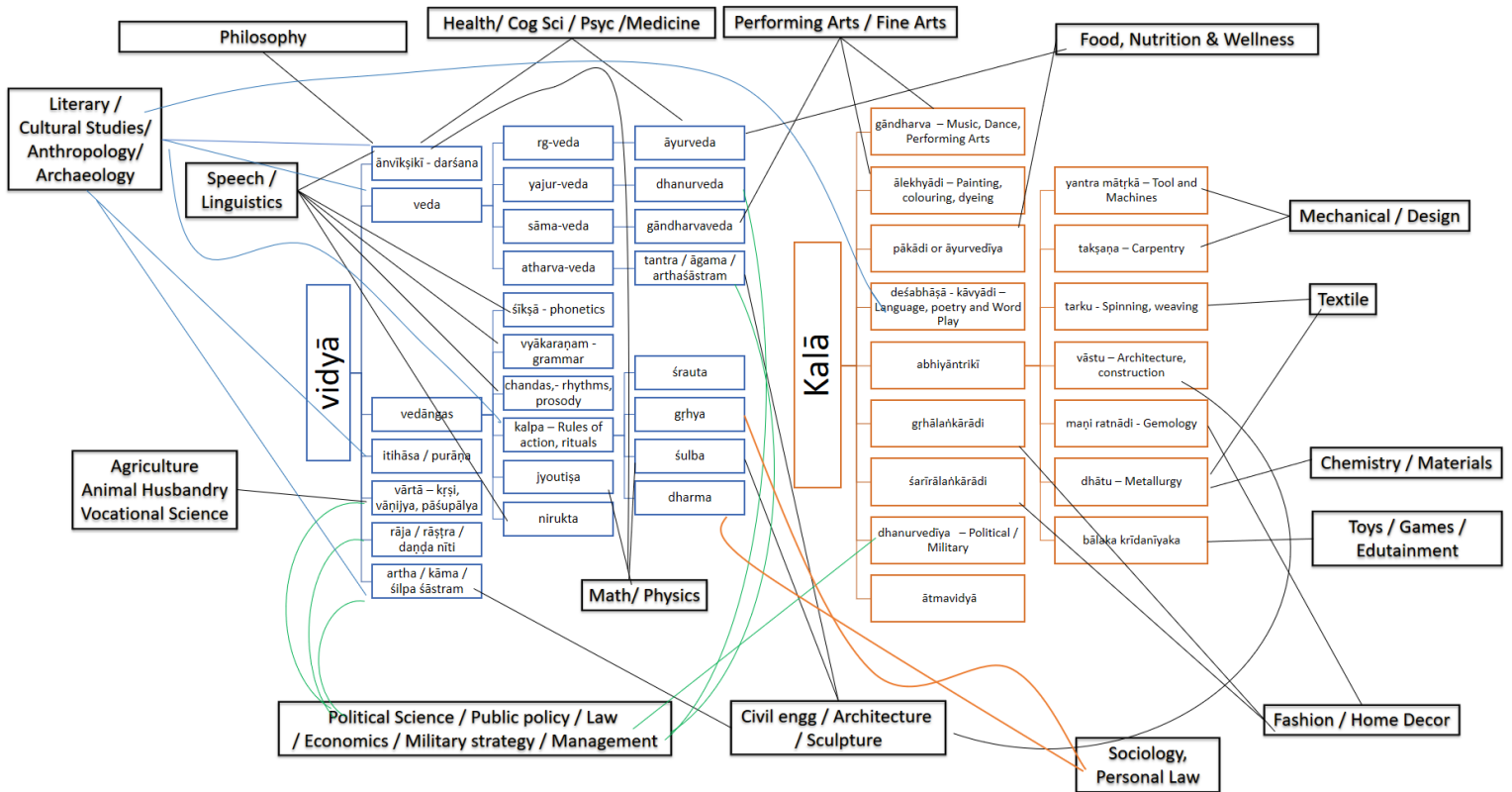
While the list of kalās themselves differ, they overlap significantly in their broad domains. The commonly found topics in this list may be grouped under the following heads²⁰. It may be noticed that many groups mirror the categories of vidyas.

- pākādi or āyurvedīya kalās – Culinary arts, Food and nutrition, preparation of medicinal herbs. Under the sukraniti scheme, they are identified as part of the cluster of Ayurvedic kalas
- dhanurvedīya kalās – Political / Military arts, strategies, physical training
- gāndharva kalās or Performing Arts: Music, Dance, instruments and their making
- Ālekhyaḍi / śilpādi kalās or Fine arts: Drawing, painting, sculpture, colouring, dyeing

The formations of battle arrays according to the signals given by musical instruments (bugles) is an art.
The arrangement of horses, elephants and chariots in war is an art.
These five arts are mentioned in Dhanurveda or the science of military tactics.
The propitiation of gods by various seats and postures is an art.
The act of driving horses and elephants is an art, as well as that of teaching them.
Earthen, wooden, stone and metal vessels give rise to four separate arts in the matter of their cleansing, polishing, dyeing or rinsing; picture-drawing is also an art.
The construction of tanks, canals, palaces, and squares is an art.
The construction of clocks, watches and musical instruments is an art.
The dyeing by the application of inferior, middling and other colours is an art.
The act of putting down the actions of water, air and fire is an art.
The preparation of boats, chariots and conveyances is an art.
The preparation of threads and ropes is an art.
The weaving of fabrics by various threads is an art.
The testing of gems as to whether they are good or bad as possessing marks of holes is an art.
The testing of gold and other metals is an art.
The preparation of artificial gold and gems is an art.
The making of ornaments with gold and other metals is an art, as well as enamelling of metals.
The softening of leathers is an art.
The flaying of skins from the bodies of the beasts is an art.
Milking and churning constitute two arts.
The knowledge of sewing of covers (coats and shirts) is an art.
Crossing waters by arms (swimming is an art.)
The cleansing of domestic utensils in an art.
Cleaning of clothes and shaving are two arts.
The extraction of oil from seeds and flesh (fats) is an art.
The drawing of ploughs and the climbing of trees are two arts.
The knowledge of work in such a way as to please somebody is an art.
The making of vessels with bamboo straws, etc., is an art.
The making of glass vessels is an art.
The pumping and withdrawing of water constitute an art.
The preparation of tools and implements from iron is an art.
The preparation of saddles for horses, elephants, bulls and camels is an art.
The maintenance, and entertainment, and nursing of children constitute an art.
The punishment of offenders whipping, is an art,
The writing of the characters of various languages is an art.
The making and preservation of the betels constitute an art.

²⁰ The prominent groups of śukranīti are retained - gāndharva, dhanurvedīya and āyurvedīya; others are grouped by cluster similarity, relevance and availability of related discipline in contemporary system

- deśabhāṣā - kāvyādi kalās – Language, poetry and Word Play
- Gṛhālāṅkāṛādi kalās or Home decor: interior design and aesthetics(decoration of living rooms, bedsteads, doorways and the like)
- Śarīrālāṅkāṛādi kalās or personal fashion: cosmetics and accessories (scents, garlands, dyes, colours, embroidery), those related to jewellery(gems and ornamentation),
- abhiyāntrikī kalās - The Engineering disciplines
 - yantra mātṛkā – creating tools, machines, manufacturing a wide variety of implements from household goods to vehicles like boats and chariots
 - takṣaṇa – Carpentry
 - tarku - Spinning, weaving, textiles
 - vāstu – Architecture, construction, town planning
 - maṇi ratnādi - Gemology
 - dhātu – Chemistry & Metallurgy
 - bālaka kṛīdanīyaka - the art of toy making (designing games, playing them, mimicry and the like) and childcare.



The list of kalās and vidyās described above is depicted in figure-1 in a tree representation, along with approximate correspondences to contemporary areas of study on the periphery. This figure merges the various schemes of classification described above in such a way that

- i) Under the Vidyas, traditionally prominent areas of study are retained as separate nodes
- ii) Under the kalas, prominent groups are retained and others are grouped such that contemporarily relevant areas show up as distinct nodes.

The difference between Vidyas and Kalas is that while Vidyas are predominantly knowledge systems with oral transmission, the Kalas are skill-based. Although this distinction seems very similar to the European concepts of techne and episteme, the Indic notions of Vidya and Kala are different in that they are verbal and non-verbal expressions of the same experiential knowledge.

This unity of purpose in Kala and Vidya is seen in the notion of the 64th Kala - the last and best one on the list is nothing but ātma vidyā or the art of finding the highest happiness within. This is identical to the parā vidya. It may also be noticed that some items like music and dance are listed under both vidyas and kalas. Several items listed under kalas go by the term vidyas.

Areas of Study for a multidisciplinary study of IKS & Heritage

IKS & Contemporary Knowledge Systems (CKS): Differences in taxonomy design

A striking aspect of the traditional IKS taxonomy is the non-differentiation between what we call today the Life Sciences, Physical sciences, Technology, Medicine, Performing Arts, Liberal Arts, Fine Arts or Humanities. The classification is pragmatic and driven by where and how the knowledge or skill is being utilised.

Secondly, the list of disciplines of study includes those that are

- i) parā vidya - directly related to the pursuit of inner states of happiness and awareness. It is achieved by the confluence of the triad pramātr̥ - pramāṇ a-prameya, leading to pramā buddhi²¹.
- ii) aparā vidya - indirectly facilitate (i) by creating a system of life, society and nation that helps in material prosperity under constraints of dharma, i.e. material prosperity without jeopardising the sustainability of the system - at individual, community or national levels.

²¹ While this method is also applicable to aparā vidya, CKS does not recognise the same

We proceed to identify the domains of study for IKS as multidisciplinary domains in current academic institutes and universities. In this exercise, we strive to ensure that these newly identified domains are well familiar/relatable to those from both IKS and CKS backgrounds. We use dual-poly nomenclatures for each domain to reflect this. Since parā vidya will be out of the pale of formal education, we focus on aparā vidya to craft multidisciplinary areas of study for IKS & Heritage in contemporary times.

Areas of research and academic study

Academic knowledge is largely produced by three kinds of studies

- Document:
 - Documentation and Conservation, Consolidation of existing knowledge, novel presentation
- Understand:
 - Enquiry and Discovery: Investigation into ‘How’, ‘Why’, ‘What’, ‘How’.
- Apply:
 - Invention and Design: Produce novel methods and products of utility.

Corresponding to the above three ways of knowledge production, we describe each of the multidisciplinary areas by describing the well-known areas of study under Bhāratīya paramparā, Humanities & Social Sciences and STEM. The Arts and Management topics are listed under HSS for brevity. Subsequently, we provide some illustrative examples of how knowledge production may happen in the respective areas under the following heads

- (i) **[Document]:** The disciplines that can be used to document and conserve our heritage for posterity, present them in innovative ways for mass dissemination.
- (ii) **[Understand]:** The disciplines that can be called upon to understand the area from both IKS and CKS to perform a multidisciplinary study of the subject. Of course when suitable collaborators are not available one may choose to look at it from the lens of only one discipline.
- (iii) **[Application]:** Applications or possible benefits of using IKS using CKS Science and Technology to benefit individuals, communities, society, nation or humanity at large.

We propose the following areas of study.



आन्वीक्षिकी विभाग

Vedic Philosophical and Cognitive Sciences

At the multidisciplinary interface of

[Bhāratīya] Darśanas, Upanishads, Prasthāna Trayī, Yoga

[HSS] Eastern & Western Philosophical Thought, Epistemology, Ontology, Philology

[STEM] Cognitive Science, Neuroscience, Psychology

Exemplar Research topics

Document and Understand:

Mindfulness in Indian traditions, Role of inhibition in yama-niyamas, Differences in Eastern and Western Epistemology, Ontology of Knowledge production

Application

Use Data science to create tools, maps, and databases. Newer methods to manage stress and anxiety



इतिहास एवं सभ्यता विभाग

Historical and Civilizational Sciences

At the multidisciplinary interface of

[Bhāratīya] Purva Mimamsa, Samhita, Brahmana, Shrauta Sutras, Grihya Sutra, Shulba Sutra, Itihasa, Purana, Dharma sastra, Itihasa, Purana, Kavya

[HSS] History, Archaeology, Anthropology, Manuscriptology, Epigraphy, Philology, Geography

[STEM] Data Science, Mathematics, Computer Science

Exemplar Research topics

Document:

Document Clothes, Ornaments, Festivals, Foods, tools, implements, lifestyles, and social interactions concerning local geographies and at various time points in history

Understand

Understanding the rise and fall of civilizations; Understanding of factors underlying the same; Differences between the concepts of history and itihaasa;

The role of climatic conditions on the development of textiles and clothing; Cultural context of Mauryan India from Archaeology; Observance of Festivals in the Mahajanapada period; Comparative study of Indian, Chinese, South American, African and Western cultures; Relation between cultural choices, environment, philosophy and value systems in a culture

Application

Genetics, Archaeo-Astronomy, and Chemistry to decode archaeological material and reconstruct histories. Data science to mine textual data.

Data Science methods to predict current trends in historical context, behaviour of various communities, geographical regions, Visualisations of Historical contexts in Movie and mass media



लौकिकशास्त्र विभाग

Contemporary Social / Cultural Sciences

At the multidisciplinary interface of

[Bhāratīya] Purva Mīmamsa, Samhita, Brahmana, Shrauta Sutras, Grihya Sutra, Shulba Sutra, Itihasa, Purana, Dharma sastra, Itihasa, Purana, Kavya

[HSS] History, Archaeology, Anthropology, Manuscriptology, Epigraphy, Philology, Geography

[STEM] Data Science, Mathematics, Computer Science

Exemplar Research topics

Document:

Use Multimedia and Virtual Reality technology to document Karma Kanda.

Document Clothes, Ornaments, Festivals, Foods, tools, implements, lifestyles, and social interactions concerning local geographies in contemporary times

Understand

Understand Bharatiya concepts of जीवन, पुरुषार्थ, समाज, राष्ट्र, वर्ण, जाति, कुल in Indic life; Compare with corresponding or similar concepts and theories in western social sciences.

Application

Computational systems science to understand the emergence of social structures as an interplay of values, thoughts, history, geography and other such constraints; Methods to predict current trends in historical context, behaviour of various communities, and geographical regions.

गणित-भौत-ज्यौतिष विभाग



Mathematical, Physical and Astronomical
Sciences

At the multidisciplinary interface of

[Bhāratīya] Jyoutisha, Shulba Sutras

[HSS] History of Science

[STEM] Astronomy, Algebra, Number theory, Geometry

Exemplar Research topics

Document and Understand:

The process of shanku-sthapana and error corrections in almanacs; Origins of Calculus in the Kerala School of mathematics;

Application

New pedagogical methods for teaching mathematics, improving provenance of mathematical concepts



वाग्बिभाग

Speech and Linguistics

At the multidisciplinary interface of

[Bhāratīya] Siksha, Vyakaranam, Chandas, Nirukta, Mimamsa, Mantra Shastra

[HSS] Comparative Linguistics, Lexicography

[STEM] Speech Science, Phonetics, Speech Signal Processing, Speech recognition, Natural Language Processing

Exemplar Research topics

Document

Databases of named entities in Sanskrit works

Understand:

The connections between Chandas and Tala systems of music; Cultural Cognates within IE languages; Algorithms for parsing taddhita forms in kavya texts.

Application:

Automatic Speech recognition, Text-to-speech, Automatic parsing, Computational Linguistics, Tools for lexicography



राजनीति एवं अर्थशास्त्र विभाग

Political, Economic and Strategic sciences

At the multidisciplinary interface of

[Bhāratīya] Dhanurveda, Artha Sastra, Dandaniti, Rajaniti

[HSS] Political Science, Modern military history, Strategic Affairs, Economics, Public policy, Management, Behavioural Science, Psychology

[STEM] Systems Science and Modeling, Econometry

Exemplar Research topics

Document

Maritime traditions of the Cholas; Military strategies of the Ahom kings against the Mughal invasions

Understand

Strategic failures in medieval Indian history in light of theories of Kautilya; Intellectual Property Managements paradigms in ancient India; Micro-economics of the Kutch and Saurashtra and its comparison to Indus Valley economics;

Application:

Public policy doctrines for current contexts, Strategies to mitigate and derisk, Governance and Public Administration



भैषज्य एवं आरोग्य विभाग

Medical and Health sciences

At the multidisciplinary interface of

[Bhāratīya] Ayurveda, Yoga, Sankhya

[HSS] Public Policy, Psychology

[STEM] Medicine, Physiology, Anatomy, Statistics, Life Sciences, Systems Biology, Medical Devices

Exemplar Research topics

Document:

Medicine practices and their usage among various tribes and communities, Yoga methods

Understand:

Mechanism of action of Pranayama on cardiac and respiratory health; Tridosha pathology as model perturbation in physiological networks;

Application:

Use of ancient Indian medicinal and Healthcare practices in alleviating current medical problems, Yoga for lifestyle diseases, Ayurveda in Systems Biology, Instrumentation / Diagnosis for Ayurveda

द्रव्य-गुण-संयोग विभाग



Culinary, Nutritional and Pharmacological Sciences

At the multidisciplinary interface of

[Bhāratīya] Paka sastra, Vrikshaayurveda, dravya vijnana, ayurvediya kalas, Siddha, Folk medicine

[HSS] Home Science, Nutrition,

[STEM] Pharmacology, Botany, Zoology, Biochemistry, Systems Biology

Exemplar Research topics

Document:

Medicinal Plant usage among tribes and communities, Food recipes across the country, ingredients, spices usage

Understand:

Genomic analysis and mechanism of action of various medicinal plants; Provenance of various contemporary popular dishes in the works of Someshwara

Application:

Computational Gastronomy for recipe discovery based on ancient principles, Apply nutritional principles embedded in paka sastra, Biochemistry of Indian recipes, Food and lifestyle versus medicine



कृषि एवं पशुपाल्य विभाग (वार्ता विभाग)

Agricultural Science, Veterinary and animal husbandry

At the multidisciplinary interface of

[Bhāratīya] Krushi vijnana, vriksha-ayurveda, best practices in agriculture and animal husbandry

[HSS] Public Policy

[STEM] Agriculture, Process Engineering, Botany, Zoology, Veterinary Science, Meteorology, Climate Science

Exemplar Research topics

Document:

Agricultural practices in various geographical regions, disease resistance of various crop varieties and patterns of disease, Genetic profile of native cattle and domestic animals

Understand:

Genomic analysis of nutritional decline during green revolution; Self sustaining Cattle farms in the Gir;

Application:

Cropping practices for climate change and mitigation, Instrumentation for native crop species monitoring, Computer Vision methods for characterisation of plants and crops



गांधर्व विभाग

Performing Arts

At the multidisciplinary interface of

[Bhāratīya] Natya sastra, Gandharva kalas, Alankara Sastra, Sahitya/Kavya, Itihasa, Purana,
[HSS] Musicology, Animation, Computer graphics, Cinematography, Histrionics, Aesthetics,
[STEM] Signal processing, Affective Neuroscience, Acoustics and Mechanics of instruments

Exemplar Research topics

Document:

Dances, Music, and instruments of various geographic regions

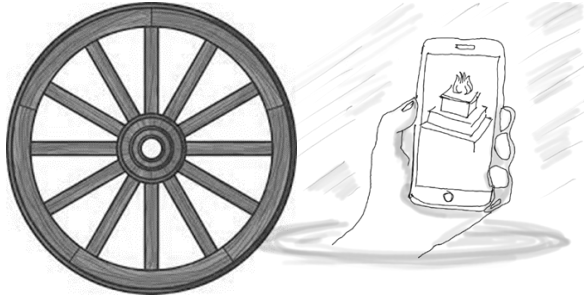
Understand:

Neuroscientific Mechanism of rasotpatti in nataka prekshaka; Origins of Abhinaya in the Yajur Veda; Role of mirror neurons in art aesthetics;

Restart traditional performing arts as courses or minors in mainstream institutions

Applications:

Technology for presenting performing arts at scale, ancient content through modern media, Prediction of emotional engagement in response to performance, design of instruments, Biomechanics of performers, Visualisation of performance; Sensor Design and development for Indic theatre performers and audience;



यांत्रिक एवं नव्य अभियांत्रिकी विभाग

Mechanical & Digital Design & Engineering

At the multidisciplinary interface of

[Bhāratīya] Yantra Kala, Rasa shastra, Dhaatu Shastra, Vaastu Shastra, Purana, Itihasa,
[HSS] History of Science, Animation, Digital design, UI design
[STEM] Mechanical Engineering and Industrial Design, Chemistry, Metallurgy, Data Science
& ML, Natural Language Processing, Computer Vision, Embedded systems,

Exemplar Research topics

Document

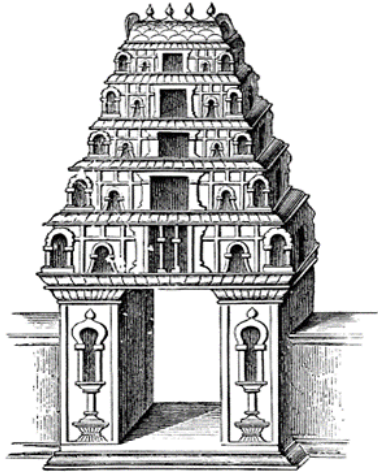
A variety of machines, tools, and contraptions as described in Vaimanika sastra, Samarangana sutradhara, Rasayana sastra, Dhatu sastra, variety of implements and tools used in local traditions. Computing methods in Ancient Indian Mathematics, Data protection and integrity methods in Indic sciences.

Understand

History of tool making; Design principles in the Samarangana Sutradhara; flight worthiness of the models in Vaimanika Shastra

Applications

AR/VR for Heritage Visualisation, Museum experience Technology, 3d printing to better understand ancient Indian tool making, Ancient Designs + Scalable manufacturing methods, recreation of ancient boats, chariots, carts and their biomechanics. Search-retrieval systems, applications, software for data mining, integration, immersive visualisation;



वास्तु विभाग

Civil and Architectural Science

At the multidisciplinary interface of

[Bhāratīya] Vaastu sastra, Shilpa sastra, Tantra, Shulba Sutras

[HSS] Archaeology

[STEM] Architecture, Conservation, Structural Engineering, Town Planning,

Exemplar Research topics

Document:

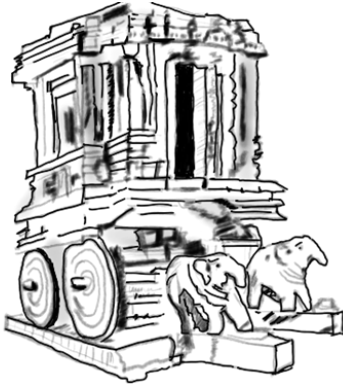
Heritage structures across the country, Heritage materials and their usage

Understand:

Earthquake resilience of Brihadeshwara and Ramappa temple; Joinery methods in Kerala school of architecture and their structural properties; Origins of architectural principles in the design of Yajna shala;

Application:

Modern structures based on ancient Indian principles of construction, Sustainability principles form Heritage structures, Novel Visualisation methods for Heritage walks and museums



शिल्प-आलेख्य विभाग

Fine Arts and Sculpture

At the multidisciplinary interface of

[Bhāratīya] Shilpa sastra, Alekhyaaadi kalas, traditional styles across the country like Thanjavur, Madhubani

[HSS] Fine arts, Sculpture, Art history

[STEM] Dyes, Organic paints, Chemistry, dating of Art

Exemplar Research topics

Document:

Digitisation of Sculptures and paintings;

Understand:

Raman Spectroscopy of the Colour palettes used in Rock art of Ajanta and Ellora; Neuro-Aesthetics of Hoysala sculptural specimens; Tools and techniques for sculpting on hard granite;

Restart schools of traditional Indian art, craft, and sculpture in mainstream institutions as single courses or minors,

Application:

Recreate traditional Indian paints and dyes; Visualisation of ancient sculptures with reconstruction,



रस-धातु विभाग

Chemical, Metallurgical & Material Sciences

At the multidisciplinary interface of

[Bhāratīya] Rasayana sastra, Dhaatu sastra, Itihasa, Purana, Kavya

[HSS] History, Archaeology

[STEM] Chemistry, Metallurgy, Material Science,

Exemplar Research topics

Document:

Use of various ceramics, metalworks across the country - Panchaloha, Ashtadhatu; Use of organic dyes and materials used by native artisans

Understand:

Understand, material properties and usage using references to material usage in Bhāratīya traditions

Applications:

Support native metalwork artisans with suitable modern methods without altering core principles; sustainable materials, organic materials based on traditional principles



अलङ्कारादि विभाग

Fashion and Interior Design

At the multidisciplinary interface of

[Bhāratīya] Alankaara sastra, Alankaara kala, Natya sastra, Yoga, Tantra

[HSS] Fashion, Interior Design, Aesthetics

[STEM] Materials, 3d printing, Marketing, Public policy, marketing

Exemplar Research topics

Document:

Costumes and Ornaments across the country, Handloom and home decor, Rangolis used through historical periods and at various geographical regions;

Wedding costumes and rituals; theory and practice of wedding planning

Understand:

The earring designs of Cholas; The anklets of Natya Shastra: A comparison with contemporary Indian styles; Subtractive techniques in traditional Indian jewellery making'

Create Dedicated courses on Wedding costumes, make-up and wedding planners where training is provided on 25 popular regional wedding plans. Training includes history, rituals, significance, ornamentation, costumes, stage setups, and materials used pre and post-wedding plans.

Technology:

Methods to promote the use of ancient Indian fashion and interior design techniques as sustainable/organic alternatives; manufacturing at scale for traditional products; Scalable manufacturing methods for traditional Indian Gold Jewellery design;

Revive entrepreneurship activity around the trend of India as an international cultural-wedding destination.



शैक्षणिक-क्रीडनीयक विभाग

Edutainment Sciences

At the multidisciplinary interface of

[śāstra paraṃparā] Kṛīḍā in kalā, Itihāsa, Purāna, Darsana, Yoga, Sankhya
[HSS] Educational Science
[STEM] Game design, Toy making, scaleable manufacturing, Psychology

Exemplar Research topics

Document:

Toys and Games across times and geographies in India

Understand

Design principles of multiplayer Indian games vis-a-vis contemporary games; The philosophical underpinnings of hopscotch; Quantifying educational experience in free exploration of Temple lego blocks;

Application:

This is probably a singular subject without sufficient parallels in contemporary times. Understanding that today's children shape the destinies of our nation tomorrow, Bharatiya traditions innovated children's toys and used them as tools for education. This tradition must be revived as a separate discipline along with educational science and pedagogy