



Re-Accredited 'B++' 2.86 CGPA by NAAC

**VEER NARMAD SOUTH GUJARAT UNIVERSITY**

University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.

**વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી**

યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

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## **-: પરિપત્ર :-**

યુનિવર્સિટી સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓ તથા ડિપાર્ટમેન્ટનાં વડાશ્રીઓ તથા યુનિવર્સિટી કેમ્પસમાં ચાલતા સ્વનિર્ભર અભ્યાસક્રમનાં કો-ઓર્ડિનેટરશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૩-૨૪ થી અમલમાં આવનાર યુજીસીની ગાઈડલાઈન મુજબ IKS( Indian Knowledge System) અંતર્ગત નીચે મુજબના અભ્યાસક્રમો એકેડેમિક કાઉન્સિલની તા.૨૦/૦૪/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક:૩૧ અને એકેડેમિક કાઉન્સિલની તા.૨૮/૦૫/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક:૨૦ થી મંજૂર કરેલ છે. તેમજ Indian Knowledge System (IKS) નું નામાભિધાન IKS ને બદલે Bhartiya Knowledge System ( BKS) રાખવાનું નક્કી કરવામાં આવેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

1. Indian Science and Technology
2. BKS-based Chemistry and Metallurgy
3. Indian Economics and Business Model
4. Ancient Indian Art and Architecture
5. Mathematics in India: from Vedic period to modern times
6. Basics of Indian Astronomy
7. Introduction to Indian Astronomy

બિડાણ: ઉપર મુજબ

ક્રમાંક : એસ./પરિપત્ર/૧૯૧૪૭/૨૦૨૩  
તા.૨૬-૦૭-૨૦૨૩

  
કુલસચિવ વગ

પ્રતિ,

૧) યુનિવર્સિટી સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓ, ડિપાર્ટમેન્ટના વડાશ્રીઓ તથા યુનિવર્સિટી કેમ્પસમાં ચાલતા સ્વનિર્ભર અભ્યાસક્રમનાં કો-ઓર્ડિનેટરશ્રીઓ.

.....આપશ્રીની કોલેજના સંબંધિત શિક્ષકોને જાણ કરી અમલ કરવા સારૂ.

## Annex. – 'B'

### Course - 1: Course on Indian Science and Technology

Course Credit: 2 credits

Training Hours: 30 Hours

1. Fundamentals
  - An overview of Indian contributions to technology
  - Technological Innovations
2. Metallurgy, Textile Chemistry & Pyro Technology
  - Copper/Bronze/Zinc: Important Mines (Zawar, Khetri mines)
  - Iron and Wootz Steel Technology
  - Textile and Dyeing- Indian Specialties (Kutchi Embroidery, Cotton Textile etc.)
  - Ceramic Technology, Stone (Lapidary), Shell, Ivory, Faience & Glass Technology
3. Water Management & Transportation
  - Harappan and Traditional Water Management System of Gujarat
  - Historical Sites- Sringeripur, South Indian Water Management System, Western Ghats Cave- Kanheri, etc.
  - Communities Involved in Water Management
  - Modes of Transportations and Reforms
  - Grand Trunk Road (Uttarapath & Dakshinapath)
  - Development of Trading Techniques
  - Boat & Ship Building
4. Mathematics & Astronomy
  - Mathematics contained in the Sulbasutra
  - Weaving Mathematics into Beautiful Poetry- Bhaskaracarya.
  - The Evolution of Sine Function in India
  - The Discovery of Calculus by Kerala Astronomers
  - Vedanga Jyotish & Measuring Time & Calendar
5. Ecology and Environment
  - Nakshatrara Gyaan and Agriculture
  - Vernacular Architecture
  - Forest Management and Urban Planning
  - Agroforestry
  - Tank, Lakes, and Stepwells
6. India's Contribution to the World

#### References Books:

- R.M. Pujari, Pradeep Kolhe, N. R. Kumar, 'Pride of India: A Glimpse into India's Scientific Heritage', Samskrita Bharati Publication.
- 'Indian Contribution to science', compiled by Vijnana Bharati.
- 'Knowledge traditions and practices of India', Kapil Kapoor, Michel Danino, CBSE, India.
- Dr. Subhash Kak, Computation in Ancient India, Mount, Meru Publishing (2016)
- Dharampal, Indian Science and Technology in the Eighteenth Century, Academy of Gandhian Studies, Hyderabad, 1971, republic. Other India Bookstore, Goa, 2000.

- Robert Kanigel, *The Man Who Knew Infinity: A Life of the Genius Ramanujan*, Abacus, London, 1999
- Alok Kumar, *Sciences of the Ancient Hindus: Unlocking Nature in the Pursuit of Salvation*, CreateSpace Independent Publishing, 2014
- B.V. Subbarayappa, *Science in India: A Historical Perspective*, Rupa, New Delhi, 2013
- S. Balachandra Rao, *Indian Mathematics and Astronomy: Some Landmarks*, Jnana Deep Publications, Bangalore, 3rd edn, 2004
- S. Balachandra Rao, *Vedic Mathematics and Science in Vedas*, Navakarnataka Publications, Bengaluru, 2019
- Bibhuti bhushan Datta, *Ancient Hindu Geometry: The Science of the Śulba*, 1932, repr. Cosmo Publications, New Delhi, 1993
- Bibhuti bhushan Datta & Avadhesh Narayan Singh, *History of Hindu Mathematics*, 1935, repr. Bharatiya Kala Prakashan, Delhi, 2004
- George Gheverghese Joseph, *The Crest of the Peacock*, Penguin Books, London & New Delhi, 2000
- J. McKim Malville & Lalit M. Gujral, *Ancient Cities, Sacred Skies: Cosmic Geometries and City Planning in Ancient India*, IGNCA & Aryan Books International, New Delhi, 2000).
- Clemency Montelle, *Chasing Shadows: Mathematics, Astronomy and the Early History of Eclipse Reckoning*, Johns Hopkins University Press, 2011
- Anisha Shekhar Mukherji, *Jantar Mantar: Maharaja Sawai Jai Singh's Observatory in Delhi*, AMBI Knowledge Resources, New Delhi, 2010
- Thanu Padmanabhan, (ed.), *Astronomy in India: A Historical Perspective*, Indian National Science Academy, New Delhi & Springer (India), 2010
- Acharya Prafulla Chandra Ray, *A History of Hindu Chemistry*, 1902, republ., Shaibya Prakashan Bibhag, centenary edition, Kolkata, 2002
- R. Balasubramaniam, *Delhi Iron Pillar: New Insights*, Indian Institute of Advance Study, Shimla & Aryan Books International, New Delhi, 2002
- R. Balasubramaniam, *Marvels of Indian Iron through the Ages*, Rupa & Infinity Foundation, New Delhi, 2008
- Anil Agarwal & Sunita Narain, (eds), *Dying Wisdom: Rise, Fall and Potential of India's Traditional Water-Harvesting Systems*, Centre for Science and Environment, New Delhi, 1997
- Fredrick W. Bunce: *The Iconography of Water: Well and Tank Forms of the Indian Subcontinent*, DK Printworld, New Delhi, 2013

## Annex. – 'B'

### Course - 2: BKS based Chemistry and Metallurgy

Course Credit: 2 credits

Training Hours: 30 Hours

1. Theoretical framework for the practice of science in ancient India:
  - Sāṅkhya-Pātañjala system, Evolution of different forms of matter (Pañcīkaraṇa) from the Vedāntic view, The atomic theory of the Buddhists and Jains, NyāyaVaiśeṣika chemical theory
2. Chemistry in practice as gleaned from the medical schools of ancient India, Qualities of compounds; formation of molecular properties in chemical compounds, Chemistry of colors, measures of weight and capacity, size of the minimum visible, Ideas of chemistry as in bṛhatsamhitā
3. Metallurgical heritage:
  - Arthaśāstra as the earliest text describing gold, silver, and other metals;
  - Processing of gold, silver, copper, iron, tin, mercury, and lead as mentioned in the Indian texts in the ancient and Medieval Period
  - Zinc distillation as mentioned in Rasārṇava and Rasaratnasamukāyā
4. Concepts of acid and bases in Indian chemistry from organic fruit, vegetable-based. Acids, plant-ash-based bases to mineral acids of the medieval period.

#### References Books:

- The Positive Sciences of the Ancient Hindus; BrijendraNath Seal; 4th Edition; 2016
- Fine Arts & Technical Sciences in Ancient India with special reference to Someśvara's Mānasollāsa; Dr. Shīv Shekhār Mīshra, Krishnadas Academy, Varanasi 1982
- Mints and Minting in India; Upendra Thakur; Chowkhanba Publication; 1972
- A Concise History of Science in India, ed. D M Bose, S N Sen and B V Subbarayappa; INSA; 2009
- Science and Technology in Medieval India - A Bibliography of Source Materials in Sanskrit, Arabic and Persian by A Rahman, M A Alvi, S A Khan Ghorī and K V Samba Murthy; 1982.
- Science and Technological Exchanges between India and Soviet Central Asia (Medieval Period), ed B V Subbarayappa; 1985
- Scientific and Technical Education in India, 1781-1900 by S N Sen; 1991
- History of Technology in India, Vol. I, ed. A K Bag (1997); Vol III, ed. K V Mital (2001); Vol-II by Harbans Mukhia (2012).

## Annex. – 'B'

### Course - 3: Indian Economics and Business Model

Course Credit: 2 credits

Training Hours: 30 Hours

1. History of Indian Economy Thoughts, New Indian Economic Model & Sectorial Contribution Past vs Present.
  - History of Indian Economy Thoughts: Context from Dharmashastras, Shukraniti, Mahabharata, and Arthashastra.
  - Kautilya's Economic thoughts in specific. India and Global GDP: Ancient India
  - Beyond Capitalism and Communalism, Dharmic, Caste as Social Capital, Black Money, and Tax Heaven.
  - Agriculture: Ancient India, Manufacturing: Ancient India, Education in India, Wealth in India, Governance, and Business in India, Where India Stands Globally.
2. Indian Business Model: Based on 10-point formula:
  - Family Base, High Level of Savings, Self-Employment, Highly Entrepreneurial Nature, Non-corporate Sector as the Core of the Economy, Community Orientation and Higher Social Capital, Faith and Relationship in Economic Affairs, A Society-driven Economy, Driven by Norms and Values
3. Project Report: Indian Models of Economy, Business, and Management

#### References Books:

- Kanagasabapathi; "Indian Models of Economy, Business and Management", Third Edition, Prentice Hall India Ltd., Delhi.
- Lotus and Stones; Garuda Prakashan (31 October 2020); Garuda Prakashan Pvt. Ltd.
- Dwivedi D.N., Essentials of Business Economics, Vikas Publications, Latest Edition.
- Inida Uninc by Prof. R Vaidyanathan, Westland Ltd. Publication
- Economic Sutras by Prof. Satish Y. Deodhar, IIMA Books series
- Black Money Tax Heaven by R Vaidyanathan, Westland Ltd. Publication

#### Web Resources:

- Goswami Anandajit, Economic Modeling, Analysis, and Policy for Sustainability, IGI Global, Latest Edition.
- Ganguly Anirban, Redefining Governance, published by Prabhat Prakashan, Latest Edition.
- VaidyanathanR., India Unincorporated, ICFAI Books, Latest Edition.

## Annex. – 'B'

### Course - 4: Ancient Indian Art and Architecture

Course Credit: 2 credits

Training Hours: 30 Hours

1. Fundamentals of Art and Architecture, Traditional and Historical Town Planning & Ancient Indian Art & Architecture
  - Geography of Bharatvarsha and Civilizational Journey, Origin of Sthapatyaveda, Concept of Space and Time, Vedic Yajna: Recreating the microcosmos, Vastu Purusha, Six Limbs of Indian Art and Architecture
  - Harappan Town Planning, Early Historical Cities and Early Text (Arthashastra), Mud Forts of Chhattisgarh,
  - Concept of Sacred and Profane, Techno-Typological Evolution & Regional Variations in Temple Architecture, Rock Cut Architecture, Structural Temple Architecture, Tirthkshetra-Kashi, Dwaraka, Kanchi, Avantika, Ayodhya, Prabhas-kshetra etc., Continuity of Traditional Town Planning: Jalpur, Madurai, Srirangam etc. Functional Aspects of Temples
2. Sacred Ecology
  - Sacred Forest (Naimisaranya, Panchvati, Dandkaranya etc.), Sacred Groves (Aaramika, Devkun), etc.), Rainwater Harvesting System: Vav, Kund, Talav etc. Sacred Hills and Mountains (Kailash, Vindhya, Sahyadri, Satrunja, Goverdhan), Kumbha: assimilation of ritual, myth, symbology, and cosmology.
3. Modern Contribution to Indic Architecture
  - Anand K. Coomaraswamy, Patrick Geddes, Alice Boner, Kapila Vatsayayan, Stella Kramrisch and Adam Hardy

#### References Books:

- Coomaraswamy, Ananda K. 2002. Early Indian Architecture: Cities and City-Gates, Munshiram Manoharlal Publishers.
- Vatsayayan, Kapila. 1997. The Square and the Circle of the Indian Arts, Abhinav Publication.
- Hardy, Adam. 2015. Theory and Practices of Temple Architecture in Medieval India: Bhoja's Samrangansutrardhar and The Bhojpur Line Drawings, Dev Publishers & Distributors.
- Sathapati, V. Ganapati. 2001. Indian Sculpture and Iconography-Forms and Measurements, Auro Publications.

## Annex. – 'B'

### Course - 5: Mathematics in India: From Vedic period to modern times

Course Credit: 2 credits

Training Hours: 30 Hours

1. Mathematics in the Vedas and Śulva Sūtras
  - Mathematical references in Vedas. The extant Śulbasūtra texts & their commentaries. The meaning of the word Śulbasūtra. Qualities of a Śulbakāra. Finding the cardinal directions. Methods for obtaining perpendicular bisector. Bodhāyana's method of constructing a square. The Bodhāyana Theorem (so-called 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.
2. Pāṇini's Aṣṭādhyāyī, Piṅgala's Chandahśāstra & Mathematics in the Jaina Texts
  - Development of Vyākaraṇa or Śabadaśāstra. Pāṇini and Euclid. Method of Pāṇini's Aṣṭādhyāyī. Śiva-sūtras and Pratyāhāras,
  - Overview and development of Prosody or Chandahśāstra.
  - Important Jaina mathematical works. Jaina geometry, The law of indices, Permutations, and Combinations.
3. Āryabhaṭīya of Āryabhaṭa
  - Āryabhaṭa, his period and his work Āryabhaṭīya, Area of a circle, trapezium, and other planar figures. Approximate value of  $\pi$ . Computation of tabular Rsines (geometric and difference equation methods), Ekavarṇa-samikarṇa and anekavarṇasamikarṇa.
4. Brāhmasphuṭasiddhānta of Brahmagupta
5. Bakṣālī Manuscript & Gaṇitasārasaṅgraha of Mahāvīra
6. Development of Combinatorics
7. Lilāvati of Bhāskarācārya, Bījagaṇita of Bhāskarācārya & Gaṇitakaumudī of Nārāyaṇa Paṇḍita
8. Magic Squares, Trigonometry and Spherical Trigonometry
9. Proofs in Indian Mathematics, Mathematics in Modern India

#### Reference Books:

- Srinivasa Ramanujan (1887-1920). A brief outline of the life and mathematical career of Ramanujan. Some highlights of the published work of Ramanujan and its impact 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,
- 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.



## Annex. – 'B'

### Course - 6: Basics of Indian Astronomy

Course Credit: 2 credits

Training Hours: 30 Hours

1. The science of Astronomy and the different units of time discussed in the texts
2. Systems employed for representing numbers
3. Spherical trigonometry & Celestial Sphere
4. Pañcāṅga
  - Division of the celestial sphere/ecliptic, significance by pointing out their basis, five elements that constitute Pañcāṅga– and their astronomical significance, computation of elements in a Pañcāṅga.
5. Key concepts pertaining to planetary computations and Computation of the true longitudes of planets
6. Precession of equinoxes – sāyana and nirayaṇa longitude
7. Finding the cardinal directions and the latitude of a place
8. Determination of the variation of the duration of the day at a given location
9. Lagna and its computation
10. Eclipses and their computation

#### References Books:

- S. N. Sen and K. S. Shukla, History of Astronomy in India, 2nd Ed., INSA, Delhi, 2001.
- S. Balachandra Rao, Indian Astronomy an Introduction, Universities Press, Hyderabad, 2000
- History of Astronomy: A Handbook, Edited by K. Ramasubramanian, Aniket Sule and Mayank Vahia, S and H, IIT Bombay, and T.I.F.R. Mumbai, 2016.
- B.V. Subbarayappa and K.V. Sarma, Indian Astronomy: A Source Book, Nehru Centre, Bombay, 1985.
- Tantrasaṅgraha of Nīlakaṇṭha Somayāji, Translation and Notes, K. Ramasubramanian and M. S. Sriram, Hindustan Book Agency, New Delhi 2011.

## Annex. – 'B'

### Course - 7: Introduction to Indian Astronomy

Course Credit: 2 credits

Training Hours: 30 Hours

1. Preliminaries
  - Sky viewed as the inside of a hemisphere. Cardinal directions, zenith, horizon, pole star at any location. The daily motion of celestial objects (Sun, Moon, planets, stars) and diurnal circles. Motion in the stellar background. Ecliptic. Basic time units: Day, Month and Year.
  - Celestial coordinates and elementary spherical trigonometry.
2. Developments from the Vedic period up to the Siddhāntic period
  - Vedic Astronomy: Astronomical concepts in Vedic literature regarding Sun, Moon, Stars, and Earth. Planets, Comets, etc. Pole star in an earlier era. Nakṣatra division of the ecliptic and motion of the Sun along it in Vedāṅga Jyotiṣa
  - Siddhāntic astronomy: Earlier Siddhāntas and Pañcasiddhāntikā. Introduction of trigonometry, Indian jyā-astronomy. Āryabhaṭṭya. Mahāyuga, Revolution numbers of planets. Ahargaṇa and Mean longitudes, Examples. Obtaining the true longitudes by applying corrections to mean longitudes.
  - Epicycle models: Manda correction (Equation of center) in detail. Its significance. Latitude of Moon.
  - Śighra correction to planets and their significance: Essential features only with the aid of diagrams and final formulae. Latitudes of planets. Precession of equinoxes— Nirayana and Sāyana longitudes.
  - Nature and Organisation of texts. Sūtra (algorithmic) format. Siddhānta, Tantra, Karaṇa and Vākya texts. Sāraṇis or Tables.
3. Indian Calendar
  - Pañcāṅga. Adhikamāsas. Solar and Luni-Solar systems.
4. Solar and Lunar Eclipses
  - Angular diameters of the Sun, Moon, and Earth's shadow. Possibility of eclipses. Finding the middle of an eclipse by iteration. Amount of obscuration at any time.
5. Tripraśna Topics (Diurnal problems)
  - Description of the celestial spheres and various circles.
  - Derivation of the expression for the declination in terms of the longitude.
  - Finding the latitude. Mid-day shadow. Finding the declination. Relation between the time and the shadow at an arbitrary instant (no derivation).
6. Planetary longitudes and latitudes, Nīlakaṇṭha Somayājī's revised planetary model and Rates of Motion of Planets
  - True longitudes of planets: Manda and Śighra corrections in detail. Geometrical description. Comparison with Kepler's model. Latitudes of planets.
  - Nīlakaṇṭha Somayājī's revision of the planetary model: Nīlakaṇṭha's analysis of the motion of the interior planets (Mercury and Venus). His geometrical model which is geometrically similar to the Tycho Brahe model (planets moving around the Sun which itself orbits the Earth), but computationally approximates the Kepler model. Idea of derivative in finding the Mandagatiphala (manda-correction to the mean rate of motion).
  - The correct formula due to Nīlakaṇṭha.
  - True rates of motion of planets: Correct expression due to Bhāskara. Application to calculate the retrograde motion of planets.

#### 7. Tripraśna topics

- Latitudinal triangles (of Bhāskara) and applications. Agrajyā or the distance between the rising-setting line and the east-west line. Correction to the east-west line due to change in Sun's declination.

- Zenith distance in terms of the declination, hour angle, and latitude ( $\cos z = \sin \phi \sin \delta + \cos \phi \cos \delta \cos H$ ). Derivation of this formula as in Siddhānta śiromaṇi. Relation among Śaṅkutala (Śaṅkvagra), Bhujā, Agrajyā and its applications.

#### 8. Rising times of Rāśis and finding Lagna

- Relation between the right ascension and longitude and rising times of rāśis at the equator. Rising times at an arbitrary latitude.

- Finding the Lagna at any instant after Sunrise (approximate).

#### 9. Eclipse calculations. The Vākya system

#### 10. Astronomical Instruments

- Gnomon. Cakra and Dhanur yantras for measuring the zenith distance of the Sun. Approximate and exact times from a 'yaṣṭi'.

- Phalakayantra to measure the hour angle. Equatorial sundial to measure time.

- Clepsydra for measuring time. Celestial globe and Armillary sphere for explaining celestial coordinates and various circles.

#### 11. Indian Astronomy in the 18th and 19th centuries

- Astronomical endeavors of Savai Jayasiṃha. Samrat-yantra and other instruments in the observatories of Jayasiṃha.

- European observers on the simplicity and accuracy of Indian eclipse computations.

- The work of Śaṅkaravarman and Candraśekhara Sāmanta. Efforts to update the Indian calendar.

#### Reference Books:

1. M. S. Sriram, Man and the Universe- An elementary account of Indian Astronomy, (Unpublished 1993).

2. M. S. Sriram, Elements of Indian astronomy- 5 Lectures, Instructional Course on Indian Sciences, Prof. K.V. Sarma Research Foundation, 2019. (Videos available at [https://www.youtube.com/watch?v=Qzam3vEnD8&list=PLF72fmBZVDxIkV0Ih\\_a5Hnax555-wu8y](https://www.youtube.com/watch?v=Qzam3vEnD8&list=PLF72fmBZVDxIkV0Ih_a5Hnax555-wu8y))

3. S. N. Sen and K. Ś. Shukla, Eds., History of Astronomy in India, 2nd Ed., INSA, New Delhi, 2001.

4. S. Balachandra Rao, Indian Astronomy-Concepts, and Procedures, M.P. Birla Institute of Management, Bengaluru, 2014.

5. K. Ramasubramanian, A. Sule and M. Vahia, Eds. History of Astronomy: A Handbook, SandHI, I.I.T Bombay, and T.I.F.R., Mumbai, 2016.

6. Āryabhaṭīya of Āryabhaṭa, Edited with translation and notes, K. S. Shukla and K. V. Sarma, Indian National Science Academy, New Delhi, New Delhi, 1976.

7. B.V. Subbarayappa and K.V. Sarma, Indian Astronomy: A Source Book, Nehru Centre, Bombay, 1985.

8. Tantrasaṅgraha of Nīlakaṇṭha Somayāji, Translation and Notes, K. Ramasubramanian and M.S. Sriram, Hindustan Book Agency, New Delhi and Springer, 2011.

9. Karaṇapaddhati of Putumana Somayāji, Translation and Notes, R. Venkāteswara Pai, K. Ramasubramanian, M.S. Sriram and M. D. Srinivas, Hindustan Book Agency, New Delhi and Springer, 2018.