

## **Aryabhata College, University of Delhi**

### **COURSE TITLE: ANCIENT INDIAN MATHEMATICS**

**Focus Area/Subject Area:** Indian Mathematics

**Credits:** 4

**Eligibility:** UG students

**Prerequisite:** Basic knowledge of Mathematics

#### **Details of the Instructor:**

1. Dr. Venkateshwara Pai, Associate Professor, Department of Humanities and Social Sciences, IISER, Pune
2. Dr. Anand Burdhan, Assistant Professor, School of Heritage Research and Management, Ambedkar University
3. Dr. Priti Jagwani, Associate Professor, Department of Computer Sciences, Aryabhata College, University of Delhi

#### **Course Objective:**

1. To promote awareness and understanding among younger minds about contributions of Vedic mathematics and its genesis.
2. To bring forward the extraordinary work done by Indian Mathematicians in the fields such as Astronomy, Astrology, Geometry, Algebra, and Arithmetic etc. and to help the existing education system become in tune with the values of Vedic knowledge and acknowledge the contributions of Indian mathematicians.

#### **Learning Outcome:**

Study of Indian Mathematics will reveal students how it is embedded in Indian art, architecture, music, and religious practices, fostering a deeper understanding and appreciation of Indian culture. It will help learners to utilize efficient methods of solving mathematical problems devised within the field and expose them to unique notations & techniques expanding their mathematical toolkit. It will be interesting for students to learn and apply the concepts in other fields such as astronomy, architecture, navigation, linguistics etc. The subject will also showcase the global influence of Indian mathematical contributions, broadens students' mathematical knowledge, enhance problem-solving skills, and in turn will provide a deeper appreciation for the beauty and diversity of mathematical thought. Thus, the scope of Indian mathematics is enormous and through proper training of teachers, the learning process for it will be effectively facilitated.

### **SYLLABUS**

1. Introductory Overview
2. Geometry in Śulbasūtras
3. Development of the Place-value system
4. Āryabhaṭīya of Āryabhaṭa
5. Brahmasphuṭasiddhānta

6. Līlāvāt
7. Kuṭṭaka: Solutions of indeterminate equations and continued fractions •
8. Kerala school of Mathematics
9. Development of Trigonometry and Spherical trigonometry for solving astronomical problems.
10. Notion of Proofs in Indian mathematics and conclusion

### References:

1. 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.
2. C. N. Srinivasiengar, History of Indian Mathematics, The World Press, Calcutta, 1967.
3. T. A. Saraswati Amma, Geometry in Ancient and Medieval India, Motilal Banarsidass, Varanasi, 1979.
4. S. Balachandra Rao, Indian Mathematics and Astronomy: Some Landmarks, 3rd Ed. Bhavan's Gandhi Centre, Bangalore, 2004.
5. G. G. Emch, M. D. Srinivas and R. Sridharan, Eds., Contributions to the History of Mathematics in India, Hindustan Book Agency, Delhi, 2005.
6. C. S. Seshadri, Ed., Studies in History of Indian Mathematics, Hindustan Book Agency, Delhi, 2010.
7. G. G. Joseph, Indian Mathematics Engaging the World from Ancient to Modern Times, World Scientific, London, 2016.
8. P. P. Divakaran, The Mathematics of India Concepts Methods Connections, Hindustan Book Agency 2018. Rep Springer New York, 2018.
9. 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