

Annexure 1B: Model Syllabi for Refresher Courses in IKS

Course 1: Course Name: Course on Indian Science and Technology

1. Fundamentals

- An overview of Indian contributions to technology
- Technological Innovations

2. Metallurgy, Textile and Chemistry

- Copper/Bronze/Zinc: Important Mines (*Zawar, Khetri* mines)
- Iron and Wootz Steel Technology
- Textile and Dyeing- Indian Specialities (Kutchi Embroidery, Cotton Textile etc.)
- Chemistry

3. Pyro technology

- Ceramic Technology
- Stone (Lapidary)
- Shell, Ivory, Faience & Glass Technology

4. Water Management

- Overview
- Harappan and Traditional Water Management System of Gujarat
- Historical Sites- Sringeverpur, South Indian Water Management System, Western Ghats Cave- Kanheri etc.
- Medieval Period
- Communities Involved in Water Management

5. Mathematics

- An overview of the Development of Mathematics in India
- Mathematics contained in the *Sulbasutra*
- Weaving Mathematics into Beautiful Poetry- *Bhaskaracarya*.
- The Evolution of Sine Function in India
- The Discovery of Calculus by Astronomers
- Concept of proof in Indian mathematics

6. Astronomy

- Vedanga Jyotish
- Measuring Time & Calendar

7. Medical Science and Technology

- Medical science and its evolution
- Basic concepts of Ayurveda
- Ayurveda ethics and code of conduct rules

8. Ecology and Environment

- *Nakshatrara Gyaan* and Agriculture
- Indigenous Architecture
- Forest Management and Urban Planning
- Agroforestry
- Tank, Lakes, and Stepwells

9. Transportation

- Modes of Transportations and Reforms

- Grand Trunk Road (*Uttarapath & Dakshinapath*)
- Development of Trading Techniques
- Boat & Ship Building

References

Text Books:

1. R.M. Pujari, Pradeep Kolhe, N. R. Kumar, 'Pride of India: A Glimpse into India's Scientific Heritage', Samskrita Bharati Publication.
2. 'Indian Contribution to science', compiled by Vijnana Bharati.
3. 'Knowledge traditions and practices of India', Kapil Kapoor, Michel Danino, CBSE, India.

Reference Books:

1. Dr. Subhash Kak , Computation in Ancient India, Mount, Meru Publishing (2016)
2. **Dharampal**, *Indian Science and Technology in the Eighteenth Century*, Academy of Gandhian Studies, Hyderabad, 1971, republ. Other India Bookstore, Goa, 2000
3. Robert **Kanigel**, *The Man Who Knew Infinity: A Life of the Genius Ramanujan*, Abacus, London, 1999
4. Alok **Kumar**, *Sciences of the Ancient Hindus: Unlocking Nature in the Pursuit of Salvation*, CreateSpace Independent Publishing, 2014
5. B.V. **Subbarayappa**, *Science in India: A Historical Perspective*, Rupa, New Delhi, 2013
6. S. **Balachandra Rao**, *Indian Mathematics and Astronomy: Some Landmarks*, Jnana Deep Publications, Bangalore, 3rd edn, 2004
7. S. **Balachandra Rao**, *Vedic Mathematics and Science In Vedas*, Navakarnataka Publications, Bengaluru, 2019
8. Bibhutibhushan **Datta**, *Ancient Hindu Geometry: The Science of the Śulba*, 1932, repr. Cosmo Publications, New Delhi, 1993
9. Bibhutibhushan **Datta** & Avadhesh Narayan **Singh**, *History of Hindu Mathematics*, 1935, repr. Bharatiya Kala Prakashan, Delhi, 2004
10. George Gheverghese **Joseph**, *The Crest of the Peacock*, Penguin Books, London & New Delhi, 2000
11. 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).
12. Clemency **Montelle**, *Chasing Shadows: Mathematics, Astronomy and the Early History of Eclipse Reckoning*, Johns Hopkins University Press, 2011
13. Anisha Shekhar **Mukherji**, *Jantar Mantar: Maharaja Sawai Jai Singh's Observatory in Delhi*, AMBI Knowledge Resources, New Delhi, 2010
14. Thanu **Padmanabhan**, (ed.), *Astronomy in India: A Historical Perspective*, Indian National Science Academy, New Delhi & Springer (India), 2010
15. Acharya Prafulla Chandra **Ray**, *A History of Hindu Chemistry*, 1902, republ., Shaibya Prakashan Bibhag, centenary edition, Kolkata, 2002
16. R. **Balasubramaniam**, *Delhi Iron Pillar: New Insights*, Indian Institute of Advance Study, Shimla & Aryan Books International, New Delhi, 2002
17. R. **Balasubramaniam**, *Marvels of Indian Iron through the Ages*, Rupa & Infinity Foundation, New Delhi, 2008

18. 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
19. Fredrick W. **Bunce**: *The Iconography of Water: Well and Tank Forms of the Indian Subcontinent*, DK Printworld, New Delhi, 2013