

**SYLLABUS**  
**MASTER OF ARTS (M.A.)**  
**IN**  
**ANCIENT INDIAN HISTORY, CULTURE AND**  
**ARCHAEOLOGY**  
**SEMESTER IV**  
**(UNDER CBCS)**



**DECCAN COLLEGE**  
**POST GRADUATE AND RESEARCH INSTITUTE**  
**PUNE – 411 006 (INDIA)**

(Declared as Deemed to be University under section 3 of UGC Act 1956 )

**2017**

## **ARC401: ART AND ARCHITECTURE OF INDIA (600 C.E. to 1200C.E.)**

### **Course Objectives:**

The objectives of this course are to introduce the major developments in art and architecture in India during the Medieval Period.

### **Course Outcomes:**

Students become familiar with the monuments and sculptures of India during the period covered in the course.

### **Unit 1: Theoretical Aspects and Development of Regional Schools (3hrs)**

- i. Brief review of the ancient Shilpa texts
- ii. Concept of Forms, Styles and Modes of Temple Architecture
- iii. Rise and Development of Regional Schools.

### **Unit 2: Early Structural Temples in North, Central, and Western India (8hrs)**

- i. General Review of Post-Gupta Monuments and Sculptures in Northern India
- ii. Pratiharas: Deogarh, Gwalior, Gyaraspur
- iii. Asian group of temples in Rajasthan
- iv. Kalchuris: Candrehe, Bheraghat, Maihar
- v. Maitrakas and Saindhavas: Gop.Khimeshvara, Ghumali, Miyani

### **Unit 3: Late Structural Temples in North, Central, and Western India (8hrs)**

- i. Paramaras:Udaypur,Jamali,Nemawar
- ii. Solanki: Sunak, Modhera, Sejakpur, Dilwarac. Chandellas: Khajuraho group of temples

### **Unit 4: Structural Temples and monuments:Eastern India (4hrs)**

- i. Development and Characteristics of Kalinga style of Temple Art and Architecture
- ii. Parshurameshvara, Mukteshvara, lingaraj and Konark sun temple

### **Midterm**

**Unit 5: Rock-cut Monuments, Structural Temples and Sculptures: Deccan (12hrs)**

- i. Chalukyas of Badami: Aihole, Badami, Pattadakal, Mahakuta
- ii. Rock-cut caves at Elephanta
- iii. Rashtrakutas: Alampur Group of Temples, Ellora Rock-cut caves and Monolithic temples
- iv. Chalukyas of Kalyana: Gadag, Ittagi, Harihar and Laksmeshvara.
- v. Yadavas: Sinnar, Balasane and Jhodge
- vi. Shilaharas: Ambarnath and Khidrapur
- vii. Study of temple Architecture – Practical Training of Plan drawing.

**Unit 6: Rock-cut Monuments, Structural Temples and Sculptures: South India (8hrs)**

- i. Pallavas: Mahabalipuram and Kanchipuram
- ii. Pandyas: Kalugumalai and Tirupattur
- iii. Cholas: Kumbhakonam, Tanjavur, Gangaikonda cholapuram and Darasuram,
- iv. Hoyasalas: Belur, Halebid and Somanathpur

**Unit 7: Bronzes of India (2 hrs)**

- i. The Pallavas and The Cholas of South India
- ii. The Palas of the Senas of Eastern India

**Recommended Readings:**

- i. Acharya, P.K. 1927. Indian Architecture According to Manasara – Shilpashatra. London: Oxford University Press.
- ii. Ali, Rahman 2002. Temples of Madhya Pradesh - The Paramara Art. New Delhi: Sundeep Prakashan
- iii. Bandyopadhyay, Bimal. 1981. Metal Sculptures of Eastern India. Delhi: Sundeep Prakashan. Deglurkar, G. B. 1994. Temple Architecture and Sculpture of Maharashtra. Nagpur: Nagpur University.
- iv. Berkson, Carmel 1992. Ellora: Concept and Style. New Delhi: IGNCA and Abhinav Publications.
- v. Brown, Percy 1940. Indian Architecture (Buddhist and Hindu Periods). Bombay: D. B. Taraporevala Sons and Co.
- vi. Chandra, Pramod (ed) 1975. Studies in Indian Temple Architecture. New Delhi: American Institute of Indian Studies.
- vii. Collyer, Kelleeson 1990. The Hoyasala Artists Their Identity and Style. Mysore: Directorate of Archaeology and Museums.

- viii. Deglurkar, G. B. 2004. Portrayal of the Women in the Art and Literature of the Ancient Deccan. Jaipur: Publications Scheme.
- ix. Deglurkar, G. B. 2005. Sursundari. Pune: Bhartiya Vidhya Bhavan (in Marathi).
- x. Dehejia, Vidya 1986. Yogini Cult and Temples A Tantric Tradition. New Delhi: National Museum.
- xi. Dehejia, Vidya 1990. The Art of Imperial Cholas. Columbia: Columbia University Press.
- xii. Dehejia, Vidya 1979. Early Stone Temples of Orissa. Delhi: Vikas Publishing House.
- xiii. DeLippe, Aschwin 1978. Indian Medieval Sculpture. Amsterdam: North Holland Publishing Co. Desai, Vishakh and Darielle Mason (eds) 1993. Gods, Guardians and Lovers. New York and Ahmedabad: Asia Society Galleries and Mapin Publishing.
- xiv. Deva, Krishna 1990. Temples of Khajuraho (2 vols.). New Delhi: Archaeological Survey of India.
- xv. Deva, Krishna 1995. Temples of India (2vols.) New Delhi: Aryan Books International.
- xvi. Dhaky, M.A.1961. The Chronology of Solanki Temples of Gujarat, Journal of Madhya Pradesh Itihas Parishad3:1-83.
- xvii. Dhaky, M.A.1965.The Vyala Figures on the Medieval Temples of India. Varanasi: Prithvi Prakashan
- xviii. Dhaky, M.A.1977.TheIndianTempleFormsinKarnatakaInscriptionsandArchitecture. Delhi: Abhinav Publications.
- xix. Dhaky, M.A.(ed.)1996.EncyclopediaofIndianTempleArchitecture.Vol.I,Part3,South India: Upper Dravida desa LaterP hase A.D. 973-1326. Delhi: American Institute of Indian Studies and Oxford University Press.
- xx. Dhaky,M.A.(ed.)1998.Encyclopedia of Indian Temple Architecture. Vol.II, Part 3, North India: Beginnings of Medieval IdiomCAD900-1000. Delhi: American Institute of Indian Studies and IGNCA.
- xxi. Dhaky, M.A.2005.TheIndianTempleTraceries.New Delhi: D.K. Printworld (P) Ltd.
- xxii. Dhavalikar, M.K.1983.Masterpieces of Rashtrakuta Art: The Kailas.Bombay: D.B.Taraporewala and Sons Pvt. Ltd.
- xxiii. Donaldson, Thomas E. 1985. Hindu Temple Art of Orissa.(3vols.).Leiden: E. J. Brill.
- Fergusson, James 1876. A History of Indian and Eastern Architecture. London: John Murray.
- Foekema, G.1994.HoyasalaArchitecture.New Delhi: BooksandBooks.
- xxiv. Foekema, G. 2003. Chalukya Architecture (3 vols.) NewDelhi: Munshiram Manoharlal Publishers Pvt. Ltd.
- xxv. Ganguly, O.C.1957.Art of Chandela. Calcutta: Rupa and Company.

- xxvi. Handa, Devendra 1984. *Osian: History, Archaeology, Art and Architecture*. Delhi: Sundeep Prakashan
- xxvii. Hardy, Adam 1995. *Indian Temple Architecture: Form and Transformation*. New Delhi: Abhinav Publications.
- xxviii. Hardy, Adam 2007. *The Temple Architecture of India*. Chichester: Wiley.
- xxix. Harle, James 1986. *The Art and Architecture of the Indian Subcontinent*. Harmondsworth: Penguin.
- xxx. Huntington, Susana. L. with John Huntington. 1985. *The Art and Architecture of India*. New York: Weatherhill.
- xxxi. Kramrisch, Stella 2002 (Reprint) *The Hindu Temples (2 vols.)* New Delhi: Motilal Banarasidas.
- xxxii. Lockwood, Michael et.al. 2001. *Pallava Art*. Madras: Tambaram Research Associates.
- xxxiii. Mathur, Asha Rani. 1988. *The Great Traditions: Indian Bronze Masterpieces*. New Delhi: Festivals of India.
- xxxiv. Meister, Michael W. and M.A. Dhaky (ed.) 1991. *Encyclopedia of Indian Temple Architecture*. Vol.II, Part 2, North India: Period of Early Maturity CAD 700-900. Delhi: American Institute of Indian Studies and Oxford University Press.
- xxxv. Meister, Michael W. and M.A. Dhaky (ed.) 1999. *Encyclopedia of Indian Temple Architecture*. Vol.II, Part 1, North India: Foundations of North Indian Style C.250 B.C-A.D 1100. Delhi: American Institute of Indian Studies and Oxford University Press.
- xxxvi. Meister, Michael W. (ed.) 1999. *Encyclopedia of Indian Temple Architecture*. Vol. I, Part 1, South India: Lower Dravidadesa 200 B.C – A.D 1324. Delhi: American Institute of Indian Studies and Manohar Publishers.
- xxxvii. Meister, Michael W. and M.A. Dhaky (ed.) 1999. *Encyclopedia of Indian Temple Architecture*. Vol. I, Part 2, South India: Upper Dravidadesa A.D 550 - 1075. Delhi: American Institute of Indian Studies and Oxford University Press.
- xxxviii. Michell, George. 1977. *The Hindu Temple: An Introduction to its Meaning and Form*. Chicago: University of Chicago Press.
- xxxix. Michell, George. (ed.) 1996. *Encyclopedia of Indian Temple Architecture*. Vol. I, Part 3, South India: Upper Dravidadesa Later Phase. Delhi: American Institute of Indian Studies.
- xl. Misra, R. N. 1987. *Sculptures of Dahala and Dakshina Kosala and Their Background*. Delhi: Agam Kala Prakashan.
- xli. Nanavati, J. M. and M. A. Dhaky. 1969. *The Maitraka and the Saindhava Temples of Gujarat*. Ascona: Artibus Asiae.

- xlii. Nanavati, J. M and M. A. Dhaky. 1963. The Ceilings in the temples of Gujarat, Bulletin of the Baroda Museum and Picture Gallery, Vols .XVI - XVII.
- xlili. Parimoo, Ratan et al 1988. Ellora Caves: Sculptures and Architecture. New Delhi: Books and Books.
- xliv. Pichard, Pierre 1995. Thanjavur Brhadisvara, an Architectural Study. Delhi: IGNC A and Ecole Francais ed el' Extreme Orient.
- xlv. Settar, S, 1992. Hoyasala Temples. Dharwad: Karnataka University.
- xlvi. Shah, U. P. and M. A. Dhaky. 1976. Aspects of Jain Art and Architecture. Ahmedabad: L.D.Institute.
- xlvii. Sivaramamurty, C. 1961. Indian Sculpture. New Delhi: Allied Publishers Pvt. Ltd.
- xlviii. Sivaramamurty, C. 1963. South Indian Bronzes. New Delhi: Lalit Kala Academy.
- xlix. Soundara Rajan, K. V. 1972. Indian Temple Styles: The Personality of Hindu Architecture.
1. New Delhi: Munshiram Manoharlal.
  - li. Soundara Rajan, K. V. 1980. Art of South India-Deccan. New Delhi: Sundeep Prakashan.
  - lii. Soundara Rajan, K. V. 1980. Art of South India: Tamil Nadu and Kerala. New Delhi: Sundeep Prakashan
  - liii. Soundara Rajan, K. V. 1981. Cave Temples of the Deccan. New Delhi: Archaeological Survey of India.
  - liv. Srinivasan, K. R. 1972. Temples of South India. New Delhi: National Book Trust.
  - lv. Srinivasan, K. R. 1964. Cave Temples of the Pallavas. New Delhi: Archaeological Survey of India.
  - lvi. Tadgell, Christopher 1995. The History of Architecture in India. London: Phaidon Press Ltd.
  - lvii. Tartakov, Gary Michael. 1997. The Durga temple at Aihole: Historiographical Study. New Delhi: Oxford University Press.
  - lviii. Trivedy, R. D. 1990. The Temples of Pratihara Period in Central India. New Delhi: Archaeological Survey of India.

## **ARC 402: ANCIENT INDIAN NUMISMATICS**

### **Course Objectives:**

To introduce the currency system of ancient India and acquaint the development in the coinage.

### **Course Outcomes:**

Students will be able to identify and decipher the coins. They will also be able to understand the socio-political background that accure through the coinage of that time; thus getting holistic picture of that economic system prevalent in ancient India.

### **Unit 1: Introduction to Numismatics (9 hrs)**

- i. Numismatography: History of Numismatic Studies in India
- ii. Numismatic Studies: Terminology, Scope and Importance in the Reconstruction of socio-cultural and economic History
- iii. Provenance of Coin: Findings from Archaeological excavations and Stratigraphic relevance, Stray findings, Hoards, Private and Public Collections

### **Unit 2: Study of Ancient Indian Coinage: polity-economic dimensions (20 hrs)**

- i. Different categories of the coins and weight standard as linked from the historical text: Shatamana, Vimshatik and Karshapana series.
- ii. Punch-Marked Coins: Archaic and Universal; Early Uninscribed Cast Copper Coins (EUCCC)
- iii. Coins of Indo-Greek, Indo-Scythian and Indo-Parthian dynasties, Tribal coins, Local Coins, Coins of City States
- iv. Coinage of the Kushanas
- v. Coins of the Satavahanas and Contemporary Rulers
- vi. Coins of the Western Kshatrapas: Kshaharata and Kardamaka Rulers
- vii. Coins of the Sangama Period: Chera, Chola and Pandya
- viii. Distribution of Roman Coins in India
- ix. Coins of the Guptas

### **Unit 3: Chemical and Statistical Analyses of Coins (9 hrs)**

- i. Recent advancement in numismatic studies
- ii. Metallurgy of Coins
- iii. Minting Techniques
- iv. Destructive and Non-destructive methods of Analysis
- v. Statistical Analysis: Frequency Tables and Histograms

#### **Unit 4: Practical Training**

(7 hrs)

- i. Introduction of scripts: Brahmi, Kharoshthi and Greek
- ii. Coin Cleaning: Treatment and Preservation
- iii. Identification of coins, preparation of coin catalogue and report writing

#### **Recommended Readings:**

- i. Allan, J. 1935. Catalogue of Coins of Ancient India. London: British Museum.
- ii. Altekar, A.S., 1937. Catalogue of Coins of the Gupta Empire. Varanasi: Numismatic Society of India.
- iii. Bhandarkar, D.R., 1921. Carmichael Lectures on Ancient Indian Numismatics. Calcutta: Calcutta University.
  - i. Bharadwaj, H.C. 1979. Aspects of Ancient Indian Technology. Delhi: Motilal Banarasidas.
  - Chattopadhyaya, Bhaskar 1967. The Age of the Kushanas – A Numismatic Study. Calcutta: Punthi Pustak.
- iv. Chattopadhyaya, Brajdulal 1977. Coins and Currency System in South India. Delhi: Munshiram Manoharlal.
- v. Dasgupta, K.K. 1974. A Tribal History of Ancient India – A Numismatic Approach. Calcutta: Nababharat Publications.
- vi. Datta, Mala 1990. A Study of the Satavahana coinage. Delhi: Harman Publishing House.  
Dhavalikar, M.K. 1975. Pracheena Bharatiya Nanakshastra. Pune: Maharashtra Vidyapeeth Granthanirmiti Mahamandal.
- vii. Handa, Devendra 2007. Tribes Coins of Ancient India. New Delhi: Aryan Books International.  
Elliot, W. 1970. (Reprint) Coins of South India. Varanasi: Indological Book House.  
Gardener, P. 1886. The Coinage of the Greek and Scythic Kings of Bactria and India in British Museum. London: British Museum.
- viii. Gokhale, Shobhana 1981. New Discoveries in the Satavahana Coinage, JNSI vol. XLIII: 54-59.
- ix. Goyal, S.R. 1995. Dynastic Coins of Ancient India. Jodhpur: Kusumanjali Book World.
  - x. Gupta, P.L. 1979. (2<sup>nd</sup> Revised Edition) Coins. New Delhi: National Book Trust.
  - xi. Gupta, P.L. 1981. Coins: Source of Indian History. Ahmedabad: B.J. Institute of Learning and Research.
  - xii. Gupta, P.L. and Sarojini Kulashreshtha 1993. Kushana Coins and History. New delhi: D.K. Publishers.
- xiii. Gupta, P.L. and T.R. Hardaker 1985. Ancient Indian Silver Punch-Marked Coins of the Magadha – Maurya Karshapana Series. Nasik: Indian Institute of Research in Numismatic Studies.



- xiv. Jha, A.K. 1998. Observations on the Principles of Typology: A Study of Ancient Indian Coinage, in *Ex Moneta: Essays on Numismatics in Honour of Dr. David W. Macdowall* (A.K. Jha and Sanjay Garg eds.) Volume I, pp. 33-42. New Delhi: Harman Publishing House.
- xv. Jha, Amiteshwar and Dilip Rajgor 1994. *Studies in the Coinage of Western Kshatrapas*. Anjaneri: Indian Institute of Research in Numismatic Studies.
- xvi. Krishnamurti, R. 1997. *Sangam Age Tamil Coins*. Madras: Garnet Publishers. Lahiri, A.N. 1965. *Corpus of Indo-Greek Coins*. *Calcutta Journal of the Numismatic Society of India*, Varanasi.
- xvii. Mangalam, S.J. 2001. *Shankar Tiwari Collection of Early Coins from Narmada Valley*. Bhopal: Directorate of Archaeology and Museums, Government of Madhya Pradesh.
- xviii. *Numismatic Digest A Journal Published by Indian Institute of Research in Numismatic Studies, Anjaneri (Nasik)*.
- xix. Rajgor, Dilip 2001. *Punch-Marked Coins of Early Historic India*. California: Reesha Books International.
- xx. Rapson, E.J. 1908. *Catalogue of Coins of Andhra Dynasty, Western Kshatrapas etc*. London: British Museum.
- xxi. Ray, S.C. 1977. *The Stratigraphic Evidence of Coins in Indian Excavations and Some Allied Issues*. Varanasi: Numismatic Society of India.
- xxii. Sahni, Birbal 1973. *The Technique of Casting Coins in Ancient India*. Varanasi: Bharatiya Publishing House.
- xxiii. Sarma, I.K. 1980. *Coinage of the Satavahana Empire*. Delhi: Agam Kala Prakashan.
- xxiv. Shastri, A.M. (Ed.) 1972. *Coinage of Satavahanas and Coins from Excavations*, Nagpur: Nagpur University.
- xxv. Shastri, A.M. (Ed.) 1999. *Age of the Satavahanas (two volumes)*: New delhi: Aryan Prakashan. Srivastava, A.K. 1969. *Catalogue of Indo-Greek Coins in the State Museum*, Lucknow. Lucknow: State Museum.
- xxvi. Srivastava, A.K. 1972. *Catalogue of Saka-Pahlava Coins of Northern India in the State Museum*, Lucknow. Lucknow: State Museum.
- xxvii. *Studies in South Indian Coins: A Journal Published by South Indian Numismatic Society, Madras*.
- xxviii. Whitehead, R.B. 1910. *Catalogue of Coins in the Punjab Museum, Lahore, Vol. I: Indo- Greek Coins*. Oxford: Clarendon Press.

## **ARC 403: ETHNOARCHAEOLOGY**

### **Course Objective:**

The objective of this course is to become familiar with the ethnologies of different communities in India and their relevance for understanding archaeological data.

### **Course Outcome:**

Students are familiarized with the importance of ethnographic data as a source to understand archaeological data.

### **Unit 1: Concepts in Ethnoarchaeology (10 hrs)**

- i. Nature and interrelationship of archaeological and ethnographic records: Role of Analogy.
- ii. Definition, scope and methods of ethnoarchaeology;
- iii. Brief review of the Ethnoarchaeological researches in India.
- iv. Ethnoarchaeology and reconstruction of past material culture; e.g. Settlement pattern, technology, ceramics, food processing, etc.

### **Unit 2: Tribe and Caste (5 hrs)**

- i. The composition of Indian society
- ii. Castes and tribes. Origin and evolution of the caste system in India and its archaeological significance.

### **Unit 3: Ethnoarchaeological Studies In Indian Settings (16 hrs)**

- i. Forager/collector model to Palaeolithic and Mesolithic societies: e.g. Andaman Islanders
- ii. Ethnoarchaeological researches on the living hunter-gatherers in central, western and southern regions of India. Pardhis, Van Vagris, Korkus, Gonds, Bastar, Birhors, Yanadis, Chenchus, and Musahars. Veddas of Sri Lanka
- iii. Present day shifting cultivation practices and their relevance to the study of Mesolithic, Neolithic and Chalcolithic cultures of India.
- iv. Ethnoarchaeology of the South Indian Neolithic culture
- v. Ethnoarchaeological research for reconstructing the early agro-pastoral Chalcolithic communities of central and western India; Mahadeo Kolis, Bhils and Dhangars.
- vi. Living Megalithic tradition in India.
- vii. Ethnoarchaeology of fishing (inland and coastal) economies
- viii. Ethnoarchaeology of marginal resource utilization (shell fishing)

**Unit 4: Ethnoarchaeological Studies Outside India:****(8 Hrs)**

- i. Important Ethnoarchaeological studies of living hunter-gatherer societies outside India: Eskimos of Alaska, Bushmen of the Kalahari Desert and Australian Aborigines

**Unit 5: Ethnoarchaeological Applications for Sciences in Archaeology (6 hrs)**

- i. Role of analogy in problems pertaining to the application of sciences in archaeology; biological anthropology, ethnobotany and archaeo-zoology.

**Recommended Readings:**

- i. Ajay Pratap 1987. Shifting Cultivation in the Rajmahal Hills of India, in *Archaeology as Long-term History*, (Ed) Ian Hodder, pp. 68-83. Cambridge: Cambridge University Press.
- ii. Ajay Pratap 2000. *The Hoe and the Axe: Ethnohistory of Shifting Cultivation in Eastern India*. New Delhi: Oxford University Press.
- iii. Allchin, B. 1985. Ethnoarchaeology in South Asia, in *South Asian Archaeology 1983*, (J. Schotsmans and M. Taddei Eds.), pp 21-33 Napels: Instituto Universitario Orientale.
- iv. Allchin, B. 1994. *Living Traditions: South Asian Ethnoarchaeology*. New Delhi: Oxford & IBH Co Pvt Ltd.
- v. Allchin, F. R. 1959. Poor Men's Thalys : A Deccan Potter's Technique, *Bulletin of the School of Oriental and African Studies*, 22(2): 250-7.
- vi. Ansari, S. 2000. Small game hunting Musahars: An Ethnoarchaeological Approach, *Puratattva*, 30: 141-150.
- vii. Ansari, S. 2001. Fishing Practices Among the Mallahs of Allahabad District, Uttar Pradesh, *Man and Environment*, 26 (1): 39-55.
- viii. Ansari, S. 2005. *Ethnoarchaeology of Prehistoric Settlement Pattern of South-Central Ganga Valley*, Indian Society for Prehistoric and Quaternary Studies Monograph Series No. 4, Pune: Indian Society for Prehistoric and Quaternary Studies.
- ix. Ansari, S. 2005. Prehistoric Settlement Pattern of South-Central Ganga Valley: An Ethnoarchaeological Perspective in *Gurudakshina: Facets of Indian Archaeology*, (Ed.) Alok Kumar Kanungo, pp. 287-328, Oxford: BAR International Series 1433.
- x. Ansari, S. 2011. *Ethnoarchaeological Perspectives of Prehistoric settlement Patterns of South-Central Ganga Valley* Oxford: BAR International Series.
- xi. Arati Deshpande-Mukherjee 2000. An Ethnographic Account of Contemporary Shellfish Gathering on the Konkan Coast, Maharashtra, *Man and Environment* 25 (2): 79-92.

- xii. Arati Deshpande-Mukherjee 2006. Reconstructing the Past: Ethnographic Observation on Shell working at Bishnupur, in Past and Present Ethnoarchaeology in India, (Gautam Sengupta, Suchira Roychoudhury and Sujit Som Eds.), pp.383-409. Pragati Publications (New Delhi) in collaboration with Centre for Archaeological Studies and Training Eastern India (Kolkata).
- xiii. Axel Steensberg. 1980. New Guinea Gardens: Study of Husbandry with Parellel in Prehistoric Europe, Cambridge University Press, Cambridge.
- xiv. Axel Steensberg. 1986. Man the Manipulator. An Ethnoarchaeological Basis for Reconstructing the Past, National Museum, Kopenhagen.
- xv. Axel Steensberg. 1993. Fire Clearance Husbandry: Traditional Techniques throughout the World, Poul Kristensen, Hernig.
- xvi. Bettinger, R.L. 1987. Archaeological Approaches to Hunter-Gatherer, Annual Review of Anthropology 16: 121-142.
- xvii. Bhan Kuldeep K. 2007 Review of Ethnoarchaeological Research in Western India and Future Directions, in Anthropology for Archaeology Proceedings of the Prof. Irawati Karve Birth Centenary Seminar (Walimbe, S.R. P.P. Joglekar and K.K. Basa Eds.), pp. 63-76. Pune: Deccan College.
- xviii. Bichieri, M.G. 1972. Hunters and Gatherers Today. New York: Holt, Rinehart and Winston. Binford, L. R. 1988. In Pursuit of the Past. New York: Thames and Hudson.
- xix. Binford, L.R. 1978. Nunamiut Ethnoarchaeology. New York: Academic Press. Coles, J. 1973. Archaeology by Experiment. London: Hutchinson.
- xx. Cooper, Z. 1992. The Relevance of the Forger/Collector Model to Island Communities in the Bay of Bengal, Man and Environment 17(2): 111-122.
- xxi. Cooper, Z. 1997. Prehistory of the Chitrakot Falls Central India. Pune: Ravish Publishers. Cooper, Z. 2002. Archaeology and History: Early Settlement in the Andaman Islands. New Delhi: Oxford University Press.
- xxii. Dhavalikar, M.K. 1983. Ethnoarchaeology in India, Bulletin of the Deccan College Research Institute 42: 49-68.
- xxiii. Dhavalikar, M.K. 1994. Chalcolithic Architecture at Inamgaon and Walki: An Ethnoarchaeological Study, in Living Traditions (Ed.) B. Allchin, pp 35-52. New Delhi: Oxford-IBH.
- xxiv. David N. And C. Kramer 2001. Ethnoarchaeology in Action. Cambridge: Cambridge University Press.

- xxv. Gould, R.A. 1978. Beyond Analogy in Ethnoarchaeology, Explorations in Ethnological Reasoning, and *Journal of Anthropological Archaeology* 1 (4): 355-81.
- xxvi. Gould, R.A. 1980. *Living Archaeology*. Cambridge: Cambridge University Press.
- xxvii. Griffin, P.B. and W.G. Solheim II. 1990. *Ethnoarchaeological Research in Asia, Asian Perspectives* 28 (2): 145-161.
- xxviii. Grigg, D.B. 1980. *The Agricultural Systems of the World*. Cambridge: Cambridge University Press.
- xxix. Jain, S.K. 1991. *Contributions to Indian Ethnobotany*. Jodhpur: Scientific Publishers.
- Jayaswal, V and K. Krishna 1986. *An Ethnoarchaeological View of India Terracotta*. New Delhi: Agam Kala.
- xxx. Jochim, M.A. 1976. *Hunter Gatherer Subsistence and Settlement: A Predictive Model*. New York: Academic Press.
- xxxi. Kanungo, A.K. 2004. Glass Beads in Ancient India and afurnace-Wound Beads at Purdalpur: An Ethnoarchaeological Approach, *Asian Perspective*, Vol 43(1): 123 -150.
- xxxii. Kanungo, A.K. 2004. *Glass Beads in Indian Archaeology: An Ethnoarchaeological Approach*. Oxford: BAR International Series 1242.
- xxxiii. Kenoyer, J.M. 1983. *Shell working Industries of the Indus Civilization: An Archaeological and Ethnographic Perspective*. Ph.D Dissertation. Berkeley: University of California.
- xxxiv. Kenoyer, J.M., M. Vidale and K.K. Bhan 1991. Contemporary Stone bead –Making in Khambhat, India: Patterns of Craft Specialization in the Archaeological Record, *World Archaeology* 23 (1): 44-63.
- xxxv. Kramer David N. 2001. *Ethnoarchaeology in Action*. Cambridge: Cambridge University Press.
- xxxvi. Kramer, C. 1980. *Ethnoarchaeology. Guildford Survey: Columbia Survey: Columbia University Press*.
- xxxvii. Kramer, C. 1994. A Tale of Two Cities: Ceramic Ethnoarchaeology in Rajasthan, in *Living Traditions* (B. Allchin Ed.), pp 307-22. New Delhi: Oxford-IBH.
- xxxviii. Lee, R.B. and I. Devore 1975. *Man the Hunter*. Chicago: Aldine Publishing Co.
- xxxix. Leshnik, L.S. And G. Sontheimer. 1975. *Pastoralists and Nomads*. Wiesbaden: Otto Harrassowitz.
- xl. Maheshwari, J.K. 1996. *Ethnobotany in South Asia*. Jodhpur: Scientific Publishers.
- xli. Maheshwari, J.K. and R. Jones 1988. *Archaeology with Ethnography: An Australian Perspective*. Canberra: Department of Prehistory, Research School of Pacific Studies, Australian National University.

- xlii. Meehan, B. And R. Jones 1988. *Archaeology with Ethnography: An Australian*
- xliii. *Perspective*. Canberra: Department of Prehistory, Research School of Pacific Studies, Australian National University.
- xliv. Michael, J. Balick and Paul Alan Cox 1996. *Plant, People and the Science of Ethnobotany*, Museum of Anthropology, University of Michigan, Ann Arbor.
- xlv. Miller, D. 1985. *Artefacts as Categories: A Study of Ceramic Variability in Central India*. Cambridge: Cambridge University Press.
- xlvi. Misra, V.N. 1974. *Archaeological and Ethnographic Evidence for the Hafting and Use of Microliths and Related Tools*, *Puratattva* 7: 3-12.
- xlvii. Misra, V.N. 1984. *The Van Vagris- Lost Hunters of Thar Desert, Rajasthan, Man and Environment* 15 (2) 89-108.
- xlviii. Mohanty, P. and J. Mishra 2002. *Fifty Years of Ethnoarchaeological research in India: A Review*, in *Archaeology and Interactive disciplines* (S. Settar and R. Korisettar Eds.), pp 169-207. Delhi: Indian Council of Historical Research
- xlix. Morris, B. 1982. *Forest Traders: A Socio-Economic Study of the Hill Pandaram*. London School of Economics Monograph, *Social Anthropology* 55. London: Athlone Press.
  - i. Morrison Kathleen D. and Laura L. Junker. 2002. *Forager-Traders in South and Southeast Asia: Long Term Histories*. Cambridge: Cambridge University Press.
  - ii. Murty, M.L.K. 1981. *Hunter-Gatherer Ecosystems and Archaeological Patterns of Subsistence Behaviour on the South-East Coast of India: An Ethnographic Model*, *World Archaeology* 13: 47-58.
  - iii. Murty, M.L.K. 1985. *Ethnoarchaeology of Kurnool Cave Area*, *World Archaeology* 17 (2): 192-205.
  - liii. Murthy M.L.K. 2007. *Social Ecology of Village Goddesses and Agro-pastoral Communities in Eastern Ghats (Andhra Pradesh)*, in *Anthropology for Archaeology Proceedings of the Prof. Irawati Karve Birth Centenary Seminar* (Walimbe, S.R. P.P. Joglekar and K.K. Basa Eds.), pp. 95-103. Pune: Deccan College.
  - liv. Murty, M.L.K. and G.D. Sontheimer 1980. *Prehistoric Background to Pastoralism in the Southern Deccan in the Light of Oral Traditions and Cults of Some Pastoral Communities*, *Anthropos* 75: 163-84.
  - lv. Nagar, M. 1975. *Role of Ethnographic Evidence in the Reconstruction of Archaeological Data*, *Eastern Anthropologist* 28 (1): 13-22.
  - lvi. Nagar, M. and V.N. Misra. 1993 *The Pardhis: A Hunting gathering Community of Central and Western India*. *Man and Environment* XVIII (1): 113 144.

- lvii. Nagaraja Rao, M.S. 1965. Survival of Certain Neolithic Elements Among the Boyas of Tekkalkota, *Athropos* 60: 180-6.
- lviii. Paddayya, K. 1998. Evidence of Neolithic Cattle Penning at Budhihal, Gulburga District, Karnataka, *South Asian Studies* 13: 141-54.
- lix. Pakem, B, J.B., Bhattacharya, B.B. Dutta, and B. Datta Ray. 1980. *Shifting Cultivation in North-East India*, Shillong: North East India Council for Social Science Research.
- lx. Pal J. N. 2007. Review of the Ethnoarchaeological Research in the Gangetic Basin, and Future Directions, in *Anthropology for Archaeology Proceedings of the Prof. Irawati Karve Birth Centenary Seminar* (Walimbe, S.R. P.P. Joglekar and K.K. Basa Eds.), pp. 77-94. Pune: Deccan College.
- lxi. Panja, S. 1996. Mobility Strategies, Site Structure and Subsistence- Settlement Organizations: An Actualistic Perspective, *Man and Environment* 21 (1): 58-73.
- lxii. Raju, D.R. 1988. *Stone Age Hunter-Gatherers: Ethno- Archaeology of Cuddapah Region, South-East India*. Pune: Ravish Publishers.
- lxiii. Ray, H.P. 1996. Maritime Archaeology: The Ethnographic Evidence, *Man and Environment* 21 (1): 74-85.
- lxiv. Richard B. Lee and Richard Daly 1999. *Hunters and Gatherers*. Cambridge: Cambridge University Press.
- lxv. Rivers, W. H. R. 1967. *The Todas*. London.
- lxvi. Roy, S.K. 1981. Aspects of Neolithic Agriculture and Shifting Cultivation, Garo Hills, Meghalaya, *Asian Perspective* 24: 193-221.
- lxvii. Satapathy, K.K. and B.K. Sarma 2002. *Shifting Cultivation in India: An Overview*, *Asian Agri-History*, 6 (2): 121-139.
- lxviii. Schiffer, M. 1978. Methodological Issues in Ethnoarchaeology, in *Exploration in Ethnoarchaeology* (R. Gould Ed.), pp 229-47. Albuquerque: University of New Mexico Press.
- lxix. Sengupta, G. Suchira Roychoudhury and Sujit Som 2006. *Past and Present Ethnoarchaeology in India*. New Delhi : Pragati Publications and Centre for Archaeological Studies and Training Eastern India ( Kolkata).
- lxx. Sinopali, C.M. 1991. Seeking the Past through the Present: Recent Ethnoarchaeological Research in South Asia, *Asian Perspectives* 28 (2): 145-161.
- lxxi. Smiley, F.E. et al. 1980. *The Archaeological Correlates of the Hunter-Gatherer Societies: Studies from the Ethnographic Record*. Ann Arbor: Michigan University Press.

- lxxii. Stiles, D. 1977. Ethnoarchaeology: A Discussion of Method and Application, *Man* 12: 87-103.
- lxxiii. Tripathi, V. and Arun K. Mishra 1997. Understanding Iron Technology: An Ethnographic Model, *Man and Environment* 22 (1): 59-68.



## **ARC 404: EARLY IRON AGE OF INDIA**

### **Course Objective:**

The Early Iron Age is a formative period in Indian Civilization and so its archaeology is of great interest. In this course the data from different parts of India is reviewed.

### **Course Outcomes:**

Students are introduced to the archaeological record of the Iron Age in India and some of the theoretical issues related to state formation and the development of complex societies

### **Unit 1:**

**(8 hrs)**

- i. Antiquity of Use of Iron
- ii. Iron, Nature of Iron ore and major Iron ore locations/deposits in India.
- iii. Beginning of Iron Age in India: Archaeological and Literary evidence
- iv. Various theories regarding the introduction of iron in India.
- v. Concept of polycentric origin.

### **Unit 2: Early Iron Age Culture of India**

**(8 hrs)**

- i. Historiography of Early Iron Age Research in India.
- ii. Emergence of various ideas of development and craft specialisation.
- iii. Introduction of Iron: Emergence of Complex Societies
- iv. Painted Grey Ware Culture: chronology, material Culture, distribution and
- v. Characteristic features.
- vi. Iron in Gandhar Grave Culture of Swat Valley

### **Unit 3: Early Iron Age and Megalithic Traditions:**

**(11 hrs)**

(Distribution, typology, material culture, Art and craft specialization, subsistence, trade and commerce, and Chronology.)

- i. Evidence and nature of distribution of Megalithic culture in India.
- ii. Settlement pattern of Early Iron age and Megalithic people
- iii. Megalithic traditions/culture in Northern India
- iv. Megalithic traditions/culture in Central India
- v. Megalithic traditions/ culture South India
- vi. Megalithic traditions/cultures in North-Eastern India

**Unit 4: Socio-Cultural- Economic Life of Early Iron Age People (8 hrs)**

- i. Role of Iron in emergence of Second Urbanisation: Various causes, processes and consequences.
- ii. Society and Social life during Early Iron Age
- iii. Living Megalithic traditions in India: An Ethno-archaeological Perspective
- iv. Iron Smelting Processes and Metallurgy: Past and Present
- v. Hoardings/Viragals

**Unit 5: Important Excavated Sites: (10 hrs)**

Ataranjikhhera, Ahirachhatra, Burzhom, Megalithic Cultures of the Adwa Valley (Central Vindhya), Joythma (Nagaland), Mahurzhari, Naikund, Bhagimohiri, Takalghat-Khapa, Ramapuram, Hirebenekal, Brahmagiri, Chandravali, Adichennalur, Kodumanal, Ummichiipoyh

**Recommended Readings:**

- i. Agrawal, D.P. and D.K. Chakrabarty (ed.) 1979. Essays in Indian Protohistory. New Delhi: D.K Publishers.
- ii. Antonini, Silva and G. Stacul 1972. Protohistoric Graveyards of Swat (Pakistan). Rome: ISMEO.
- iii. Banerjee, N.R. 1965. The Iron Age in India. Delhi: Munshiram Manoharlal.
- iv. Brubaker, Robert. 2002. Aspects of Mortuary variability in the South Indian Iron Age.
- v. Bulletin of the Deccan College Research Institute 60 61: 253 302.
- vi. Chakrabarti, D.K. 1992. Early Use of Iron in India. Bombay: Oxford University Press.
- vii. Chakrabarti, D.K. 1984. Study of the Iron Age in India. Puratattva 13:81 85.
- viii. Deo, S.B. 1973. Problem of South Indian Megaliths. Dharwad: Karnataka University.
- ix. Deo, S.B. 1985. The Megaliths: Their Culture, Ecology, Economy and Technology. In Recent Advances in Indian Archaeology, S.B. Deo and K. Paddayya (eds.). Pune: Deccan College.
- x. Ghosh, A. 1973. The City in Early Historical India. Simla. Indian Institute of Advanced Study.
- xi. Leshnik, Lawrence 1971. South Indian Megalithic Burial. Wiesbaden: Franz Steiner Verlag GmH.
- xii. Mohanty, R.K., and S.R. Walimbe, 1993. A Demographic Approach to the Vidarbha Megalithic Cultures Man and Environment, XVIII (2):93-103.
- xiii. Mohanty, R.K. and V. Selvakumar, 2002. The Archaeology of Megaliths in India: 1947-1997, in Indian Archaeology in Retrospect, (S. Settar and R. Korisettar Eds.), New Delhi: Manohar Publishers. Vol. 1: 313-52 & 479-81
- xiv. Moorti, U.S. 1994. Megalithic Culture of South India: Socio Economic Perspectives. Varanasi: Ganga Kaveri Publishing House.
- xv. Narsimhaiah, B. 1980. Neolithic and Megalithic Cultures in Tamil Nadu. Delhi: Sandeep Prakashan.
- xvi. Rao, K. P. 1988. Deccan Megaliths. Delhi: Sandeep Prakashan.

- xv. Renfrew, Colin. 1989. *Archaeology and Language: Puzzle of Indo European Origins*. London: Penguin Books.
- xvi. Roy, T.N. 1983. *The Ganges Civilization: A Critical Study of the PGW and NBPW Periods of Ganga Plains of India*. New Delhi: Ramanand Vidya Bhavan.
- xvii. Sinha, B.P. 1968. *Potteries in Ancient India*. Patna: University Press.
- xviii. Tripathi, Vibha. 1976. *The Painted Grey Ware: an Iron Age Culture of Northern India*. Delhi: Concept Publishing House.
- xix. Tripathi, Vibha. 2008. *History of Iron Technology in India (from Beginning to Pre-Modern Times)*. New Delhi: Rupa and Infinity Foundation

## **ARC 406: Ancient Technology and Archaeological Chemistry**

### **Course Objective:**

- i. Primarily it aims at providing students with adequate grounding in the application of natural science to the solution of problems related to Archaeology, and its allied branches to unravel human history, his environments with special reference to Indian subcontinent.
- ii. Instilling in the students the applications and implications of interdisciplinary nature of the science in Humanities.
- iii. Developing in the students the ability to determine the appropriate methods and tools needed to address in case of ancient biological and non-biological materials.

### **Course Outcome:**

- i. Attainment in understanding and appreciating a spectrum of analytical tools applied to the study of ancient materials.
- ii. Inculcating the realization of the difference between the methods used by the archaeologists, experts of heritage management on one hand while the scientists practicing Archaeological Chemistry on the other.
- iii. Helping students develop ability to determine the appropriate tools needed to address in seeking answers of ancient technology, conservation and preservation, reconstruction of ecology, diet, pathology and provenance of ancient materials.

### **Unit 1:**

**(03 hrs)**

- i. What is Archaeological Chemistry: Scope and Definition
- ii. History and Development of the subject
- iii. Archaeological materials and chemical methods of study: Soil, minerals, metals, bioinorganic materials including fossils, bones, plants etc.

### **Unit 2:**

**(03 hrs)**

- i. Geochemical Surveys of archaeological sites
- ii. Field methods and Laboratory methods
- iii. Case studies in Indian Archaeology

### **Unit 3:**

**(04 hrs)**

- i. Physical methods of provenance analyses
- ii. Neutron Activation Analysis, X-ray Diffraction, X-ray Fluorescence, Mass Spectrometer, ICPMS, Optical Microscopy, Electron Microscopy with examples as case studies.

**Unit 4:** (05 hrs)

- i. Archaeometallurgy: A review
- ii. Iron metallurgy in ancient India
- iii. Copper metallurgy in Ancient India
- iv. Zinc and Brass in Archaeological Perspective in India

**Unit 5:** (10 hrs)

- i. Clay, Pottery and other Ceramic materials
- ii. Ancient technology of pottery production
- iii. Ceramic technology of the Harappan and Deccan Chalcolithic
- iv. Ceramic technology of early historic and medieval period
- v. Chemistry and making of ceramics
- vi. The Provenance of Pottery, physical methods of ceramic analysis

**Unit 6:** (04 hrs)

- i. Ancient Glass: super cooled liquids
- ii. Glass making, Components of glass and glass types, decay of glass
- iii. Provenance of glass

**Unit 7:** (03 hrs)

- i. Palaeobiochemistry of organic materials
- ii. Palaeodietary studies: Trace elements, Lipids, Residue analyses
- iii. Palaeoenvironmental reconstruction: Stable Isotopes, Trace elements

**Unit 8:** (03 hrs)

- i. Chemical Methods of (Relative) Dating
- ii. Fluorine dating, principles, methods, techniques and application.
- iii. Uranium series dating, principles, methods, applications with relevant examples

**Unit 9:****(10 hrs)**

Educational tours to National Institutes and Laboratories:

- i. Tata Institute of Fundamental Research (TIFR), Mumbai, I.I.T., Mumbai,
- ii. National Chemical Laboratory (NCL), Pune
- iii. Indian Institute of Tropical meteorology (IITM), Pune
- iv. ISSCER, Pune.

**Recommended Readings:**

- i. Agrawal. O.P. 2007. *Essentials of Conservation and Museology*. Delhi: Sundeep Prakashan.
- ii. Barnard, Hans & Jelmer W Eerkens (Eds). 2007. *Theory and Practice of Archaeological Residue Analysis*. British Archaeological Reports Series 1650.
- iii. Brothwell, D.R> and A.M. Pollard (Eds.) 2004. *Handbook of Archaeological Sciences*. New York: John Wiley & Sons Ltd. 761 pp.
- iv. Chakraborty, Kalyan Shekhar and Vijay Sathe 2014. Diagenetic Study of the Fossils and Semi Fossilised Bones from the Late Pleistocene and Early Holocene Deposits. *Heritage: Journal of Multidisciplinary Studies in Archaeology* 2: 625-650
- v. Chakravarty, K.K. (Ed.) 1984. *Rock Art of India*, Arnold Heinemann.
- vi. Deotare, B.C., A. Kshirsagar and V.D.Gogte. 1988. Archaeo Chemistry: A Study of soils, bones and pottery, Chapter 16, *Excavations at Inamgaon*, Vol. 1,(Sankalia H.D., Dhavalikar M.K. and Ansari Z.D. Eds.),p.963 990, Deccan College Post Graduate and Research Institute, Pune, India.
- vii. Goffer, Z. 1980. *Archaeological Chemistry*, John Wiley: New York
- viii. Goffer, Ziv. 2008. *Archaeological Chemistry*. 2nd Edition.
- ix. George (Rip) Rapp 2009. *Archaeomineralogy*. 2nd Edition. Heidelberg: Springer.
- x. J. B. Lambert. 1997. *Traces of the Past: Unraveling the Secrets of Archaeology Through Chemistry*, Addison-Wesley, Reading, Massachusetts.
- xi. Leng, Melanie J. (Ed.) 2006. *Isotopes in Palaeoenvironmental Research*. Volume 10. Springer. 307 pp.
- xii. Gogte, V.D. 1982. Megalithic Iron Smelting at Naikund, in *Excavations at Naikund*, (Deo S.B.and Jamkhedkar A.P. Eds.), pp.52 59, Department of Archaeology and Museums, Government of Maharashtra, Bombay, India.
- xiii. Gogte, V.D. 1997. The Chandraketurgarh Tamluk Region of Bengal: Source of the Early Historic Rouletted Ware from India and Southeast Asia, *Man and Environment*, **XXII** (1) 69 85.

- xiv. Gogte, V.D. 2000. Indo Arabian Maritime Contacts during the Bronze Age: Scientific Study of pottery from Ras al Junayz (Oman), *Adumatu*, Issue no.2 (July), 7-14.
- xv. Gogte, V.D. and A.Kshirsagar. 1987. Chalcolithic Diet : Trace Elemental Analysis of Human bones, Chapter 17, *Excavations at Inamgaon*, **Vol. 1**, (Sankalia H.D., Dhavalikar M.K. and Ansari Z.D. Eds.),p.991-1000, Deccan College Post Graduate and Research Institute, Pune, India.
- xvi. Hegde, K.T.M., Craddock, P.T. and V.H. Sonavane. 1986. Zinc Distillation in India, the 24<sup>th</sup> International Symposium Proceedings, (Olin, J. Ed.). Washington: Smithsonian Institution.
- xvii. Joshi, R.V. and A. Kshirsagar. 1986. *Chemical Studies of Archaeological Bones from India: Fluorine and Fossilization Process*. Pune: Deccan College.
- xviii. Joshi, R.V. and B.C. Deotare. 1983. *Chemical Analysis of Archaeological Deposits From India*. Pune: Deccan College.
- xix. Minc, L.D. and R.J. Sherman 2011. Assessing natural clay composition in the valley of Oaxaca as a basis for ceramic provenance studies. *Archaeometry* **53** (2), 285-328.
- xx. Pate, Donald 1994. Bone Chemistry and Palaeodiet. *Journal of Archaeological Method and Theory* 1 (2), 161-209.
- xxi. Piga, Giampaolo 2012. *The Use of Spectroscopy and Diffraction techniques in the study of bones and implications in Anthropology, Palaeontology and Forensic Sciences*. Unpublished Ph.D. Thesis, Universitat Autònoma de Barcelona.
- xxii. Plenderleith, H.J. 1971. *The Conservation of Antiquities and Works of Art*, London: Oxford University Press.
- xxiii. Pollard, A.M. 2008. *Archaeological Chemistry*. RSC Publishing. 2nd Ed.
- xxiv. Rye, O.S. 1981. *Pottery Technology*, Washington: Taraxacum
- xxv. Sachin Joshi and Sathe, Vijay 2007. Fluorine Dating of the Pleistocene Vertebrate Fossils from the Manjra valley, Maharashtra, *Man and Environment* **32**(2), 33-38
- xxvi. Sathe, Vijay and Sachin Joshi 2013. 2013-14. X-ray Diffraction analyses of Bioapatite for taxonomic discrimination in Archaeozoology. *Bulletin Deccan College Postgraduate and Research Institute*, Pune.
- xxvii. Sathe, Vijay and K. Paddayya 2013. The Faunal Background of the Stone Age Cultures of Hunsgi and Baichbal valleys, Southern Deccan. *Bulletin Deccan College Postgraduate and Research Institute*, Pune. 295-312

- xxviii. Shinde Vasant, Shweta Sinha Deshpande, Amrita Sarkar. 2016. *Chalcolithic South Asia: Aspects of Crafts and Technologies*. Series Editor, O C Handa. Pentagon Press and Indus Infinity Foundation
- xxix. Spoto, Giuseppe 2003. Chemical methods in Archaeology. In Kirk-Othmer Encyclopaedia of Chemical Technology. John Wiley & Sons.
- xxx. Tite, M.S. 1972. *Methods of Physical Examination in Archaeology*, London: Seminar Press.
- xxxi. Tressuad, Alain. 2007. *Fluorine and the Environment* (Agrochemicals, Archaeology, Green Chemistry and Water), *Advances in Fluorine Science* 2, N.Y.: Elsevier.
- xxxii. Tylecote, R.F. 1982. *Metallurgy in Archaeology*, London: E. Arnold.



# **ARC 407: QUANTITATIVE METHODS AND INFORMATION SCIENCE**

## **Course Objectives:**

The objective of this course is to introduce basic statistical methods and GIS to archaeology students.

## **Course Outcomes:**

Students are familiarized with some computer and GIS applications and basic statistical methods.

### **Unit 1: Computing Fundamentals (5 hrs)**

- i. Information Science: Development and scope
- ii. Readymade software and programming languages
- iii. Practical lessons of programming

### **Unit 2: Managing Information (5 hrs)**

- i. Excavation and Computers
- ii. Archaeological Database management
  - a. What is database?
  - b. What is archaeological data?
  - c. Recording artefacts
  - d. Analyzing data
  - e. Data Security

### **Unit 3: Digital Landscapes (5 hrs)**

- i. GIS
- ii. Remote Sensing
- iii. Digital Image Processing
- iv. Modelling and Simulation
- v. Maps and GPS based cartography

### **Unit 4: Preserving And Managing Evidence of the Past (3 hrs)**

- i. CRM and increasing computer usage
- ii. CRM at the regional level
- iii. Museums, computers and archaeological collections

**Unit 5: Communicating Archaeology** (3 hrs)

- i. Interactive multimedia and the Internet
- ii. Use of web resources for research
- iii. E-Publication

**Unit 6: Place of quantitative methods in archaeological research** (4 hrs)

- i. Historical perspective
- ii. Importance of quantitative methods
- iii. Archaeological theory and quantitative thinking
- iv. Validity and reliability of quantitative analysis

**Unit 7: Basic Statistics** (8 hrs)

- i. Classification and tabulation of data
- ii. Visual methods
- iii. Measures of central tendency
- iv. Concept of variability
- v. Measures of association

**Unit 8: Relationship between variables** (5 hrs)

- i. Chi square test and contingency tables
- ii. Ranking and Correlation tests
- iii. Regression Analysis

**Unit 9: Sampling Techniques** (4 hrs)

- i. Sample and population,
- ii. Probability and non-probability methods
- iii. Sampling errors

**Unit 10: Advanced Statistical Methods** (3 hrs)

- i. Multivariate methods
- ii. Comparing samples
- iii. Analysis of variance

### **Recommended Readings:**

- i. Anderssen, J., Madsen T. and Scollar I. (Eds). 1993. *Computing the Past: Computer Applications and Quantitative Methods in Archaeology*, CAA 92. Aarhus: Aarhus University Press.
- ii. Sushama G. Deo and P.P. Joglekar. 2008-09. Use of GPS-based field methods: An Introduction,
- iii. *Bulletin of the Deccan College Research Institute* 68-69: 135-144.
- iv. Drennan R.D. 2009. *Statistics for Archaeologists: A Commonsense Approach*. New York: Plenum Press.
- v. Lock Gary and J. Moffett (eds.) 1992. *Computer Applications and Quantitative Methods in Archaeology 1991*. London : BAR International Series
- vi. Lock Garry and Zoran Stancic (eds.) 1995. *Archaeology and Geographical Information Systems*. London : Taylor & Francis
- vii. Lock, G. (2003). *Using computers in archaeology: Towards virtual pasts*. London and New York, Routledge.
- viii. Reilly, P. and S. Rahtz. 1992 *Archaeology and the Information Age: A Global Perspective*. London and New York: Routledge.
- ix. Richards, J. D. (1998). Recent Trends in Computer Applications in Archaeology. *Journal of Archaeological Research* 6(4): 331-382.
- x. Shennan, S. 1988 *Quantifying Archaeology*. Edinburgh: University Press.
- xi. Sinha, P. 2009. *Cogitating Prehistoric Archaeological Landscape With Pattern Recognition, Computer Applications to Archaeology* Williamsburg, Virginia, USA. March 22-26, 2009.
- xii. VanPool, T. L. and R. D. Leonard (2010). *Quantitative Analysis in Archaeology*, John Wiley& Sons.

# **ARC 408: ENVIRONMENTAL ARCHAEOLOGY (GEOARCHAEOLOGY)**

## **Course Objectives:**

The objective of this course is to introduce students to the scope and methods of geoarchaeology.

## **Course Outcomes:**

Students learn about the different natural contexts and processes affecting archaeological sites.

### **Unit 1:**

**(3 hrs)**

Definition, concepts and development of Geoarchaeology

### **Unit 2: Landform Evolution**

**(12 hrs)**

- i. Identifying the natural Processes
  - a. Slope
  - b. Fluvial
  - c. Glacial
  - d. Aeolian
  - e. Lacustral
  
- ii. Post depositional features
  - a. Soils and sediments
  - b. Calcrete formation
  - c. Ferricretes
  - d. Weathering

**Unit 3: Methods****(8 hrs)**

- i. Field techniques (Physical and Chemical)
  - a. Regional scale
    - GIS and Remote sensing
    - Map studies
  - b. Site specific
    - Resistivity
    - Magnometry
    - Section description
    - Sampling
- ii. Laboratory techniques
  - Grain size analysis
  - Soil characterization
  - Mineralogy
  - Phosphate analysis
  - Stable Isotope studies
- iii. Absolute and Relative Dating methods

**Unit 4: Cultural Ecology****(10 hrs)**

- i. Human responses to changing environment
  - a. Palaeolandscape
  - b. Palaeoclimate
  - c. Sea level changes
- ii. Origin, growth and decay of cultures
- iii. Human Impact on landscape

**Unit 5: Regional Studies****(12 hrs)**

- a. India
- b. Other countries

## Recommended Reading:

### Basic Texts:

- i. Goldberg, P., and R. I. Macphail. 2006. *Practical and Theoretical Geoarchaeology*. Oxford: Blackwell.
- ii. Holliday, Vance T. 2004. *Soils in Archaeological Research*. Oxford: Oxford University Press.

### Additional Readings:

- i. Abeyratne, M., N. A. Spooner, R. Grun, and J. M. Head. 1997. Multidating studies of Batadomba Cave, Sri Lanka. *Quaternary Science Reviews* 16:243-255.
- ii. Ajitprasad, P. 2004. Holocene Adaptations of the Neolithic and Chalcolithic settlements in North Gujarat in Yasuda and Shinde *edited Monsoon and Civilization*, pp- 115-132
- iii. Bettis, E. A. I., D. W. Benn, and E. R. Hajic. 2008. Landscape evolution, alluvial, environmental history, and the archaeological record of the Upper Mississippi River Valley. *Geomorphology* 101:362-377.
- iv. Boyd, W. E. 2008. Social change in late Holocene mainland SE Asia: A response to gradual climate change or a critical climatic event? *Quaternary International*.
- v. Bridgland, D. R., and R. Westaway. 2008. Climatically controlled river terrace staircases: A worldwide Quaternary phenomenon. *Geomorphology* 98:285-315.
- vi. Brooks, N. 2004 "Beyond collapse: the role of climatic desiccation in the emergence of complex societies in the middle Holocene," in *Environmental Catastrophes in Mauritania, the Desert and the Coast. Abstract Volume and Field Guide. Mauritania, 4-18 January 2004. First Joint Meeting of ICSU Dark Nature and IGCP 490*. Edited by S. Leroy and P. Costa, pp. 26-30.
- vii. Butzer, K. W. 2008. Challenges for a cross-disciplinary geoarchaeology: The intersection between environmental history and geomorphology. *Geomorphology* **101**: 402-411.
- viii. Cornelissen, Els. 2002. Human Responses to Changing Environments in Central Africa Between 40,000 and 12,000 B.P in *Journal of World Prehistory*, Vol. 16, No. 3 pp. 197-235

- ix. Cullen, H. M., P. B. deMenocal, S. Hemming, G. Hemming, F. H. Brown, T. Guilderson, and F. Sirocko. 2000 Climate change and the collapse of the Akkadian empire. *Geology* 28:379-382.
- x. Kealhofer, L., P. Grave, H. Genz, and B. Marsh. 2009. Post-Collapse: the re-emergence of polity in Iron age Bogazkoy, Central Anatolia. *Oxford Journal of Archaeology* 28:275-300.
- xi. Lape, Peter V. and Chao Chin-yunga. 2008. Fortification as a Human Response to Late Holocene Climate Change in East Timor in *Archaeology in Oceania*, Vol. 43, No. 1, Climate Change and Archaeology in the Pacific - Part II
- xii. Maloney, B. K. 1999. Late Holocene Climatic Change in Southeast Asia: The Palynological Evidence and Its Implications for Archaeology in *World Archaeology*, Vol. 24, No. 1, pp. 25-34
- xiii. Marriner, N., and C. Morhange. 2007 Geoscience of ancient Mediterranean harbours. *Earth-Science Reviews* 80:137-194.
- xiv. O'Sullivan, P. B. 2008. The 'collapse' of civilizations: what palaeoenvironmental reconstruction cannot tell us, but anthropology can. *The Holocene* 18.
- xv. Pappu, R. S. 1995. The Contribution of Earth Science to the Development of Indian Archaeology, in *Quaternary Environments and Geoarchaeology of India*, Edited by S. Wadia, R. Korisettar, and V. S. Kale, pp. 414-434. Bangalore: Memoirs of the geological Society of India 32.
- xvi. Panin, A. V. and M. A. Bronnikova 2014. Human dimensions of palaeoenvironmental change: Geomorphic processes and geoarchaeology. *Quaternary International* 324(0): 1-5.
- xvii. Pollard, A. M. 1999 Geoarchaeology: an introduction. *Geological Society, London, Special Publications* 165:7-14.
- xviii. Redman, Charles L. 1999. *Human Impact on Ancient Environment*. The University of Arizona Press, Tuscon.
- xix. Rosen Arlene M. and Isabel Rivera-Collazo. 2012. Climate change, adaptive cycles, and the persistence of foraging economies during the late Pleistocene/Holocene transition in the Levant in *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 109, No. 10, pp. 3640-3645

- xx. Tainter, J. A. 1988. *The Collapse of Complex Societies*. Cambridge: Cambridge University Press.
- xxi. Wilson, L. (2011). The role of geoarchaeology in extending our perspective. *Geological Society, London, Special Publications* 352(1): 1-9.
- xxii. Weiss, H., and R. S. Bradley. 2001 What Drives Societal Collapse? *Science* 291:609-61.