

# **B.Sc. (H) ANTHROPOLOGY**

**THREE-YEAR FULL-TIME PROGRAMME  
(Six-Semester Course)**



## **COURSE CONTENTS**

**(Effective from the Academic Year 2010-2011)**

**UNIVERSITY OF DELHI**

**DELHI – 110 007**

## Course Structure

### YEAR-1

#### PART I: Semester-1

Paper 1	ANHT - 101	Introduction to Social Anthropology
Paper 2	ANHT - 102	Introduction to Biological Anthropology
Paper 3	ANHT - 103	Archaeological Anthropology-I
Paper 4	ENAT – 101*/ CSAT – 101*	Technical Writing & Communication in English / Computational Skills

#### PART I: Semester-2

Paper 5	ENAT – 201*/ CSAT – 201*	Technical Writing & Communication in English / Computational Skills
Paper 6	ANHT - 204	Archaeological Anthropology-II
Paper 7	ANHT - 205	Anthropology of Kinship
Paper 8	ANHT - 206	Biostatistics and Data Analysis

**\*The college will have an option to take either of the two papers in a particular semester for a particular course, while students have to appear in both the papers**

**In addition, there shall be one qualifying paper in self-learning mode called Environmental Studies offered in Semester-2**

### YEAR-2

#### PART II: Semester-3

Paper 9	ANHT - 307	Theories of Culture and Society
Paper 10	ANHT - 308	Human Genetics
Paper 11	ANHT – 309/ CBHT - 301	Primate Biology / Cell Biology-I
Paper 12	MBHT - 301	Molecular Biology-I

**PART II: Semester-4**

Paper 13	ANHT - 410	Tribes and Peasants in India
Paper 14	ANHT - 411	Anthropology of religion, politics & economy
Paper 15	ANHT – 412/ CBHT – 402	Biodiversity & Indigenous Knowledge / Cell Biology II
Paper 16	ANHT – 413/ MBHT - 402	Anthropology of India / Molecular Biology-II

**YEAR-3****PART III: Semester-5**

Paper 17	ANHT - 514	Human Ecology: Biological Dimensions
Paper 18	ANHT - 515	Biological Diversity in Human Populations
Paper 19	ANHT - 516	Human Ecology: Social and Cultural Dimensions
Paper 20	GGHT - 501	Genetics & Genomics-I

**PART III: Semester-6**

Paper 21	ANHT - 617	Field work dissertation
Paper 22	ANHT - 618	Fundamental of Human Origins and Evolution
Paper 23	ANHT - 619	Genomic Diversity in Human Populations
Paper 24	ANHT – 620/ GGHT - 602	Anthropology In Practice / Genetics & Genomics-II

# **Paper 1-ANHT 101: Introduction to Social Anthropology**

## **THEORY**

**Marks: 100**

### **UNIT-1**

Social anthropology: history and subject matter; Relationship of social and cultural anthropology with sociology, psychology, history, economics and political science.

### **UNIT-2**

Concepts of Society; Pre-requisite of Human society

Individual and Society; Group and its types; Community; Association and Institution  
Status and Role ;

### **Unit -3**

Social fact; Social Action; Social Structure , Function and Social Organisation ; Structural - Functionalism ; Social System ; Social Conflict

### **Unit -4**

Techniques and methods: Field work/ Ethnography and Survey Research  
Comparative and Historical Methods

## **Core Readings**

1. Metcalf Peter (2005) Anthropology: the basics. Abingdon (England), Routledge.
2. Ingold Tim (1994) Companion encyclopedia of anthropology. London, Routledge reference.
3. R.M MacIver & Charles H. Page (1950) Society : An Introductory Analysis. London, Macmillan
4. Ralph Linton (1936) The Study of Man. New York, Appelton Century Croft.
5. M. J. Herskovits (1974) Cultural Anthropology, New Delhi, Oxford and IBH Publications.
6. Roger Keesing (1984) An Introduction of Cultural Anthropology. New York, MacMillan.
7. Kingsley Davis (1948) Human Society, New York: MacMillan.
8. John Monaghan and Peter Just (2000) Social and Cultural Anthropology: A very Short Introduction.
9. Thomas Hylland Eriksen (2010) Small Places, Large Issues: An Introduction to Social and Cultural Anthropology.
10. Nigel Rapport and Joanna Overing (2006) Social and Cultural Anthropology: The Key Concepts .

# **Paper 1-ANHP 101: Introduction to Social Anthropology**

## **PRACTICALS**

**Marks: 50**

### **Social Anthropology**

The Practical will include the following techniques and methods in collection of data in social anthropology.

Observation

Interview

Questionnaire and Schedule

Genealogy

Case Study

### **Core Readings**

1. Notes and Queries in Anthropology (1971) London: Routledge & Kegan Paul
2. H. Russel Bernard (1990) Research Methods in Cultural Anthropology, New Delhi, Sage Publications
3. Bruce L. Berg (1995) Qualitative Research Methods for the Social Sciences, London, Allyn and Bacon
4. Srivastava. V. K. (Ed.) (2004) Methodology and fieldwork Oxford University Press, New Delhi.
5. Sarantabos, S., 1998(1993), Social Research. London Macmillan
6. Pelto, Perliti J., and Goetel. H. Pelton. 1978, Anthropology Research; The structure of Inquiry. Cambridge: Cambridge University Press

# **Paper 2-ANHT 102: Introduction to Biological Anthropology**

## **THEORY**

**Marks: 100**

### **UNIT-1**

Meaning and scope of anthropology, branches of anthropology;

History and subject matter of physical/biological Anthropology;

Relationship of physical/biological anthropology with other disciplines: medical and health sciences, life sciences, earth sciences, and environmental sciences.

### **UNIT-2**

Fundamentals of physical/biological anthropology:

- a. Human Evolution;
- b. Human Variation;
- c. Human Genetics;
- d. Human Growth and Development.

### **UNIT-3**

Theories of organic evolution (Lamarckian, Darwinian, Mutational and Synthetic).

### **UNIT-4**

Position of man in animal kingdom: living primates, distribution, characteristics, phylogeny, classification; comparative anatomy of man and apes; Primate Behaviour.

### **UNIT-5**

Concept of race, genetic basis of race, UNESCO Statement on Race; ethnic group, racial classification of human populations (E.A. Hooton's classification)

## **Core Readings**

1. Craig Stanford, John S. Allen and Susan C. Anton (2008) Biological Anthropology (2nd Edition).
2. John Buettner-Janusch (1969) Origins of Man. Wiley Eastern Pvt Ltd
3. E. L. Simon (1972) Primate Evolution: An Introduction to Man's Place in Nature. New York, MacMillan.

4. Craig Stanford, John S. Allen and Susan C. Anton (2009) Exploring Biological Anthropology: The Essentials, Prentice Hall.
5. Michael Park (2007) Biological Anthropology: An Introductory. Reader, McGraw Hill.
- 7 P. K. Seth & S Seth (1986) Perspectives in Primate Biology. New Delhi, Today & Tomorrow Printers.
8. John G. Fleagle (1999) Primate Adaptation and Evolution. Elsevier.
- 9 E.A. Hooton (1947) Up from the Ape. New York, MacMillan.
- 10 M. F. Ashley Montague (1977) *UNESCO Statement on Race*. New York, Academic Press.
11. G.A.Harrison et al. (1988) Human Biology. Oxford, Oxford University Press.

## **Paper 2-ANHP 102: Introduction to Biological Anthropology**

### **PRACTICALS**

**Marks: 50**

Osteology	:	Skull, Axial Skeleton, Appendicular Skeleton and Vertebrae.
Somatoscopy	:	Head, Face, Nose, Eyes, Lips and Hair.
Somatometry	:	Drawing, description and use of the instruments used for anthropological measurements Standing Height Vertex, Sitting Height Vertex, Leg Length, Hand Length, Hand Breadth, Head Circumference, Nasal Length, Nasal Breadth, Head length, Head Breadth
Indices	:	Cephalic Index, Nasal Index
Serology	:	ABO blood group system

**Books to be consulted:**

1. Indera P. Singh and M.K. Bhasin: (1989) Anthropometry. Delhi, Kamla Raj Enterprises
2. M.K. Bhasin and S.M.S. Chahal: Manual of Human Blood Analysis (1996), Delhi, Kamla Raj Enterprises
3. Judith Hall, Judith Allanson, Karen Gripp, and Anne Slavotinek (2006) Handbook of Physical Measurements (Oxford Handbook) Oxford University Press, USA; 2 edition
4. Stanley J. Ulijaszek and C. G. Nicholas Mascie-Taylor (2005) Anthropometry: The Individual and the Population (Cambridge Studies in Biological and Evolutionary Anthropology) Cambridge University Press



**Paper 3-ANHT-103: Archaeological Anthropology-I**  
*(Prehistoric India)*

**THEORY**

**Marks: 100**

**UNIT-1**

*Introduction*

- a. Definition and scope of archaeological anthropology
- b. Relation with other disciplines
- c. Methods of studying archaeological anthropology
- d. Methods of archaeological interpretation – ethnoarchaeology.

**Unit-2**

*Methods of Estimation of Time*

- a. Geo-chronological methods
- b. Absolute dating methods
- c. Relative dating methods
- d. Methods of climatic reconstruction: palynology, paleontology, soil pH estimation.

**UNIT-3**

*Understanding culture*

- a. Technique of tool manufacture and estimation of their relative efficiency;
- b. Classification of tools: primary and combination fabrication techniques;
- c. Typology and cultural nomenclature.

**UNIT-4**

*Prehistoric India*

- a. Pleistocene chronology of India: A critical assessment
- b. Character, distribution and interpretation of habitat and economy of :
  - i Lower palaeolithic;
  - ii Middle palaeolithic;
  - iii Upper palaeolithic;
  - iv Mesolithic culture;
  - v Art, ritual and belief.

**Core Readings**

1. D. K. Bhattacharya (1996) An Outline of Indian Prehistory. Delhi, Palika Prakashan.
2. H. D. Sankalia (1974) Prehistory and Protohistory of India and Pakistan. Poona, Deccan College.
3. H. D. Sankalia (1982) Stone Tool Type and Technology. Delhi, B.R.Publication.

4. B.M. Fagan (2004) *People of Earth: An Introduction*. Boston, Little, Brown & Company.
5. Felix Gadstein, Names James Ogg, Alan Smith (2004) *A Geologic Time Scale*. New York, Cambridge University Press.
6. Robin Dannell (2009) *The Palaeolithic Settlements of Asia* New York, Cambridge University Press.

### **Paper 3-ANHP-103: Archaeological Anthropology**

#### **PRACTICAL**

**Marks: 50**

1. Computer applications in archaeology:
  - (a) Introduction
  - (b) Scope
  - (c) Data processing (small number of samples)
  - (d) Computer aided graphic techniques
2. Identification of tools:
  - (a) Handaxe varieties, chopper/chopping tools
  - (b) Cleaver varieties
  - (c) Side scraper varieties
  - (d) Knives
  - (e) Burins
  - (f) End scrapers
  - (g) Borers
  - (h) Microlithic tools
  - (i) Bone tools
3. Identification of lithic technology.
4. Identification of bone tool technology.
5. Representation and interpretation of types and techniques.

#### **Books to be consulted:**

1. H.D. Sankalia: *Stone Age Tools* (1964) Poona, Deccan College
2. D.K. Bhattacharya: *Old Stone Age Tools and Techniques* (1979) Calcutta, K.P. Bagchi Company

# **Paper 4/5-ENAT-101/ 201: Technical Writing and Communication Skills in English**

**Marks: 100**

## **Unit 1**

Communication: Language and communication, differences between speech and writing, distinct features of speech, distinct features of writing.

## **Unit 2**

Writing Skills; Selection of topic, thesis statement, developing the thesis; introductory, developmental, transitional and concluding paragraphs, linguistic unity, coherence and cohesion, descriptive, narrative, expository and argumentative writing.

## **Unit 3**

Technical Writing: Scientific and technical subjects; formal and informal writings; formal writings/reports, handbooks, manuals, letters, memorandum, notices, agenda, minutes; common errors to be avoided.

## **SUGGESTED READINGS**

1. M. Frank. Writing as thinking: *A guided process approach*, Englewood Cliffs, Prentice Hall Regents.
2. L. Hamp-Lyons and B. Heasley: Study Writing; *A course in written English*. For academic and professional purposes, Cambridge Univ. Press.
3. R. Quirk, S. Greenbaum, G. Leech and J. Svartik: *A comprehensive grammar of the English language*, Longman, London.
4. Daniel G. Riordan & Steven A. Panley: "*Technical Report Writing Today*" - Biztantra.

## **Additional Reference Books**

5. Daniel G. Riordan, Steven E. Pauley, Biztantra: *Technical Report Writing Today*, 8th Edition (2004).
6. *Contemporary Business Communication*, Scot Ober, Biztantra, 5th Edition (2004).

## Paper 4/5-CSAT-101/201: Computational Skills

### THEORY

**Marks: 100**

#### **Computer Fundamentals (12 Periods)**

Introduction to Computers: Characteristics of Computers, Uses of computers, Types and generations of Computers

Basic Computer Organization - Units of a computer, CPU, ALU, memory hierarchy, registers, I/O devices

User Interface with the Operating System, System Tools

#### **Data Representation (8 Periods)**

Binary representation of integers and real numbers, 1's Complement, 2's Complement, Addition and subtraction of binary numbers, BCD, ASCII, Unicode;

#### **Networks terminology (4 Periods)**

Types of networks, router, switch, server-client architecture

#### **Multimedia (4 Periods)**

Introduction, Characteristics, Elements, Applications

#### **Problem Solving (10 Periods)**

Notion of algorithms, stepwise methodology of developing an algorithm, developing macros in spreadsheet

#### **General Awareness (4 Periods)**

IT Act, System Security (virus/firewall etc.), *I-Tax, Reservations, Banking,*

## **Paper 4/5- CSAP-101/201: Computational Skills**

### **PRACTICALS**

**Marks: 50**

1. Defined projects will be done by the students and evaluated by the instructor.
2. Document Preparation
3. Presentation Software
4. Familiarizing with the Operating System, Control Panel, Networking Configuration, Firewall setting
5. Spreadsheet Handling, Working with worksheets, Creating a spreadsheet, entering and formatting information, basic functions and formulas, creating charts, tables and graphs.

### **SUGGESTED BOOKS**

[1] V Rajaraman, **Fundamentals of Computers**, Fourth Edition, PHI.

[2] Anita Goel, **Fundamentals of Computers**; Forthcoming title in Pearson-Education

Note: Use of Open Office/Star Office is recommended, as they are freely downloadable.

Reference manual for Open Office available at: <http://www.openoffice.org>

Reference manual for Star Office available at: <http://www.sun.com/software/staroffice/>

## **Paper 6-ANHT-204: Archaeological Anthropology-II (Prehistoric Africa and Europe)**

**THEORY**

**Marks: 100**

### **UNIT-1**

#### *Prehistoric Africa*

- a. Early climatic sequences in East Africa
- b. Early climatic sequences in South Africa
- c. Cultural succession in East Africa.
- d. Cultural succession in South Africa.

### **UNIT-2**

#### *Prehistoric Europe*

- b. Geo-chronology of Europe
- c. Distribution of palaeolithic culture in Europe (western, central, eastern) and Balkans:
  - i. Lower palaeolithic
  - ii. Middle palaeolithic
  - iii. Upper Palaeolithic
- d. Mesolithic Period in Europe
  - i. Character of subsistence economy and settlement pattern
  - ii. Dispersal and internal variation
- e. Palaeolithic and Mesolithic Art of Europe
  - i. Character;
  - ii Distribution;
  - iii Interpretation;
  - iv Dating.

### **Core Readings**

1. D. K. Bhattacharya (1978) Emergence of Culture in Europe, Delhi, B.R. Publication.
2. Champion et al. (1984) Prehistoric Europe, New York, Academic Press.
3. D. K. Bhattacharya (1996) Palaeolithic Europe. Netherlands, Humanities Press.
4. B.M. Fagan (1983) People of Earth: An Introduction, Boston, Little, Brown & Company.

5. D. W. Phillipson (2005) *African Archaeology*, Cambridge, Cambridge University Press.

## **Paper 6-ANHP-204: Archaeological Anthropology-II (Prehistoric Africa and Europe)**

### **PRACTICALS**

**Marks: 50**

#### **Field Report based on *field trip to a known archaeological site***

The students will be required to undertake a field trip to a known archaeological site for about seven days and on the basis of material collected, a typed Field Report has to be submitted.

#### **Core Readings:**

1. Thomas Hester, Harry Shafer and Kenneth L. Feder (1997) *Field Methods in Archaeology*, 7<sup>th</sup> Ed. McGraw-Hill
2. Colin Renfrew and Paul Bahn, *Archaeology* (3<sup>rd</sup> ed., 2001). Ch. 3 is good on field methods.
3. Philip Barker, *Techniques of Archaeological Excavation* (1977).
4. Ed Harris, *Principles of Archaeological Stratigraphy* (2<sup>nd</sup> ed., 1989).

## **Paper 7-ANHT-205: Anthropology of Kinship**

### **THEORY**

**Marks: 100**

#### **UNIT-1**

Basic concepts: kinship, descent and filiations, kin terms and behaviour, ; approaches to the study of Kinship

#### **UNIT-2**

Kinship and descent: Descent groups: Patrilineal, Matrilineal, Double-descent and Cognitive descent ; Function of descent groups

#### **UNIT -3**

Definition of Marriage, Alliance Systems : Symmetrical and Asymmetrical alliances  
Family, Household and Domestic group; Development cycle of domestic group

#### **Unit 4**

Kinship, Marriage and Family in India

### **Readings**

1. J.H.M. Beattie (1968) Other Cultures. New York, the Free Press.
2. Robin Fox (1983) Kinship and Marriage. Cambridge, Cambridge University Press.
3. Paul Bohannan (1963) Social Anthropology. New York, Mac Millan.
4. Karve Irawati (1968) Kinship organization in India. London, Asia Publication House.
5. R. Parkin, L. Stone (2004) Kinship and Family: An Anthropology Reader. Oxford, Victoria. Blackwell Publishing.
6. C.C Harris (1990) Kinship. Concepts in social thought. Minneapolis, University of Minnesota Press.
7. Carsten, Janet (2004) After kinship. New departures in Anthropology, UK: Cambridge University Press.
8. Lévi-Strauss, Claude (1969) The elementary structures of kinship. Boston, Beacon Press.
9. Goody, Jack, and Meyer Fortes (1973) The Character of kinship. Cambridge (England), University Press.



## **Paper 8-ANHT-206: Biostatistics and Data Analysis**

### **THEORY**

**Marks: 100**

#### **Biostatistics and bioinformatics**

Types of biological data

Variable and graphs

Frequency distributions

Population and samples

Measures of central tendency – mean, mode and median

Measures of dispersion and variability – the range, M.D., Variance, S.D., C.V.

Moments, skewness and kurtosis

Tests of significance – chi-square goodness of fit, chi-square contingency analysis, testing for differences between two means (t-test), and testing for difference between coefficients of variation (z-test).

Correlation and Regression

Computer applications in human genetics

Introduction to various databases freely available on the web and used in the analysis of biological data

Odds ratios and confidence interval

#### **Core Readings**

1. Harvey Motulsky (1995) Intuitive Biostatistics, 2nd Edition, Oxford University.
2. Hartl and Jones (2001) Genetics -Principles and Analysis, 5th edition Jones and Barlet.
3. Stephen C. Newman (2001) Biostatistical Methods in Epidemiology, New York, Wiley.
4. P W Hedrick (2000) Genetics of Populations, 2nd Edition, Jones & Bartlett.
- 5 Veer Bala Rastogi (2006) Fundamentals of Biostatistics, New Delhi, Ane Books India.

# Paper 9-ANHT-307: Theories of Culture and Society

## **THEORY**

**Marks: 100**

### **Unit 1**

Introduction to the concept of Culture; Culture and Nature Relationship; Cultural Evolution

### **Unit 2**

Classical Anthropological Theories: Evolutionism, Historical Particularism, Diffusionism, Neo- evolutionism, Functionalism; Structural-functionalism.

### **Unit 3**

Recent trends in Anthropological Theories: Structuralism, Interpretive approaches, postmodernism, deconstruction

### **Unit 4**

Culture and its relationship to: Environment; Health and medicine; Gender and Development

### **Readings**

1. Geertz Clifford (2001) The interpretation of cultures: selected essays. New York, N.Y: BasicBooks.
2. W.J. Goode and P. K. Hatt (1952) Methods in Social Research. Mc Graw Hill Co., New Delhi.
3. Marvin Harris (2001) Rise of Anthropological Theory. AltaMira Press, Walnut Creek, CA.
4. Allan Barnard (2000) History and theory of anthropology. Cambridge: Cambridge University Press
5. Tim In Gold (1994) Companion encyclopedia of anthropology. London, Routledge..
6. Voget Fred W (1975) A history of ethnology. New York: Holt, Rinehart and Winston.
7. Applebaum Herbert A (1987) Perspectives in cultural anthropology. Albany: State University of New York Press.

## **Paper 9-ANHP-307: Theories of Culture and Society**

**PRACTICALS**

**Marks: 50**

### **Readings of Ethnographies**

The students will be required to read two classical ethnographies one by a western scholar and one by an Indian scholar. They will be asked to give a critical account of the methodology and main conclusions of the selected ethnographies. The selection of ethnographies will be done by the concerned teacher each year

They will be examined in the practical on their understanding of the methods, analysis, interpretations and theoretical orientations used in the respective ethnographic account.

# Paper 10-ANHT-308: Human Genetics

## **THEORY**

**Marks: 100**

### **UNIT-1**

History development and scope of human genetics

#### ***Cell Biology***

- a) Chromosome structure
- b) Identification of human chromosomes
- c) Numerical and structural chromosomal abnormalities.  
Numerical (Down's syndrome, Edward's syndrome, Patau's syndrome); Structural Chromosomal (cri-du-chat 5p-; Hiereshorn syndrome, Turner's syndrome, Klinefelter's syndrome, Fragile-X syndrome).

#### ***DNA as Genetic Material***

- a) DNA structure
- b) Concept of gene
- c) Gene expression
- d) Genetic disorders at molecular level

### **UNIT-2**

#### ***Types of Inheritance with examples***

- a) Dominant and recessive inheritance
- b) Co-dominant inheritance
- c) Sex-chromosomal inheritance
- d) Extra-nuclear inheritance
- e) Concept of multiple alleles – ABO blood groups,
- f) Concept of genetic polymorphisms of proteins and DNA markers (RFLPs)
- g) Other complicating factors in human genetics, like late age of onset, Variable Expressivity, Penetrance, Uniparental Disomy, Genomic Imprinting

### **UNIT-3**

#### ***Techniques in Human Genetics***

- a) Chromosomal Banding and Karyotyping
- b) Electrophoresis
- c) Southern Blotting technique

## **UNIT-4**

### ***Genetics and Environment***

- a) Variation and variability - skin colour
- b) Methods of studying human heredity- linkage, pedigree, twin and sib-pair analysis
- c) Genetic adaptation with examples

## **UNIT-5**

### ***Applications of human genetics: screening, counseling and engineering***

### **Readings**

1. Robert H. Tamarin (2002) Principles of Genetics Tata-McGraw Hill, Seventh Edition.
2. Daniel Hartl & E.W. Jones (1998) Genetics, Principles and Analysis by. 4<sup>th</sup> Edition, Jones & Barlett Publication.
3. Atherly A.G. Girton J. R & McDonald, J. F (1999) The Science of Genetics, Saunders College Publications / Harcourt.
4. Sturtevant A.H (1965) A History of Genetics by (1965) Harper & Row, New York.
5. W.D. Stansfield (2002) Theory and problems of Genetics - (Schaum's outline series) McGrawHill 2002.

## **Paper 11-ANHT-309: Primate Biology**

### **THEORY**

**Marks: 100**

#### **UNIT-1**

- a) Aim and scope of evolutionary biology with special reference to nonhuman primates.
- b) Trends in early primate radiation-dentition, postural modification with special reference to shoulder girdle, pelvic girdle, limbs, hand and foot.

#### **UNIT-2**

- a) Population genetics of nonhuman primates.
- b) Cladistic relationships and molecular evolution of primates:
  - Serological aspects.
  - Amino acid sequences
  - Immunological studies
  - Proteins
  - Chromosomal aspects
  - DNA

#### **UNIT-3**

- a) Socioecology and population dynamics of nonhuman primates.
- b) Communication: patterns, signals, display and vocalization.
- c) Use of nonhuman primates in biomedical research.

#### **UNIT-4**

- a) Breeding and husbandry of non-human primates:Conservation of non-human primates.

## Paper 11-ANHP-309: Primate Biology

### PRACTICALS

**Marks: 50**

- 1 Osteology, craniometry and osteometry of primate bones.
- 2 Blood groups and dermatoglyphics of non-human primates.

### Readings

1. **Comparative Primate Biology**, Vol. 2, Part B: Behaviour, cognition, and motivation Edited by G. Mitchell and J. Erwin, Alan R. Liss, New York, 1987.
2. **Current Perspective in Primate Biology** by David M. Taub, 1986 Published by Van Nostrand Reinhold
3. **Perspectives in primate biology**, vol9 of Advances in behavioral biology by AB Chiarelli. Plenum Press, 1974, the University of Michigan
4. **Primate behaviour**. Sarah Lindsay, 1997, Grove Press
5. **Primate Behaviour**. Leonard A. Rosenblum. 1975. Academic Press
6. **Perspectives in primate biology**. Volume 3  
Edited by P.K. Seth and Swadesh Seth, Today & Tomorrow's, New Delhi, India, 1989, 266 pp.

**OR**

# Paper 11-CBHT-301: Cell Biology-I

## THEORY

Marks: 100

### Unit 1. An Overview of Cells

(Ch 1 Cooper *et al.*/ Ch 1 Karp)

Overview of prokaryotic and eukaryotic cells, cell size and shape, Phages, Virioids, Mycoplasma and *Escherichia coli*.

### Unit 2. Tools and techniques of Cell Biology

(Ch 1 Cooper *et al.*/ Ch 18 Karp/

#### Ch 3 De Robertis)

**Microscopic**-Principles of Light microscopy; Phase contrast microscopy; Confocal microscopy; Electron microscopy (EM)- scanning EM and scanning transmission EM (STEM); Fluorescence microscopy;

**Analytical**-Flow cytometry- fluochromes, fluorescent probe and working principle; Spectrophotometry; Mass spectrometry; X-ray diffraction analysis.

**Separation**-Sub-cellular fractionation- differential and density gradient centrifugation; Chromatography- paper, thin-layer, gel-filtration, ion-exchange, affinity and High-Performance Liquid Chromatography (HPLC).

### Unit 3. Composition of Cells

(Ch 2 Cooper *et al.*)

Molecules of cell, cell membranes and cell Proteins.

### Unit 4. The Nucleus

(Ch 9 Cooper *et al.*)

Nuclear Envelope- structure of nuclear pore complex, nuclear lamina, Transport across Nuclear Envelope, Chromatin: molecular organization, Nucleolus and rRNA Processing.

### Unit 5. Protein Sorting and Transport

(Ch 10 Cooper *et al.*)

The Endoplasmic reticulum, The Golgi Apparatus, Mechanism of Vesicular Transport, Lysosomes.

### Unit 6. Mitochondria, Chloroplasts and Peroxisomes

(Ch 11 Cooper *et al.*)

Structural organization, Function, Marker enzymes, Mitochondrial biogenesis, Protein import in mitochondria, Semiautonomous nature of mitochondria and chloroplast, chloroplast DNA, Peroxisomes' assembly

### Unit 7. Cytoskeleton and Cell Movement

(Ch 12 Cooper *et al.*)

Structure and organization of actin filaments; actin, myosin and cell movement; intermediate filaments; microtubules.



## **Paper 11-CBHP-301: Cell Biology-I**

### **PRACTICALS**

**Marks: 50**

1. Separation of nucleic acid bases by paper chromatography.
2. Microscopy- Theoretical knowledge of Light and Electron microscope.
3. Principles of fixation and staining.
4. Study of the photomicrographs of cell organelles.

#### **Permanent slide preparation:**

5. Cytochemical staining of DNA-Feulgen.
6. Cytochemical staining of DNA and RNA- Methyl Green Pyronin (MGP).
7. Cytochemical staining of Polysaccharides-Periodic Acid Schiff's (PAS).
8. Cytochemical staining of Total proteins- Bromophenol blue.
9. Cytochemical staining of Histones -Fast Green.

### **SUGGESTED BOOKS**

1. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology. VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. (2009). The Cell: A Molecular Approach. V Edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). The World of the Cell. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.

# Paper 12-MBHT-301: Molecular Biology-I

## THEORY

Marks: 100

### Unit 1. Nucleic Acids convey Genetic Information

(Ch 2 Watson)

DNA as the carrier of genetic information, Key experiments establishing-The Central Dogma, DNA Double helix, Genetic code, Direction of Protein Synthesis, Genomics.

### Unit 2. The Structures of DNA and RNA / Genetic Material (Becker)

(Ch 6 Watson/ Ch 18)

DNA Structure: Miescher to Watson and Crick- historic perspective, DNA structure, Salient features of double helix, Types of DNA, Types of genetic material, denaturation and renaturation, cot curves.

DNA topology - linking number, topoisomerases; Organization of DNA- Prokaryotes, Viruses, Eukaryotes.

RNA Structure

Organelle DNA -- mitochondria and chloroplast DNA.

### Unit 3. Genome Structure, Chromatin and the Nucleosome (Becker)

(Ch 7 Watson/ Ch 18)

Genome Sequence and Chromosome Diversity, Chromosome Duplication and Segregation,

The Nucleosome

Chromatin structure- Euchromatin, Heterochromatin- Constitutive and Facultative heterochromatin.

Regulation of Chromatin Structure and Nucleosome Assembly.

Organization of Chromosomes

### Unit 4. The Replication of DNA (Prokaryotes and Eukaryotes) (Becker)

(Ch 8 Watson/ Ch 19)

Chemistry of DNA synthesis, general principles - bidirectional replication, Semi-conservative, Semi discontinuous, RNA priming, Various models of DNA replication including rolling circle, D-loop (mitochondrial),  $\Theta$  (theta) mode of replication, replication of linear ds-DNA, replicating the 5' end of linear chromosome. Enzyme involved in DNA replication – DNA polymerases, DNA ligase, Primase, Telomerase and other accessory proteins

### Unit 5. The Mutability and Repair of DNA

(Ch 9 Watson)

Replication Errors, DNA Damage and their repair.

## Paper 12-MBHP-301: Molecular Biology-I

### PRACTICALS

Marks: 50

1. Preparation of Polytene chromosome from *Chironomous* larva/*Drosophila* larva
2. Demonstration of mammalian sex chromatin.
3. Preparations of temporary mount and study the different stages of Mitosis (Onion root tip).
4. Perform Southern Blot Hybridization (Restrict DNA for Southern Blot electrophoresis, perform electrophoresis of restricted DNA, perform southern transfer, hybridization and detection of gene of interest)
5. Demonstration of Northern Blotting.
6. Demonstration of Western Blotting.
7. Perform DNA amplification by PCR.
8. Study of semiconservative replication of DNA through micrographs/schematic representations.

### SUGGESTED BOOKS

1. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology. VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
3. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). The World of the Cell. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.
4. Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R., (2008) Molecular Biology of the Gene (VI Edition.). Cold Spring Harbour Lab. Press, Pearson Pub.

## **Paper 13-ANHT-410: Tribes and Peasants in India**

### **THEORY**

**Marks: 100**

#### **UNIT-1**

Anthropological concept of tribe, problems of nomenclature, definition and characteristic features of tribes in India; social structure, aspects of tribal economy, political organization and religion

#### **UNIT-2**

Tribes and wider world: impact of development schemes and programme on tribal life; the history of tribal administration, issues of acculturation and assimilation.

#### **UNIT-3**

The concept of peasantry; distinction between tribes and peasants Approaches to the study of peasants – economic, political and cultural.

Characteristics of Indian village and a study of some of its aspects; social organization; councils and administration; factionalism and religion;

#### **UNIT-4**

Rise of tribal and peasant movements and ethnicity issues

#### **Core Readings**

1. Christoph von Fürer-Haimendorf (1984) Tribes in India, Oxford, Oxford University Press.
2. L.P. Vidyarthi and B. K. Rai (1985) Tribal Culture in India, New Delhi, Concept Publishing Company.
3. Anthony Walker (1982) The Todas, New Delhi, Hindustan Publishing House.
4. Robert Redfield (1956) Peasant Society and Culture Chicago, Chicago University Press
5. Eric Wolf (1966) Peasants, NJ, Prentice Hall.
6. Teodor Shanin (1987) Peasants and Peasantry, New York: Blackwell.
7. McKim Marriott (ed.) (1955) Village India ,Illinois, University of Chicago Press.
8. A.K. Kalla & P.C. Joshi (ed.) (2004) Tribal Health and Medicine, Delhi, Concept Publishing Company.

# **Paper 14-ANHT-411: Anthropology of Religion, Politics and Economy**

## **THEORY**

**Marks: 100**

### **Unit 1**

Anthropology of Religion; concepts in the study of evolution of religion and magic (animism, animatism, totemism and naturism)

### **Unit 2**

Functions of religion and magic; aspects of evil, witchcraft and sorcery; religious specialist : shamans priests and mystics

### **Unit 3**

Economic institutions: production, distribution, exchange and consumption in simple and complex societies.

### **UNIT-4**

Political institution: concepts of power and authority; types of authority; state and stateless societies; law and justice in simple and complex societies.

## **Readings**

1. Marvin Harris 1991, Cultural Anthropology, New York, Harper Collins Publications
2. Lessa, W. A., E. Z. Vogt, et al. 2002. Reader in comparative religion: an anthropological approach. New York; London, Harper and Row.
3. Arturo Escobar 1995. Encountering development: The making and unmaking of the third world, Princeton University, Press
4. A Reader in Comparative Religion by Lessa and Vogt (4<sup>th</sup> ed) New York, Harper And Row (1979)
5. A Reader in the Anthropology of Religion (ed) Michael Lambeck, Malden, Blackwell (2002)
6. Dimensions of the Sacred: An Anatomy of World's Beliefs by Ninian Smart, C.A. University of California Press (1998)
7. Elementary Forms of religious Life by Emile Durkheim, Tr. Karen E Fields, New York, Free Press (1995) reprint.

# **Paper 15-ANHT-412: Biodiversity and Indigenous Knowledge**

## **THEORY**

**Marks: 100**

I Basic Concepts of Bio diversity, Conservation, Indigenous knowledge, UN convention on Bio diversity.

II Community Ecology and Environmental Substantiality. Interface between Human activity & Animal World: Comparative Perspectives.

III Conservation Policies and Law

Intellectual Property Right

Policies on National Parks & Displacement of Indigenous People.

Indian Forest Policy: Historical and Contemporary Perspectives.

IV Nature – Culture Debate: Women & Environment

Common Property Resources,

Conservation & Society Development support and communication.

V Indigenous Knowledge:

IK as Millennium Development Goals (MDG)

Validation & Protection of Indigenous Knowledge with reference to India (case studies)

## **Readings**

1. Glauco Sanga, Gherado Ortalli 2000 nature knowledge : ethnoscience, cognition and utility.
2. R.F. Ellen, Peter Parkes and Alan Bicker 2000 Indigenous Environmental Knowledge and its Transformations.
3. Guillermo Castilleja Et.al social challenge of biodiversity conservation United Nations Environment Programme
4. Darrell Addison Posey (2004) Indigenous knowledge and ethics.
5. Regers W'O Okot-Uma, Rose Morie- Rita Odachi 1999 Biodiversity and Gender for sustainable Development. Commonwealth Beertariot

6. Laird, Sarah A. (ed), Janes & Jaunces Science 2002. Bio-diversity and Traditional knowledge.
7. Warren, D.M. 1992. Indigenous knowledge, biodiversity conservation and development
8. Ramakrishnan, P.S., Saxena, K.G, and Chandrashekara, U.M. Eds. (1998). Conserving the sacred for Biodiversity Management. Oxford & IBH, New Delhi
9. Posey, D.A. Ed. (1999). Intermediate Technology Publications/ UNEP. Cultural and Spiritual values of Biodiversity- A complementary Contribution to the Global Biodiversity Assessment.
10. Nazrea, V.V. Ed. (1999). University of Arizona Press, Tucson. Ethno ecology: Situated Knowledge/ Located Lives.

## **Paper 15-ANHP-412: Biodiversity and Indigenous Knowledge**

### **PRACTICALS**

**Marks: 50**

1. Generation of Folk Taxonomy:
  - i. Free Listing
  - ii. Pile Sorting
  - iii. Cognitive Mapping
2. Project Report on Indian Case Law pertaining to Conservation Policy and IPR.
3. Case Study on Indigenous Knowledge:
  - i. Ethnomedicine
  - ii. Forestry and Wild Life
  - iii. Coping with Disasters

**OR**

## Paper 15-CBHT-402: Cell Biology-II

### THEORY

Marks: 100

#### Unit 1. The Plasma Membrane

(Ch 13 Cooper *et al.*)

Structure; Transport of small molecules, Endocytosis

#### Unit 2. Cell Wall, the Extracellular Matrix and Cell Interactio (Ch 14 Cooper *et al.*)

Bacterial and Eukaryotic Cell Wall; the extracellular matrix and cell matrix interactions; cell-cell interactions.

#### Unit 3. Cell Signaling

(Ch 15 Cooper *et al.*)

Signaling molecules and their receptor; functions of cell surface receptors; Intracellular signal transduction pathway; signaling networks.

#### Unit 4. The Cell Cycle

(Ch 16 Cooper *et al.*)

Eukaryotic Cell Cycle, Regulation of Cell cycle progression, Events of Mitotic Phase, Meiosis and Fertilization.

#### Unit 5. Cell Death and Cell Renewal

(Ch 17 Cooper *et al.*)

Programmed Cell Death, Stem Cells and Maintenance of adult tissues, Embryonic Stem Cells and Therapeutic cloning.

#### Unit 6. Cancer

(Ch 18 Cooper *et al.*)

Development and Causes of Cancer, Tumor Viruses, Oncogenes, Tumor Suppressor genes, Cancer Treatment- molecular approach.



## **Paper 15-CBHP-402: Cell Biology-II**

### **PRACTICALS**

**Marks: 50**

1. To demonstrate the presence of mitochondria in striated muscle cells/ cheek epithelial cell using vital stain Janus Green B.
2. Study of polyploidy in Onion root tip by colchicine treatment.
3. Preparations of temporary mount of Grasshopper testis / onion flower bud anthers and study the different stages of Meiosis.
4. Study of mitosis and meiosis from permanent slides.
5. Identification and study of cancer cells- Slides/Photomicrographs.

### **SUGGESTED BOOKS**

1. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology. VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. (2009). The Cell: A Molecular Approach. V Edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). The World of the Cell. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.

## Paper 16-ANHT-413: Anthropology of India

### THEORY

Marks: 100

#### UNIT-I

Early Writings

- (a) History of Anthropological writings in India.
- (b) Colonialism and Anthropology
- (c) Writings of Administrators and Missionaries
- (d) Policy of Integration

#### UNIT-2

Indian Society & Culture

- (a) Ashram and Purusharth
- (b) Varna and Jati
- (c) Little Tradition and Great Tradition Nature
- (d) Nature –Man Spirit complex

#### UNIT-3

Indian Communities in Different Spaces : Caste  
Ethnic  
Urban Communities

#### UNIT-4

Pioneers of India Anthropology : Contributions of Biological & Social  
Anthropologist. S.C.Roy, D.N. Majumdar,  
S. S. Sarkar and others.

## **Paper 16-ANHP-413: Anthropology of India**

### **PRACTICALS**

**Marks: 50**

To study and make a summary of any two monographs/books/census/reports/Governments Reports on development.

### **SUGGESTED BOOKS**

1. Nandini Sunder (et al.) (2008) Anthropology in the East, Permanent Black, New Delhi.
2. M.N. Srinivas 1969 India: Social Structure
3. Milton Singer 1973 When a Great Tradition Modernises.
4. B. S. Cohen 1987 Anthropologist Among Historians
5. Louis Dumont 1993 Homo Hierarchicus, Oxford, New Delhi
6. Imtiaz Ahmed 1981 Ritual and Religion among Muslims of India.
7. Rudolph and Rudolph 1987 : In Pursuit of Laxmi: Political Economy of Indian State Orient Longman; New Delhi.
8. Karin Kapadia 1996 Siva & her Sisters.
9. S.C. Dube: 1993 Indian Society, National Book Trust, New Delhi

**OR**

## Paper 16-MBHT-402: Molecular Biology-II

### THEORY

Marks: 100

#### Unit 1. Mechanism of Transcription

(Ch 12 Watson/ Ch 21 Becker)

RNA Polymerase and the transcription unit

Transcription in Prokaryotes

Transcription in Eukaryotes

#### Unit 2. RNA Modifications

(Ch 13 Watson)

Split genes, concept of introns and exons, removal of Introns, spliceosome machinery, splicing pathways, alternative splicing, exon shuffling, RNA editing, and mRNA transport.

#### Unit 3. Translation (Prokaryotes and Eukaryotes)

(Ch 14 Watson/ Ch 22 Becker/

Ch 21 DeRobertis)

Assembly line of polypeptide synthesis - ribosome structure and assembly, various steps in protein synthesis. Charging of tRNA, aminoacyl tRNA synthetases. Proteins involved in initiation, elongation and termination of polypeptides. Fidelity of translation. Inhibitors of protein synthesis.

Regulation of translation

Translation-dependent regulation of mRNA and Protein Stability.

#### Unit 4. Transcription Regulation in Prokaryotes

(Ch 16 Watson)

Principles of transcriptional regulation, regulation at initiation with examples from *lac* and *trp* operons

#### Unit 5. Transcription Regulation in Eukaryotes

(Ch 17 Watson)

Conserved mechanism of regulation, Eukaryotic activators, Signal integration, combinatorial control, transcriptional repressors, signal transduction and control of transcriptional regulator, Gene Silencing

#### Unit 6. Regulatory RNAs

(Ch 18 Watson)

Riboswitches, RNA interference, miRNA, siRNA, Regulatory RNA and X-inactivation

## Paper 16-MBHP-402: Molecular Biology-II

### PRACTICALS

Marks: 50

1. Preparation of culture medium (LB) for *E.coli* (both solid and liquid) and raise culture of *E.coli*.
2. Demonstration of antibiotic resistance. (Culture of *E.coli* containing plasmid (pUC 18/19) in LB medium with/without antibiotic pressure and interpretation of results).
3. Isolation and quantitative estimation of salmon sperm / calf thymus DNA using colorimeter (Diphenylamine reagent) or spectrophotometer (A260 measurement).
4. To perform Ames test in *Salmonella* / *E.coli* to study mutagenicity.

### SUGGESTED BOOKS

1. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology. VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
3. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). The World of the Cell. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.
4. Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R., (2008) Molecular Biology of the Gene (VI Edition.). Cold Spring Harbour Lab. Press, Pearson Pub.

## **Paper 17-ANHT-514: Human Ecology: Biological Dimensions**

**THEORY**

**Marks: 100**

### **UNIT-1**

#### ***Human ecosystems - adaptation in different ecological zones***

- (a) Principles and components of environmental pollution - air, water and soil pollutants.
- (b) Influence of ecological factors like temperature extreme, hypoxia, altitude with special reference to adaptation vis-à-vis work capacity, vital capacity and skin colour.
- (c) Human population ecology - demographic performance of various human populations living under varying ecological conditions.
- (d) Ecological adaptation to infectious/non-infectious genetic diseases or abnormalities, with special reference to malarial conditions – Haemoglobin variants, G-6-PD, small pox, blood groups.

### **UNIT-2**

Ecological rules – Allen's and Bergman's rule, **Gloger's Rule**, and Thompson and Boxton rule.

### **UNIT-3**

Human growth and development from conception to maturity and senescence; methods of studying human growth, importance of age in growth studies, growth curves, factors affecting growth and role of heredity and environment in human ontogeny, secular trends.

### **UNIT-4**

Analysis of human physique and body composition – Sheldon's, Heath and Carter's classification

### **UNIT-5**

Health status: nutritional status and management of growth, obesity and physical fitness, medical ecology: communicable and non-communicable diseases.

## Core Readings

1. Bogin, B. (1999) Patterns of Human Growth. 2nd edition CUP. Frisancho, R. (1993) Human Adaptation and Accommodation. University of Michigan Press.
2. Moran, E. (2007) Human Adaptability: An Introduction to Human Ecology. Third edition. Westview Press.
3. Schutkowski, H. (2005) Human Ecology: Biocultural adaptations in human communities. Springer, Ecological Studies 182
4. Wells, J.C.K. & Stock, J.T. (2007) Biology of the Colonising Ape. Yearbook of Physical Anthropology 50:191-222.
5. Foley, R.A. 1995. Humans before Humanity: an Evolutionary Perspective. Blackwell.
6. Richerson, P. and R. Boyd. 2005. Not by Genes Alone: How Culture Transformed Human Evolution. University of Chicago Press.
7. Noel Cameron (2002) Human Growth and Development. Amerstadam, Academic Press.
8. G. A. Harrison et al. (1988) Human Biology. Oxford University Press.
9. W. A. Marshall (1977) Human Growth and its Disorders. London, Academic Press.
10. J. M. Tanner (1978) Foetus into Man. London, Open Books.
11. P.T Baker and J.S Weiner(ed.) (1966) The Biology of Human Adaptability. Oxford & New York, Oxford University Press.
12. A.K Kapoor and Satwanti Kapoor(ed.)(1995) Biology of Highlanders. Jammu, Vinod Publisher & Distributor.
13. E.F. Moran (2000) Human Adaptability: An Introduction to Ecological Anthropology. West View, Boulder & Co.
14. J.E.L. Carter & B.H Heath (1990) Somatotyping Cambridge ,Cambridge University Press.

# Paper 17-ANHP-514: Human Ecology: Biological Dimensions

## PRACTICALS

Marks: 50

### Craniometry:

Direct measurements on ten skulls of both sexes including adult and juvenile

#### A. Linear and Curvilinear Measurements

1. Maximum Cranial Length
2. Maximum Cranial Breadth
3. Nasion-Inion Length
4. Greater Occipital Breadth
5. Bimastoid Breadth
6. Greater Frontal Breadth
7. Minimum Frontal Breadth
8. Bizygomatic Breadth
9. Outer Biorbital Breadth
10. Inner Biorbital Breadth
11. Nasion-Prosthion Height
12. Nasion-Bregma Height
13. Orbital Breadth
14. Orbital Height
15. Maxillo-Alveolar Length
16. Maxillo-Alveolar Breadth
17. Palatal Length
18. Palatal Breadth
19. Nasal Height
20. Nasal Breadth
21. Length of Occipital Foramen
22. Breadth of Occipital Foramen
23. Frontal Arc
24. Parietal Arc
25. Occipital Arc

#### B. Indices

1. Cranial Index
2. Nasal Index
3. Upper Facial Index

#### C. Angles

1. Frontal Profile Angle
2. Facial Profile Angle
3. Nasal Profile Angle
4. Alveolar Profile Angle



## **D. Mandible**

1. Bi-condylar Breadth
2. Bigonial Breadth
3. Length of Lower Jaw (Mandibulometer)
4. Height of Lower Jaw
5. Height of Ramus
6. Breadth of Ramus
7. Profile Angle of Lower Jaw

## **Osteometry**

Osteometric measurements on the following bones (one each) are to be taken:

1. Humerus
  - i. Maximum Length
  - ii. Total Length
  - iii. Caliber Index
2. Ulna
  - i. Maximum Length
  - ii. Physiological Length
  - iii. Least Circumference of the Shaft
  - iv. Caliber Index
3. Radius
  - i. Maximum Length
  - ii. Physiological Length
  - iii. Least Circumference of the Distal Half
  - iv. Caliber Index
4. Femur
  - i. Greatest Length
  - ii. Physiological Length
  - iii. Circumference in the middle of the Shaft
  - iv. Length Thickness Index
5. Tibia
  - i. Total Length of Tibia
  - ii. Minimum Circumference of shaft
  - iii. Length Thickness Index
6. Fibula
  - i. Absolute Length
  - ii. Least Circumference
  - iii. Length Thickness Index

**Books to be consulted:**

1. Indera P. Singh and M.K. Bhasin: (1989) Anthropometry. Delhi, Kamla Raj Enterprises
2. White, Tim D (1991) *Human Osteology*. San Diego: Academic Press, Inc.
3. Bass, William (1987) *Human Osteology: A laboratory and field manual*. Special publication No. 2 of the Missouri Archaeological Society, Inc.

# **Paper 18-ANHT-515: Biological Diversity in Human Populations**

## **THEORY**

**Marks: 100**

### **UNIT-1**

Definitions of race, ethnic group and population; genetic basis of race, uses of racial classifications

Sources of genetic variation: mutation, genetic recombination, gene flow, genetic drift and selection. Hardy-Weinberg Law

### **UNIT-2**

Criteria for racial classifications: skin colour, hair and eye colour, stature, head form, eyes, lips and ears, face and nose; Genetic/Genomic markers ; Dermatoglyphics (palmar and finger only).

Characteristics of major races of mankind – Caucasoid, Negroid and Mongoloid

### **UNIT-3**

Racial classification: Deniker's, Coon, Garn and Birdsell's racial classifications. American Anthropology Association Statement on Race

Indian populations – Risley's, Guha's and Sarkar's classifications

### **UNIT-4**

The depth of diversity: biological diversity in Indian populations – with reference to blood groups ( $A_1A_2BO$ , Rh), phenylthiocarbamide (PTC) and colour blindness, Red cell enzymes (AK, PGM, G6PD), Serum Proteins (Haptoglobins, Transferrins) Hemoglobins, (HbS, HbC and HbE)

Finger pattern types and palmar main line formulae

### **UNIT-5**

Ongoing evolution in man: microevolution, cultural factors affecting human variation, Selection relaxation; shifting balance theory, Molecular approach for studying biological diversity

## Core Readings

1. A. K. Kalla (1994) *Ethnology of India*. New Delhi, Munshiram Manohar Lal Publication.
2. J. H. Underwood (1979) *Human Variation and Human Microevolution*. Eaglewood Clifes, Prentice Hall.
3. Richard A. Goldsby (1977) *Race and Races*. New York, Mac Millan Publishing
4. A.E. Mourant et al. (1954) *The Distribution of Human Blood Group*. Oxford Blackwell.
5. A.E. Hooton *Up from the Ape*
5. M. F. Ashley Montague *UNESCO Statement of Race*. New York, Academic Press.
7. Juan Comas (1961) *Manual of Physical Anthropology*.
8. H. Harris (1975) *The Principal of Human Biochemical Genetics*. New York, American Elsvier Publication Company.
9. M.K. Bhasin and H Walter (2001) *Genetics of Castes and Tribes of India*. Delhi, Kamla Raj Enterprises.
10. Bhasin et al. (1994) *People of India– An Investigation of Biological Variability in the Ecological, Ethno-economical and Linguistic Groups*. Delhi, Kamla Raj Enterprises.

# Paper 18-ANHP-515: Biological Diversity in Human Populations

## PRACTICALS

Marks: 50

### I. Somatometry

Somatometric Measurements:

1. Body Weight
2. Standing Height vertex
3. Sitting Height vertex
4. Height Acromion
5. Height Dactylion III
6. Height Tibiale
7. Height Spherion
8. Total Upper extremity length ( Direct)
9. Hand Length
10. Hand Breadth
11. Foot Length
12. Foot Breadth
13. Total Lower Extremity Length (q-Method)
14. Mid-upper Arm circumference
15. Maximum Calf circumference
16. Biceps Skinfold thickness

Relative Measurements

1. Relative Sitting Height Vertex
2. Relative Total Upper Extremity Length
3. Relative T.L.E Length

### II. Somatometry: Hand and Face Measurements:

1. Bigonial Breadth
2. Maximum Head Length
3. Maximum Head Breadth
4. Minimum Frontal Breadth
5. Minimum Bizygomatic Breadth
6. Nasal Height
7. Nasal Breadth
8. Physiognomic Facial Height
9. Morphological Facial Height
10. Physiognomic Upper Facial Height
11. Morphological Upper Facial Height
12. Physiognomic Ear Length

13. Physiognomic Ear Breadth
14. Circumference of the Head

## II Indices

1. Ponderal Index
2. Cephalic Index
3. Nasal Index

## III Somatoscopy:

1. Form of Head Hair
2. Profile of Forehead
3. Eye - direction, fold, colour
4. Root of Nose
5. Nasal Bridge
6. Nasal Tip
7. Chin Form
8. Darwin's Tubercle
9. Ear Lobes
10. Supra-orbital Ridges

Total number of subject to be measured by each student –10

Determination of A1 A2BO and Rh (Test with anti-Rh) blood group of 25 subjects  
Agar gel electrophoresis for Hb separation

Dermatoglyphics

Analysis and Interpretation of finger ball pattern type and indices. Palmar main line formulae of 25 subjects.

Statistical treatment of the data collected.

Genomic data analysis

## Core Readings

1. Inder P. Singh and M.K. Bhasin (1989) Anthropology. Delhi, Kamla Raj Enterprises.
2. M.K. Bhasin and S.M.S. Chahal (1996) A Laboratory Manual for Human Blood Analysis Delhi, Kamla Raj Enterprises.
3. K. Boorman and B. Dodd (1988) Blood Group Serology. London, Churchill Living stone.

4. R.R. Race and R. Sanger (1975) Blood Groups in Man. 6 edn. Oxford, Black Well Scientific Publication.
5. J.S. Weiner and J.A. Lourie (1969) Human Biology: A Guide to Field Methods IBP Hand Book No. 9. Oxford, Black Well Scientific Publication.
6. Sudha Rastogi and B.R.K. Shukla (2003) Laboratory Manual of Physical Anthropology. Lucknow.
7. H. Cummins & C. Midlo (1961) Finger Prints, Palms & Soles: An Introduction to Dematoglyphics. New York, Dower Publication.
8. S.B. Holt (1968) The Genetics of Dermal Ridges: Illinois: Charles C. Thomas.
9. S. Nath (1991) Anthropology: A Study of Body Sizes, Shape & Form. Delhi, Friends Publication.
10. S. Nath (1984) Finger Print Identification. Delhi, SAP.
11. Inder P. Singh and M.K. Bhasin (2004) A Manual of Biological Anthropology. Delhi, Kamla Raj Enterprises.

# **Paper 19-ANHT-516: Human Ecology: Social and Cultural Dimensions**

## **THEORY**

**Marks: 100**

### **UNIT-1**

Concept of ecology: the concepts of adaptation, environment, technology and economy.

### **UNIT-2**

The various modes of adaptation in pre-industrial societies

- a) Hunting and food-gathering
- b) Fishing
- c) Pastoralism
- d) Horticulture
- e) Shifting cultivation
- f) Settled cultivation

### **UNIT-3**

The foundations and theories of human and environment relationships:

- a) Materialism and environmental determinism
- b) Historical particularism and Age-Area; the influence of German diffusionism
- c) Environmental particularism
- d) Cultural ecology and multilineal evolution
- e) Cultural Materialism
- f) Eco-systems approach

### **UNIT-4**

Ecology and its contemporary relevance:

- a) Deep Ecology
- b) Eco-movements with Indian examples
- c) Ecology and health

### **Readings**

1. Cohen (1974) Man in Adaptation, Chicago, Aldine.
2. Marvin Harris (1975) Cows, Pigs, War and Witches, New York, Random House



3. Daryl Forde (1957) *Habitat, Culture and Society*, London, G.Methuen & Co.
4. Kaplan and Manners (eds.) (1968) *Theories in Anthropology*, London Routledge & Kegan Paul.
5. Roy Rappaport (1975) *Pigs for Ancestors*, New Haven, Yale University Press.
6. Marvin Harris (1969) *Rise of Anthropological Theory*, London Routledge & Kegan Paul.
7. Michael R. Dove, C. Carpenter (2008) *Environmental Anthropology: A historical reader*, Cambridge University Press.
8. Sutton, M.Q., E.N. Anderson (2004) *Introduction to Cultural Ecology*, Oxford Berg.

## **Paper 19-ANHP-516: Human Ecology: Social and Cultural Dimensions**

### **PRACTICALS**

**Marks: 50**

1. Technological equipments, their use, energy input and output in relation to various types of economy – hunting, fishing, pastoral, Swidden culture and agricultural technology.
2. Drawing, identification and technological description of the following:
  1. Implements for food gathering, hunting, fishing and agriculture
  2. Implements used in fire-making
  3. Musical instruments
  4. Textile
  5. Magico-religious artefacts
  6. Habitation
  7. Land and water transport

#### Books to be consulted:

1. Notes and Queries in Anthropology. 1971. London: Routledge and Kegan Paul Publications.
2. TIM INGOLD (2010) Archaeology, Anthropology, Art and Architecture, London, Routledge
3. F. Boas (ed.) 1938. *General Anthropology*. Boston: D.C. ;Meath & Company
4. M. N. Basu and M. N. Basu . 1975. *A Study on material Culture*. Calcutta: The World Press Private Limited.

# Paper 20-GGHT-501: Genetics and Genomics-I

## THEORY

Marks: 100

### **Unit 1. Introduction to Genetics** (Ch 1 Klug and Cummings)

Mendel's work on transmission of traits, Genetic Variation, Molecular basis of Genetic Information.

### **Unit 2. Mitosis and Meiosis** (Ch 2 Klug and Cummings)

Interrelation between the cell structure and the genetics function, Mitosis, Meiosis (explaining Mendel's ratios).

### **Unit 3. Mendelian Genetics and its Extension** (Ch 3-4 Klug and Cummings)

Principles of Inheritance, Chromosome theory of inheritance, Laws of Probability, Pedigree analysis Incomplete dominance and codominance, Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Environmental effects on phenotypic expression, sex linked inheritance.

### **Unit 4. Linkage, Crossing Over and Chromosomal Mapping** (Ch 5 Klug and Cummings, Ch 7, Gardner)

Linkage and crossing over, Cytological basis of crossing over, Molecular mechanism of crossing over, Recombination frequency as a measure of linkage intensity, two factor and three factor crosses, Interference and coincidence, Somatic cell genetics – an alternative approach to gene mapping.

### **Unit 5. Mutations** (Ch 8 Klug and Cummings/ Ch 11 Gardner)

Chromosomal Mutations: Deletion, Duplication, Inversion, Translocation, Aneuploidy and Polyploidy; Gene mutations: Induced versus Spontaneous mutations, Back versus Suppressor mutations, Molecular basis of Mutations in relation to UV light and chemical mutagens, Detection of mutations: CLB method, Attached X method, DNA repair mechanisms.

### **Unit 6. Sex Determination** (Ch 7 Klug and Cummings)

Chromosomal mechanisms, Environmental factors effecting sex determination, Barr bodies, Dosage compensation.

**Unit 7. Extrachromosomal Inheritance (Ch 9 Klug and Cummings/ Ch 20 Gardner)**

Chloroplast mutation/Variation in Four o' clock plant and *Chlymodomonas*, Mitochondrial mutations in *Neurospora* and yeast, Maternal effects, Infective heredity-Kappa particles in *Paramecium*.

**Unit 8. Quantitative Genetics (Ch 25 Klug and Cummings/ Ch 21, Gardner)**

Quantitative and multifactor inheritance, Transgressive variations, Heterosis

## Paper 20-GGHP-501: Genetics and Genomics-I

### PRACTICALS

Marks: 50

1. Mendelian laws and gene interaction using *Drosophila* crosses.
2. Chi-square and probability.
3. Study of Linkage, recombination, gene mapping using marker based data from *Drosophila*.
4. Study of Human and *Phlox/ Allium* Karyotype (normal and abnormal).
5. Pedigree analysis of some human inherited traits.
6. Study of Hardy-Weinberg Law using simulations (seeds).

### SUGGESTED BOOKS

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). VIII ed. Principles of Genetics. Wiley India.
2. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. XI Edition. Benjamin Cummings.
4. Russell, P. J. (2009). *iGenetics- A Molecular Approach*. III Edition. Benjamin Cummings.
5. Glick, B.R., Pasternak, J.J. (2003). *Molecular Biotechnology- Principles and Applications of recombinant DNA*. ASM Press, Washington.
6. Pevsner, J. (2009). *Bioinformatics and Functional Genomics*. II Edition. John Wiley & Sons.
7. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. IX Edition. *Introduction to Genetic Analysis*, W. H. Freeman & Co.

### ADDITIONAL READINGS

Both students as well as teachers of genetics can further benefit from knowledge of following topics as given below-

- Epigenetics- <http://www.nature.com/nrg/focus/epigenetics/index.html>
- Tetrad Analysis in fungi
- Centromere Mapping
- Cytogenetic Mapping

## **Paper 21-ANHT-617: Dissertation based on Fieldwork**

**Field Report and Viva Voce**

**Marks: 150**

The department shall organize a fieldwork of about two weeks' duration. Each student will be required to submit two typed copies of a comprehensive ethnographic field report based on socio-cultural and biological aspects of a population studied during the fieldwork.

### **Readings**

- 1. Clifford, James and George E. Marcus (1986) *Writing culture: the poetics and politics of ethnography*. Berkeley: University of California Press.
- 2. Geertz, Clifford (1973) *The Interpretation of Cultures*. New York: Basic Books.
- 3. Harris, Marvin (1997) *Culture, People, Nature: An Introduction to General Anthropology (7th Edition)*. Boston: Allyn & Bacon
- 4. Salzmann, Zdeněk. (1993) *Language, culture, and society: an introduction to linguistic anthropology*. Boulder, CO: Westview Press.
- 5. Shweder, Richard A., and Robert A. LeVine, eds. (1984) *Culture Theory: essays on mind, self, and emotion*. Cambridge, UK: Cambridge University Press.

# Paper 22-ANHT-618: Fundamentals of Human Origins and Evolution

## THEORY

Marks: 100

### UNIT-1

1. Climate, time and human evolution: Miocene, Plio-Pleistocene climate and geological time scale.
2. Nature and process of fossilization
3. Dating Methods:
  - i) Absolute Dating Methods:
    - a) Radiometric Dating Methods:  
Carbon14, Potassium-Argon, Rubidium-Strontium Methods,  
Fission Track Dating Technique
    - b) Non-radiometric Methods:  
  
Palaeomagnetism, Racemization, Dendrochronology,  
Obsidian Hydration Method, Thermoluminescence.
  - ii) Relative Dating Methods:  
Stratigraphy and correlation  
Fluorine dating method

### UNIT-2

Origin of primates and their radiation – an overview

### UNIT-3

Miocene Hominoids – distribution, morphology and evolutionary relationships.  
Australopithecines and their phylogenetic relationships

### UNIT-4

Australopithecine, Origin of Genus Homo; *Homo habilis* and related finds

*Homo erectus* finds from Asia and Africa.

The origin of *Homo sapiens* and fossil evidences (*Archaic Homo sapiens* and Neanderthaloids)

## **UNIT-5**

Upper Palaeolithic Men (Grimaldi, Chancelade, Cro-Magnon, Rhodesian Man);  
The hominization process.

### **Core Readings**

1. Cartwright, J. (2000) Evolution and Human Behaviour. MacMillan Press.
2. Ridley, M. (2003) Nature via Nurture. Fourth Estate.
3. Bilsborough, A. (1992) Human Evolution. Blackie.
4. Boyd, R. & Silk, J. (2006) How Humans Evolved. 4th edit. Norton.
5. Foley, R.A. (1995) Humans Before Humanity. Oxford: Blackwells Publishers
6. Cambridge Encyclopedia of Human Evolution (1994) Cambridge University Press
7. Lewin, R. & Foley R.A. (2003) Principles of Human Evolution. 2nd ed. Blackwell.
8. Seth, P,K. (2003) Understanding Evolution of Man: An Introduction to Palaeoanthropology, Delhi, Kalpaz Publications
9. Stein, P & Rowe, B. (2005) Physical Anthropology, 9<sup>th</sup> Ed, Boston, McGraw Hill
10. Wolpoff, M (1998) Paleoanthropology. 2<sup>nd</sup> Ed. , Boston, McGraw Hill

# Paper 23-ANHT-619: Genomic Diversity in Human Populations

## THEORY

Marks: 100

### UNIT I

From DNA diversity to phenotype: an overview

Types of variation

Use of Autosomal markers and Haplotypes for understanding Genomic diversity

Human similarities and diversity in a global perspective

#### *Human Genome Project*

- a) History, development and the objectives
- b) Human Genome Diversity Project
- b) Genome Diversity in Indian context
- c) Hapmap Project, SNP Consortiums

Use of Y chromosome and mitochondrial DNA population structure in tracing human migrations

Molecular evolution, human genetic diversity and the genetic basis of human evolution.  
Molecular basis of common complex diseases.

Fundamental factors (mutation, genetic drift, selection, migration, and mating systems) and their interactions that create diversification within and between populations and affect the genetic structure of populations and their adaptation and evolution;

Genetic variability in natural populations: Adaptive genetic polymorphisms; DNA polymorphism; Genetic co-adaptation & Linkage disequilibrium, Balanced genetic polymorphism; Heterosis & heterozygous superiority



## Core Readings

1. Scott Freeman, John C. Hendon, Evolutionary Analysis, Fourth Edition, Pearson Education. 2001
2. Hoelzel, Molecular Genetic Analysis of Populations, 2nd Edition, Oxford University, 1998.
3. Hartl and Jones, Genetics -Principles and Analysis, 5th edition Jones and Barlet.[2001]
4. P W Hedrick, Genetics of Populations, 2nd Edition, Jones & Bartlett 2000
5. Hartl & Clark, Principles of Population Genetics, Third Edition, Sinauer Associates, Inc. 1997
6. Theory and problems of Genetics - W.D. Stansfield (Schaum's outline series) McGrawHill 2002.
7. Jobling, M.A., Hurles, M.E., Tyler-Smith, C. (2004) Human Evolutionary Genetics: Origins, Peoples & Disease. Garland Science.
8. Lewin, R. (1999) Patterns in Evolution: The New Molecular View, Scientific American Library.
9. Lewis, R. (1994) Human Genetics: Concepts and Applications. Wm. C. Brown.
10. Russell, P. J. (2009) Genetics- A Molecular Approach. III Edition. Benjamin Cummings

## **Paper 24-ANHT-620: Anthropology in Practice**

### **THEORY**

**Marks: 100**

- UNIT-1 : History, concepts and domain of Applied Anthropology in India and at global level
- UNIT-2 : Action Anthropology, Anthropology & Public policy, Community development and need Assessment
- UNIT-3 : Constitutional provisions, planning & development and Evaluation in India
- UNIT-4 : Role of social and biological anthropology in human welfare; Management anthropology; Anthropology of NGO's; Visual Anthropology.
- UNIT-5 : Forensic Anthropology and Law; Demography, Populations and tourism in India

### **Core Readings**

1. Ervic, Alexander M., 2000, Applied Anthropology: Tools and Perspectives for Contemporary Practice, Boston, MA: Allyn and Bacon.
2. Gwynne, Margaret A., 2003, Applied Anthropology: A Career-Oriented Approach, Boston, MA: Allyn and Bacon.
3. Higgins, Patricia J. And J. Anthony Paredes, eds. 2000, Classics of Practicing Anthropology 1978-1998. Society of Applied Anthropology, Oklahoma City, Oklahoma.
4. Stephens, W. Richar, and Elliot M. Fratkin, 2003, Careers in Anthropology, Boston, MA: Allyn and Bacon.
5. L. P. Vidyarthi and B.N. Sahay (eds), 2001, Applied Anthropology and Development in India, National Publishing House, New Delhi.
6. Anthropology in Practice: Building a Career outside the Academy, Publishing Lynne Reinner, Riall W. Noaln, 2002.
7. Alexander Ervin, 2004, Applied Anthropology Tools and Practise, Allyn and Bacon.

**Paper 24-ANHP-620: Anthropology in Practice**

**PRACTICALS**

**Marks 50**

1. Study of Community Development in Rural/ Urban Setting with various approaches.
2. Write a project on Constitutional provisions as per Government of India.
3. Draw a scene of Crime and identify the various evidences.
4. Write a project on Religious Tourism/ Tribal Tourism/ Ecological tourism/ Health Tourism.

**OR**

# Paper 24-GGHT-602: Genetics and Genomics II

## THEORY

Marks: 100

**Unit 1. Genetic Analysis and Mapping in Bacteria and Bacteriophages (Ch 6, Klug and Cummings/ Ch 5, Griffith *et al.*)**

Conjugation; Transformation; Transduction, Recombination.

**Unit 2. Genome Dynamics-Transposable genetic elements, Eukaryotic Viruses (Ch 22, Klug and Cummings/ Ch 14, Griffith *et al.*)**

Prokaryotic transposable elements- IS elements, Composite transposons, Tn-3 elements; Eukaryotic transposable elements- Ac-Ds system in maize and P elements in *Drosophila*; Uses of transposons; Eukaryotic Viruses.

**Unit 3. Developmental Genetics and Model System (Ch 19, Klug and Cummings)**

Study of model systems in developmental genetics- *Drosophila melanogaster*, *Sachharomyces cerevisiae*, *Caenorhabditis elegans*, *Arabidopsis thaliana*, and *Xenopus laevis*.

**Unit 4. Genomics, Bioinformatics and Proteomics (Ch 21, Klug and Cummings/Ch 8-9, Russell/ Ch2, 3, 4 Ghosh, Z. and Mallick,V.)**

Genomes of bacteria, *Drosophila* and Humans; Human genome project; Evolution and Comparative Genomics.

Introduction to Bioinformatics, Gene and protein databases; Sequence similarity and alignment; Gene feature identification.

Gene Annotation and analysis of transcription and translation; Post-translational analysis- Protein interaction.

**Unit 5. Genomic Analysis- Dissection of Gene Function (Ch 23, Klug and Cummings)**

Genetic analysis using mutations, forward genetics, genomics, reverse genetics, RNAi, functional genomics and system biology.

**Unit 6. Population Genetics (Ch 27, Klug and Cummings)**

Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection, mutation, genetic drift.

**Unit 7. Evolutionary Genetics (Ch 28, Klug and Cummings)**

Genetic variation and Speciation.

## Paper 24-GGHP-602: Genetics and Genomics II

### PRACTICALS

Marks: 50

1. Genomic DNA isolation from *E.coli* (without plasmid).
2. Restriction enzyme digestion of genomic DNA from *E.coli*.
3. Isolation of plasmid DNA and genomic DNA together from *E.coli*. and restriction enzyme digestion.
4. Restriction enzyme digestion (*EcoRI*) of genomic and plasmid DNA (obtained from Expt.3).
5. Estimation of size of a DNA fragment after electrophoresis using DNA markers.
6. Construction of Restriction digestion maps from data provided.
7. Demonstration of DNA fingerprinting.

### SUGGESTED BOOKS

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2006). Principles of Genetics. VIII Edition John Wiley & Sons.
2. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. IX Edition. Benjamin Cummings.
4. Russell, P. J. (2009). *iGenetics- A Molecular Approach*. III Edition. Benjamin Cummings.
5. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.
6. Pevsner, J. (2009). Bioinformatics and Functional Genomics. II Edition. John Wiley & Sons.
7. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. IX Edition. Introduction to Genetic Analysis, W. H. Freeman & Co.
8. Ghosh, Z. and Mallick, V. (2008). Bioinformatics-Principles and Applications. Oxford Univ. Press

# SEMESTER SYSTEM AT THE UNDERGRADUATE LEVEL

Course of Study **B.Sc (Honours) Anthropology\***

**Total number of papers: 24**

## Semester I

Paper 1 Introduction to Social Anthropology <b>ANHT - 101</b>	Paper 2 Introduction to Biological Anthropology <b>ANHT - 102</b>	Paper 3 Archaeological Anthropology-I <b>ANHT - 103</b>	Paper 4 <b>ENAT - 101</b> Technical Writing & Communication in English/ Computational Skills <b>CSAT - 101</b>
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## Semester II

Paper 5 <b>ENAT – 201</b> Technical Writing and Communication in English/ Computational Skills <b>CSAT - 201</b>	Paper 6 Archaeological Anthropology-II <b>ANHT - 204</b>	Paper 7 Anthropology of Kinship <b>ANHT - 205</b>	Paper 8 Biostatistics and Data Analysis <b>ANHT - 206</b>
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## Semester III

Paper 9 Theories of Culture & Society <b>ANHT - 307</b>	Paper 10 Human Genetics <b>ANHT - 308</b>	Paper 11 <b>ANHT - 309</b> PRIMATE BIOLOGY OR CELL BIOLOGY I <b>CBHT - 301</b>	Paper 12 <b>MOLECULAR BIOLOGY I</b> <b>MBHT - 301</b>
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## Semester IV

Paper 13 Tribes and Peasants in India <b>ANHT - 410</b>	Paper 14 Anthropology of religion, politics & economy <b>ANHT - 411</b>	Paper 15 <b>ANHT - 412</b> BIODIVERSITY & INDIGENOUS KNOWLEDGE OR CELL BIOLOGY II <b>CBHT - 402</b>	Paper 16 <b>ANHT - 413</b> ANTHROPOLOGY OF INDIA OR MOLECULAR BIOLOGY-II <b>MBHT - 402</b>
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## Semester V

Paper 17 Human Ecology: Biological Dimensions <b>ANHT - 514</b>	Paper 18 Biological Diversity in Human Populations <b>ANHT - 515</b>	Paper 19 Human Ecology: Social and Cultural Dimensions <b>ANHT - 516</b>	Paper 20 <b>GENETICS &amp; GENOMICS-I</b> <b>GGHT - 501</b>
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## Semester VI

Paper 21 Field work dissertation <b>ANHT - 617</b>	Paper 22 Fundamental of Human Origins and Evolution <b>ANHT - 618</b>	Paper 23 Genomic Diversity in Human Populations <b>ANHT - 619</b>	Paper 24 <b>ANHT – 620</b> ANTHROPOLOGY IN PRACTICE OR <b>GENETICS &amp; GENOMICS-II</b> <b>GGHT - 602</b>
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\* The students shall either choose Cell Biology I & II, Molecular Biology I & II and Genetics and Genomics I & II OR Primate Biology, Molecular Biology I, Biodiversity and Indigenous Knowledge, Anthropology of India, Genetics and Genomics-I and Anthropology in Practice.