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

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#### PART I: Semester-2

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*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

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<td>ANHT - 410</td>
<td>Tribes and Peasants in India</td>
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<td>ANHT - 411</td>
<td>Anthropology of religion, politics &amp; economy</td>
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<td>ANHT – 412/ CBHT – 402</td>
<td>Biodiversity &amp; Indigenous Knowledge / Cell Biology II</td>
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### YEAR-3

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<td>ANHT - 514</td>
<td>Human Ecology: Biological Dimensions</td>
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<td>Field work dissertation</td>
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<td>ANHT - 618</td>
<td>Fundamental of Human Origins and Evolution</td>
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<td>23</td>
<td>ANHT - 619</td>
<td>Genomic Diversity in Human Populations</td>
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<td>24</td>
<td>ANHT – 620/ GGHT - 602</td>
<td>Anthropology In Practice / Genetics &amp; Genomics-II</td>
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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

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

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


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**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:

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  

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


   Poona, Deccan College.

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
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

2. L. Hamp-Lyons and B. Heasely: Study Writing; A course in written English. For academic and professional purposes, Cambridge Univ. Press.

Additional Reference Books

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


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
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

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:


THEORY

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 Cognative 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

Paper 8-ANHT-206: Biostatistics and Data Analysis

THEORY

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

THEORY

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

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.
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

Paper 11-ANHT-309: Primate Biology

THEORY

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:
   o Serological aspects.
   o Amino acid sequences
   o Immunological studies
   o Proteins
   o Chromosomal aspects
   o 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.

Readings

2. *Current Perspective in Primate Biology* by David M. Taub, 1986 Published by Van Nostrand Reinhold
   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.)

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

1. Separation of nucleic acid bases by paper chromatography.
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.

SUGGESTED BOOKS

THEORY

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 (Ch 6 Watson/ Ch 18 Becker)
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 (Ch 7 Watson/ Ch 18 Becker)
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) (Ch 8 Watson/ Ch 19 Becker)
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), θ (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

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

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

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

5. Regers W’O Okot-Uma, Rose Morie- Rita Odachi 1999 Biodiversity and Gender for sustainable Development. Commonwealth Becrtario


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
THEORY

Unit 1. The Plasma Membrane  
Structure; Transport of small molecules, Endocytosis  
(Ch 13 Cooper et al.)

Unit 2. Cell Wall, the Extracellular Matrix and Cell Interaction  
Bacterial and Eukaryotic Cell Wall; the extracellular matrix and cell matrix interactions; cell-cell interactions.  
(Ch 14 Cooper et al.)

Unit 3. Cell Signaling  
Signaling molecules and their receptor; functions of cell surface receptors; Intracellular signal transduction pathway; signaling networks.  
(Ch 15 Cooper et al.)

Unit 4. The Cell Cycle  
Eukaryotic Cell Cycle, Regulation of Cell cycle progression, Events of Mitotic Phase, Meiosis and Fertilization.  
(Ch 16 Cooper et al.)

Unit 5. Cell Death and Cell Renewal  
Programmed Cell Death, Stem Cells and Maintenance of adult tissues, Embryonic Stem Cells and Therapeutic cloning.  
(Ch 17 Cooper et al.)

Unit 6. Cancer  
Development and Causes of Cancer, Tumor Viruses, Oncogenes, Tumor Suppressor genes, Cancer Treatment- molecular approach.  
(Ch 18 Cooper et al.)
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.
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

Paper 16-ANHT-413: Anthropology of India

THEORY

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 Purushartha
(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
4. B. S. Cohen 1987 Anthropologist Among Historians

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)
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
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

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, smallpox, 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


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. Bzygomatic Breadth
9. Outer Biorbital Breadth
10. Inner Biorbital Breadth
11. Nasion-Prosthion Height
12. Basion-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. Bigonal 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:

THEORY

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 (A1A2BO, 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

5. A.E. Hooton *Up from the Ape*
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
THEORY

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 multilinear 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


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

THEORY

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/Variegation 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
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.

**SUGGESTED BOOKS**


**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](http://www.nature.com/nrg/focus/epigenetics/index.html)
- Tetrade Analysis in fungi
- Centromere Mapping
- Cytogenetic Mapping
Paper 21-ANHT-617: Dissertation based on Fieldwork

Field Report and Viva Voce

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 sociocultural and biological aspects of a population studied during the fieldwork.

Readings


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, Thermoluminiscence.
   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

Australopethicine, 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**

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


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


3. Hartl and Jones, Genetics - Principles and Analysis, 5th edition Jones and Barlet.[2001]


# Paper 24-ANHT-620: Anthropology in Practice

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

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
THEORY

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* *Saccharomyces 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

## SEMESTER SYSTEM AT THE UNDERGRADUATE LEVEL

### Course of Study

**B.Sc (Honours) Anthropology**

### Total number of papers: 24

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<td>ANHT - 412 BIODIVERSITY &amp; INDIGENOUS KNOWLEDGE OR CELL BIOLOGY II</td>
<td>ANHT - 413 ANTHROPOLOGY OF INDIA OR MOLECULAR BIOLOGY-II</td>
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### Semester VI

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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.*