

B.A./ B.Sc. First Semester
Paper Code: ANT-B101
End Semester Examination, 2014
ANTHROPOLOGY
Paper: First (Basics of Biological Anthropology)
Time Allowed: Three hours

- 1.(i) The Father of Modern Physical Anthropology?
a. J. F. Blumenbaach
b. J. G. Herder
c. **S.L.Washburn**
d. None of the above
- (ii) Who is pioneer of Organic Evolution?
a. Gregor John Mendel
b. **Charles Darwin**
c. JohanssonRobert Hook
d. All of the above
- (iii) "The Descent of Man" was written by
a. Gregor John Mendel
b. **Charls Darwin**
c. Lamarck
d. Carolus Linnaeus
- (iv) True Bipedal locomotion is observed among:
a.Chimpanzee b. Gorilla c.**Human** d.Langur
- (v) Great apes are mainly found in;
a. Asiab. Europec.**Africa** d. America
- (vi) "Philosophy Zoologique" was published in
a. 1819 b. 1871 c.**1809** d. 1848
- (vii) 'Survival of the fittest' was given by
a. Lamarck b.**Darwin** c. Spencer d. Hutton
- (viii) Who among these criticize Lamarck by giving the example of rat?
a. **August Weisman** b. Charles Darwin
c. Spencer d. Hutton
- (ix) Mongoloids are characterized by having
a. Blond hair b. **Epicanthic fold**
c. Blue eyes d. Dark skin
- (x) The first racial classification on the people of India was given by
a.**Herbert Hope Risley (1915)**
b.Giuffrida–Ruggari (1921)
c.Haddon's classification (1924)
d.Guha's classification (1935, 37)

Note: Write long answer of the following questions. Attempt any **four** questions. Each question carries 5 marks.

2. Explain the relationship of Biological Anthropology with other sciences.

Answer 2: (Mention any five relations of Biological Anthropology with other sciences)

The study of physical anthropology is specially characterized by a wide dimension. Man is not only a complex and highly evolved animal but his life and behavior- pattern are extremely complicated. Thus, the study of physical anthropology centering round biological developments of man and conditioned by cultural activities will not be perfectly made illustrative without going into studies of different sciences. On the other hand, physical anthropology shares the views of these scientific disciplines and most of the time close integration of ideas is found herein. Now-a-days physical anthropology has been contributing a lot to the spheres of studies of different sciences. On the other hand, physical anthropology is being enriched with the varied findings of these scientific disciplines. An attempt has been made here to pin-point the relation of physical anthropology to several allied disciplines.

1. *Relation of Physical Anthropology to Human Biology:*

Physical anthropology is the study of the biological perspective of man. Naturally it is study of the biological sciences. In understanding of this gradual process of human evolution the physical anthropologists are in an emergent need to compare the biological features of man and the animals. Modern physical anthropology is highly biology oriented. Study of human genetics has become the essential part of physical anthropology. This particular trend of study of physical anthropology especially human heredity, factors relating to growth and development has enriched the field of human biology.

2. *Relation of Physical Anthropology to palaeontology:*

Palaeontology is the scientific study of fossils. The evaluation of various fossilized remains in relation to geological periods and other associated finds is the major task of the palaeontologists. In searching out human origin the physical anthropologists depends solely on the interpretations of various fossil finds human and non-human ancestors. The principles of palaeontological studies help a lot in these devices of the physical anthropologists.

3. *Relation of Physical Anthropology to Geology:*

Geology is the study of the nature and structural pattern of the earth-its land forms, rock formation, various strata of the earth and their formation, and many other related matters. Various happenings in the remote past and the records of the oldest forms of life, that flourished long ago, can be highlighted through the systematic study and analysis of the earth's crusts and different fossil-laden strata in the background of geological methodology. In the study

of human evolution as well as various cultural stages of man the physical anthropologists are to go a long way into the past. To study the various layers of earth and to understand the time sequences the physical anthropologist employ the knowledge and findings of the geologists.

4. *Relation of Physical Anthropology to Prehistoric Archaeology:*

The biological development of man became more and more conspicuous with the devices of tool using by the earliest types of men. In order to clear out the picture of human differentiation from non-human ancestors it is essential to understand the times and types of tool using as tools are considered as the remarkable cultural achievements helping early men to adjust with the changing situations. Prehistoric archaeology is such a discipline which deals with the tools technology of the remote past periods in relation to the different human types evolved during different periods of geological significance. Thus physical anthropology is closely related to prehistoric archaeology for the fact that it helps in getting a comprehensive idea on the working of early man.

5. *Relation of Physical Anthropology to Physiology:*

Modern physical anthropology has changed its angel of vision. From the study of the metric analysis of the superficial bodily parts it has entered into the study of the structural and functional patterns of the various internal organs as well as other physiological features of the body. In addition to the study of various muscular arrangements in the body, functional development of brain, study of blood groups, hemoglobin patterns of human and non-human primates, bio-chemical variation in man and other animals are now being taken up by the physical anthropologists to bring out the total view of human body development. In this type of study physical anthropology comes very close to physiology for getting actual structural and functional views of these organs.

6. *Relation of Physical Anthropology to Medical Sciences:*

Physical anthropology now-a-days tries to explore the nature and extent of various hereditary or genetic diseases. The modern impact of genetics on physical anthropology has opened a new dimension in which various diseases and genetic abnormality oriented happenings have become the important items of discussion of physical anthropology. Various nutritional patterns, growth, deformations and the impact anthropologists in the background of medical sciences. In this way physical anthropology has been combined with medical science to bring forth a new discipline- Medical Anthropology.

7. *Relation of Physical Anthropology to Forensic Science:*

Forensic science has its root in medical sciences. It tries to identify the individual through the systematic analysis of skeletonized remains. With these the study of blood types, palm and sole prints also came into the picture of forensic sciences. Forensic science is mainly harnessed to detect the criminals and to bring out the clues of crimes from the study of various bodily remains. The various methodologies for throwing light on the total perspective from the

insignificant remains. Thus the stepping of this branch of physical anthropology goes parallel to the understanding of forensic science.

8. *Relation of physical anthropology with demography:*

Demography is the science of population. The nature of population is studied through the factors like birth, death, migration, growth, spatial distribution, age-sex structure in the background of time. The studies are conducted through statistical methods. Various statistical data are collected on the features of population as stated and through a systematic analysis of the data the nature of population is brought out. In studying the anthropological perspectives of any human population group this sort of demographic analysis is essential. Thus the study of physical anthropology is inseparable from demographic approach of viewing people.

9. *Relation of Physical Anthropology to Ecology:*

Ecology deals with the study of interrelationship between organisms and their surroundings environmental conditions. Human ecology refers to the study of the relationship patterns between the populations and their environment, and energy exchanges with other living organisms. In physical anthropology the study of human ecology is of special importance as it explores the nature and extent of human adjustments in relation to climates and related matters. The mode of adaptation of human beings has affected the biological features and the study of these changing characteristics is indispensable in understanding human evolution. In physical anthropology there is a specific scope to study the pattern of adaptation to the natural environment.

10. *Relation of Physical Anthropology to Population Genetics:*

Modern physical anthropology is closely related to the new sub-field known as population genetics. A population in a genetical perspective is defined as “a reproductive community of sexual and cross fertilizing individuals which share in a common gene pool” (Dobzhansky, 1955:37). The basic construct of genetics is the population. The community of potentially interbreeding individuals at a particular locality is termed Mendelian population. The largest Mendelian population is the species and the different species from distinct groups because they do not share the same gene pool. Human races, a much discussed and controversial topic of physical anthropology, are regarded as “Mendelian populations with potential and actual gene flow between their respective gene pool” (BuettnerJanush, 1969:389). Populations are breeding isolates due to geographical barriers. The study of races during the present- period has been channelized through this genetic line of thinking. Thus Physical anthropology shares its views with population genetics.

3. Write short note on

a. Catarrhine

b. Taung baby

Answer 3a: Catarrhine

The infraorder Catarrhini is divided into two super families, Cercopithecoidea (Old World Monkeys) and Hominoidea.

1. Cercopithecoidea:

The Cercopithecoidea has one family, called the Cercopithecidae, which includes two subfamilies, Cercopithecinae, and Colobinae.

The Cercopithecinae comprises seven genera: **Cercopithecus, Cercocebus, Macaca, Papio, Cynopithecus, Theropithecus and Erythrobus.** The Colobinae consists of five genera: **Colobus, Presbytis, Rhinopithecus, Nasalis and Pygathrix.**

Cercopithecus: These monkeys are commonly known as Guenons. They live in different parts of Africa. Although they are mostly arboreal, several species come down to collect food to the forest floor, open bush, plantation area, and thus exhibit terrestrial habits as well. These monkeys are mainly frugivorous, but they eat insects, birds, eggs and are diurnal in habit. They live in small groups. A group is composed of a dominant male, a few female and their children.

The superfamily Hominoidea consists of three families: **Hylobatidae, Pongidae and Hominidae.** The species of Hylobatidae include Gibbon; of Pongidae include Orangutan, Gorilla and Chimpanzee; and of Hominidae consists of one genus called Homo.

Let us describe any one family member of Hominoidea,

Hylobatidae (Gibbon): The gibbons are distributed in the rain forests of Southeast Asia and also in Northeast India and Myanmar. The siamangs are confined to Sumatra. Gibbons are arboreal creatures, slenderly built with extremely long arms. When they stand erect the hands touch the ground. This extraordinary length of upper extremity is directly connected with their mode of locomotion. The gibbons are true brachiators, swinging from branch to branch clutching briefly with alternate hands. They live in small family groups consisting of an adult male, an adult female and one or two young offspring. An adult gibbon weighs about 50 kgs. And in height it is about one metre.

Answer 3b: Taung Baby

Australopithecus africanus is also known as Taung baby as it was found at 1924 at Taung in Bechuanaland, South Africa. Remains of *Australopithecus* consisting of an almost complete skull of a young individual, probably not more than five years of age, were first

discovered by Raymond Dart. The skull contained twenty milk teeth and four permanent first molars in good condition. Some important characteristics are as follows;

- i. The size of the cranium and facial portion closely resemble that of the chimpanzee. The head is dolicocephalic.
- ii. The face is prognathous, concave and premaxilla are well marked.
- iii. A diastema is present in the upper jaw between the lateral incisor and the canine
- iv. The cranial capacity is 520 c.c.
- v. The nasal aperture is high, the nasal bones are short, broad and separated by inter nasal suture.
- vi. Higher foreheads, lesser jaw projection, and a more horizontal and forward position of the foramen magnum than the adults of the species.
- vii. The jaw is massive, molar teeth are very large but quite humanoid, canines are small and their crowns are in the same level along with that of the other teeth.
- viii. The incisors are small in size and almost vertical in position, while in apes it is sloped.

4. Differentiate between Lamarckism and Darwinism.

Answer 4:

Lamarckism:

Lamarck is best known for his *Theory of Inheritance of Acquired Characteristics*, first presented in 1801 (Darwin's first book dealing with natural selection was published in 1859): If an organism changes during life in order to adapt to its environment, those changes are passed on to its offspring. He said that change is made by what the organisms want or need. For example, Lamarck believed that elephants all used to have short trunks. When there was no food or water that they could reach with their short trunks, they stretched their trunks to reach the water and branches, and their offspring inherited long trunks. Lamarck also said that body parts that are not being used, such as the human appendix and little toes are gradually disappearing. Eventually, people will be born without these parts. Lamarck also believed that evolution happens according to a predetermined plan and that the results have already been decided.

Lamarck's Hypothesis: The Inheritance of Acquired Characteristics

1. A changing environment creates a need for certain features to be developed in order to survive.
2. "Acquired Characteristics": Through use and/or non-use, those features needed for survival are developed in each individual.
3. Inheritance: Those characteristics developed ("acquired") by individuals are somehow passed on to their offspring, who can continue that development...
4. New Species: Eventually, over many generations, enough differences have developed that we can say we have a new species.

Darwinism:

Darwin believed that the desires of animals have nothing to do with how they evolve, and that changes in an organism during its life do not affect the evolution of the species. He said that organisms, even of the same species, are all different and that those which happen to have variations that help them to survive in their environments survive and have more offspring. The offspring are born with their parents' helpful traits, and as they reproduce, individuals with that trait make up more of the population. Other individuals, that are not so well adapted, die off. Most elephants used to have short trunks, but some had longer trunks. When there was no food or water that they could reach with their short trunks, the ones with short trunks died off, and the ones with long trunks survived and reproduced. Eventually, all of the elephants had long trunks. Darwin also believed that evolution does not happen according to any sort of plan.

Darwin's Hypothesis: Natural Selection

1. Overproduction: More offspring produced than will ultimately survive and reproduce
2. Variation: Inheritable features vary from individual to individual.
3. Change in environment: Changes in climate, topography, food supply, predators, etc.
4. "Struggle for existence": Mainly competition within the species, for food, habitat, survival from being eaten
5. "Survival of the fit" (not necessarily the strongest): Those with more adaptive traits tend to survive longer and/or produce the most offspring; these are the "naturally selected"
6. Inheritance of "selected" features: Traits involved are already inheritable, but may involve new combinations.
7. New Species, better adapted to the new environment: When the collective traits of the population differ significantly from the earlier population, and can no longer reproduce with the earlier population.

LAMARCK	DARWIN
1. Environment changes, thus creating a "need" to change.	1. Variations of inheritable features which already normally exist.
2. Development of new features, "in order to survive or so that one can survive.	2. Environment "screens out" (or SELECTS) features contributing to survival, and tends to eliminate the others.
3. Newly acquired traits somehow get passed down to offspring	3. Those with traits which help survival tend to survive and have more offspring, who inherit those traits.
4. New Species, eventually	4. New Species, eventually

5. Discuss briefly Man's position in Animal Kingdom.

Answer 5:

The animal kingdom has 2 subdivisions, namely Protozoa and Metazoan. The Metazoan includes Invertebrates and Vertebrates. The vertebrate is subdivided into five classes. These are Fish, Amphibian, Bird, Reptile and Mammal. Man belongs to the class Mammal. The mammal have certain characteristic features by which they are distinguished from the other four classes of vertebrate;

- The mammals are warm-blooded, air-breathing vertebrate having epidermal covering in the form of hair. They are viviparous, and mother nourishes the fetus with the blood system through placenta. After birth breast milk of the mother is the source of nourishment.
- The vertebral column has intervertebral discs. Each vertebra has three primary centres of ossification, one for the body and the other for the arch.
- A long bone consists of two epiphyses and a shaft. The vestige of coracoid contributes to the formation of the pectoral girdle.
- There are two condyles on the two sides of the foramen magnum in the skull, which articulate with the atlas. The mammals have two sets of teeth, ie. diphyodont. The teeth are embedded in sockets and are of different shapes. The articulation between the skull and the jaw is direct without any intermediation of quadrate bone.
- Each half of the heart consists of a ventricle and an auricle and hence the heart has four chambers.
- The mammals have an epiglottis, which is a movable plate guarding the opening of the larynx.
- The red blood corpuscles are circular and non-nucleated.
- A corpus callosum unites the cerebral hemispheres,

The class mammal has two sub-classes, called Prototheria and Theria. Theria consists of two sections namely, Metatheria and Eutheria. The Eutheria or Placental mammal comprises nine orders. Of these are Cetacea, Sirenia, Edentata, Ungulata, Carnivora, Insectivora, Cheiroptera, Rhodentia and Primate.

Man has been placed in the order Primate, which consists of two suborders. Prosimians exhibit several characters including toothcomb, for which man cannot be put under that suborder. Hence, man belongs to the other suborder, Anthrozoidea.

Anthropoidea has two infraorders, Platyrrhini and Catarrhini. Examination of several features, including dental formula of Platyrrhini which is 2.1.3.3 does not allow to put man under Platyrrhini. Hence, man is a member of Catarrhini.

Catarrhini includes two superfamilies, namely Cercopithecoidea and Hominoidea. Because of bigger body size, complex brain, absence of tail, man does not belong to Cercopithecoidea but to Hominoidea.

Hominoidea has three families: Hylobatidae, Pongidae and Hominidae. Several distinguishing features are in favour of putting man under Hominidae. Therefore, position of man can be determined as follows:

Class: Mammalia
Order: Primate
Suborder: Anthropoidea
Infraorder: Catarrhini
Superfamily: Hominoidea
Family: Hominidae
Genus: Homo
Species: Homo Sapiens

6. Write short note on

- a. Australoid b. Hominoidea

Answer 6a:Australoid

The Australoids closely resemble the Caucasoids in respect to many characters and hence they are considered as a sub-division of the Caucasoid. They include two main groups- The Australian aborigines and the Pre-Dravidian or Australoid or Veddoid.

Australian Aborigines:

- Skin color is medium to dark chocolate brown.
 - Hair form is curly, sometimes wavy, rarely straight, hair color varies from medium brown to black, face and body hair is usually abundant.
 - Head is usually narrow, dolicocephalic, brow ridges are extremely large, glabellar region is very prominent.
 - Nose is broad, very platyrrhine, nasal root is depressed, bridge is of medium height.
 - Face is short, showing medium to pronounced prognathism, chin is usually receding.
 - Eye color is dark brown, stature is variable, average height being 165 cm
- These people suggest an admixture of an archaic Caucasoid type with negroid.

PreDravidian or Australoid or Veddoid:

They live in South and Central India. Typical representatives are Kadir, Kurumba, Panyan, Irula, Bhil, Gond, Khond, Oraon etc.

- Skin color is dark brown to nearly black.
- Hair is black, wavy in form.
- Dolicocephalic head with sloping forehead and prominent brow ridges
- Nose is very broad, depressed at root.
- Face is short and narrow, prognathism is moderate.
- They are short, average height being 157 cm.

Answer 6b: Hominoidea

The superfamily Hominoidea consists of three families: **Hylobatidae, Pongidae and Hominidae**. The species of Hylobatidae include Gibbon; of Pongidae include Orangutan, Gorilla and Chimpanzee; and of Hominidae consists of one genus called Homo.

Let us describe any one family member of Hominoidea,

Pan (Chimpanzee):

Tropical forests of Africa are the homeland of the Chimpanzees. Their habitats include varieties of environmental settings, mountains, woodlands, rain forests. The chimpanzees are divided into four subspecies, each occupying different geographical regions. In anatomical traits the chimpanzees are more or less similar to the gorilla.

- Chimpanzees are more active and noisy, diet consists of vegetarian, but occasionally eat ants, meat and fish.
- They pick up small pieces of grass or twigs and prepare a sort of tool, which they poke into termite nests to catch termites and eat the same.
- They live in groups from 2 to 48 members in one group and moves from place to place in search of food.
- Like gorillas, they move quadrupedally on the ground and rarely they walk bipedally.
- Use arms for grooming, holding, building nests, using tools.
- Cranium with a cranial capacity of about 40 cc. is larger than the facial portion.
- Supraorbital ridges are prominent, nasal bones are small, strong projected jaw with large sharp, large and pointed canines.

7. Describe the changes in vertebral column in man due to Bipedal gait?

Answer 7: Bipedal gait

The important changes in the human skeleton due to the assumption of an erect posture and bipedalism are as follows;

1. In man the skull is not suspended but well-balanced or pivoted on the first vertebra of the vertebral column, which is inserted at the base of the skull.
2. In humans, four curves are present: cervical curve is convex in front: thoracic curve is concave in front. This arrangement makes the vertebral column S-shaped. Of these, thoracic and pelvic curves appear during social life but the other two curves, namely, cervical and lumbar, develop gradually, as the child endeavours to sit upright and then walk erect. Apart from the curves, direction of the spines is also changed.
3. With the changes in the axis of the body, the shape of thorax is also changed. The thorax becomes barrel-shaped. The ribs become more curved due to lateral expansion of the chest.
4. The pelvic girdle, in keeping with its major function of transmitting body weight, also undergoes certain changes. Its transverse diameter increases and iliac bones become fan-shaped.
5. The femur is to support the pelvis from below. It does so by its head articulating with the acetabulum which is directed downwards and outwards.
6. The changes in the foot and hand are remarkable. Foot is a supporting organ as the great toe becomes non-opposable.

Man stands erect on his feet and keeps his hands free while walking on his two feet. The hand of man has become specialized to do different kinds of manual work which need precision.

8. Explain the Concept of Race? What are the morphological features of major races?

Answer 8:

Concept of race:

The single human species of *Homo sapiens* exhibits differences in its biological characteristics from one part of the world to another. However, this differentiation occurs only within the possible range of variation in the species-specific characteristics. Several of these variations are prominent and easily identifiable. Several groups of human populations thus differ from one another. Each group of human population that exhibits similarities in its biological that exhibits similarities in its biological characteristics and differs from another group is called a race. The variations between races are mainly morphological, serological, genetical and geographical isolation.

Thus population is defined as a group of human population that inbreeds and shares a common gene pool, at the same time it differs in its gene frequencies from other groups. Physical anthropologists and other scholars denounce the very concept of race. Ashley Montague, the chief protagonist has long held the opinion that races are merely products of human imagination. There is no doubt about the fact of human geographical variability, most manifest on a continental basis. The usual division of our species into races or ethnic groups, however, often depends upon a faulty perception of human differences. For example, the size and form of the human face differs considerably throughout the world and the proportions of the lower limbs and the trunk vary over a broad range. Many more subtle differences between human populations, such as those in frequencies of different blood groups, types of blood protein (including enzyme) polymorphisms and DNA markers can be determined only with the help of serological, biochemical and molecular techniques and sophisticated equipments, but they exist nonetheless.

Diverse as they are, these definitions emphasize first an assumption of the role of geographic isolation in race formation. Second, most agree on the importance of breeding population in forming a collection of genes that sets the race apart.

Race is a classification based on traits which are

- a. hereditary
- b. traits transmitted by heredity which characterise all the members of a related group.

The geographical and morphological characteristics of major races are as follows,

1. Caucasoid: The caucasoids include numerous ethnic groups with diverse racial elements.

Geographical distribution: Various types include Mediterranean type distributed in Portugal, Spain, France, Italy, Greece, Turkey and parts of North Africa, Iran, Afghanistan, Pakistan, Arabia and India. Nordics distributed in Scandinavian, Northern Germany, Northern France, Belgium and British Island and Alpine type in Denmark, Norway, Northern Italy and Asia minor and East Baltic type is distributed in Poland, Russia and Finland etc. with a wide range of variation generalized as follows:

Morphological features: Skin color is light reddish white to olive brown, head hair light blonde to dark brown, fine to medium, straight to wavy, Eye color is light blue to dark brown, dolicocephalic head form, narrow face to medium broad, Nose is leptorrhine to mesorrhine with high bridge.

2. Mongoloid:

Geographical distribution: This race originated in the vast steppe lands of Central Asia from where they have moved to the different parts of the world. This race is divided into four sub-races.

1. Classic Mongol
2. Arctic Mongol
3. Indonesian Mongol
4. American Mongol

Morphological features: They are characterized by yellow or yellow brown skin colour, straight hair form, usually brachycephalic headform, very low nasal root, low and medium broad nasal bridge, usually concave or straight nasal profile, oblique with narrow slit like opening of eyeform and total epicanthic fold in the upper lid, medium to dark brown eye colour, flat face form and variable stature.

3. Negroid

Geographical distribution: Represented by the Kadars, Pulayans (Cochin and Travancore, Irular and Primitive tribes of Wynad. They are considered to be autochthones of India.

Morphological Features: Skin Colour – Dark Brown to Dark Black; Hair - Woolly in form; Head Form - Small, Round, Medium or Long; Forehead is Bulbous; Supraorbital Ridges - Smooth; Eyes - Dark in Colour, Nose Form - Straight, Flat and Broad; Stature- Very Short height or Pygmy.

4. Australoid

Geographical distribution: The Australoids are referred also as Proto - Australoid, Pre - Dravidian, Nisada and Veddid. The representatives of this group are some tribes of South India, namely - Urali, Kannikar, Malapantarram, Paniyan, Kadar etc.

Morphological Features: Skin Colour - Dark Complexion; Hair - Dark colour and Wavy in form; Head Form - Long (Dolichocephalic); Eye - Dark in Colour; Nose Form - Broad; Stature – Short height.