

**B.A./ B.Sc. First Semester**  
**Paper Code: AU-6990 (B)**  
**End Semester Examination, 2014**  
**ANTHROPOLOGY**  
**Paper: First (Basics of Biological Anthropology)**  
**Time Allowed: Three hours**

**Maximum Marks: 30**

**Passing Marks: 12**

**Note:** Attempt questions of all **two** sections as directed. Distribution of marks is given with sections.

**Section – ‘A’**

**1x10=10**

**Note:** Select one of the most appropriate answer from the following objective questions.  
Each question carries 1 mark.

1. (i) Who is pioneer of Synthetic theory of evolution?
  - a. **Gregor John Mendel**
  - b. Charles Darwin
  - c. Johanson
  - d. Dobzhansky
  
- (ii) Human Palaeontology deals with
  - a. Skeletal remains of human
  - b. Extinct remains of man
  - c. Relate human remains with geological stratification
  - d. **All of the above**
  
- (iii) Who discover Homo heidelbergensis?
  - a. Raymond Dart
  - b. Donald Johansson
  - c. **Otto Schoetensack**
  - d. None of the above
  
- (iv) ‘Formative Phase’ of Anthropology is predominated by
  - a. **Ethnographic studies**
  - b. Folklore studies
  - c. Ethnological studies
  - d. Monographic studies
  
- (v) Homo erectus was found during which epoch;
  - a. Oligocene
  - b. Miocene
  - c. **Pleistocene**
  - d. Pliocene
  
- (vi) Opposable thumb is a characteristic of

- a. Tree shrews
- b. Primates
- c. Tarsius
- d. **All of the above**

(vii) The suborder Anthroidea is divided

- a. Platyrrhini
- b. Ceboidea
- c. Catarrhini
- d. **All of the above**

(viii) Who was 'Lucy'?

- a. **Australopithecus africanus**
- b. Homo habilis
- c. Australopithecus aferensis
- d. None of the above.

(ix) Hair form is an example of

- a. **Anthroposcopic variables**
- b. Anthropometric variables
- c. Genetic variables
- d. Special characters

(x) 'Anthropology on Human Nature, Man's Most Dangerous Myth' was written by

- a. J.B.S. Haldane
- b. E. Hooton
- c. **M.F. Ashley Montagu**
- d. Carleton S. Coon

#### Section-'B'

4x5=20

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

2. Write down the meaning and scope of Biological Anthropology.

#### **Answer 2: Meaning and Scope of Biological Anthropology**

##### **Meaning:**

Anthropology is a discipline, which deals with the study of human being (man) holistically. Etymologically the term is derived from two distinct greek words, anthropos', the meaning of which is man and the logos' refers to science or study. Therefore, we define anthropology as a discipline which studies the human beings.

**Definition:** Anthropology is the scientific study of the origins, the behavior and the physical, social, cultural development of humans. It is the study of humankind, past and present, in all its aspects especially human culture or human development.

Anthropology is

- Holistic
- Comparative
- Dynamic

It is the holistic study of all aspects of culture and society in an integrated and comprehensive manner. It offers a total study of all aspects of culture

### **Scope of Anthropology:**

Anthropology is a very broad scope social science discipline. In fact, its broad scope is a defining characteristic of anthropology. Anthropology's broad scope is evident in the sorts of questions that interest anthropologists.

For example, questions might be,

- what makes humans different from other animals?
- Is there such a thing as human nature and if so, what is it like?
- How and why do human groups differ, both biologically and culturally?
- Why have human cultures changed so much in the last 10,000 years?
- How are people who live in industrialized urbanized nations different from "traditional" or "indigenous" people?

We want to know why many Canadians and Australians like beef, which devout Hindus and Buddhists refuse to eat.

In short, anthropologists of one kind or another are liable to investigate almost everything about human beings: our evolution, our genes, our emotions, our behaviors, how people organize their living, our language, our religion, our behaviors and so forth. A good way to emphasize anthropology's broad scope is to say anthropologists are interested in all human beings – whether living or dead, Asian or African or European and that anthropologists are interested in many different aspects of humans, including their technologies, family lives, political systems, religions and languages. No place or time is too remote to escape the notice of anthropologists. No dimension of humankind from skin color to dress customs falls outside the anthropologist's interest.

As anthropology is such a broad discipline, no single anthropologist can master the entire field. Therefore, modern anthropologists specialize in one of the five subfields: archaeology, biological or physical anthropology, anthropological linguistics, and applied anthropology.

### **Scope in Biological anthropology**

Biological (also called Physical) anthropology is concerned with the anatomy and behavior of monkeys and apes, the physical variation between different human populations, and the biological evolution of the human species. The specialization of primatology studies the evolution, anatomy, adaptation, and social behavior of primates, the taxonomic order to which humans belong. We humans or *Homo sapiens sapiens* share 98% of our genes with chimpanzees.

Another type of biological anthropologist studies how and why human populations vary physically due to hereditary, genetic factors. This subfield is human variation. All humanity belongs to a single species—*Homo sapiens sapiens*. One of the most important findings of biological anthropology is that physical/genetic similarities among the world's peoples far outweigh the differences. Indeed, many anthropologists today believe that the term RACE has little biological meaning, no matter how much importance people attach to visible physical differences in their cultural ideas and beliefs.

Another important goal of biological anthropology is to understand how and why the human species evolved from prehuman, ape like ancestors. The specialization that investigates human biological evolution is known as paleoanthropology. Paleoanthropologists have reconstructed the history of how humans evolved anatomically.

Through analyzing fossils, comparing DNA sequences and other methods, the outlines of human evolution are becoming clear. Many scholars agree that the evolutionary line leading to modern humans split from those leading to modern African apes, chimpanzees and gorillas around 5 to 6 million years ago. While most biological anthropologists work in universities or museums as teachers, and researchers, many people trained in biological anthropology apply their knowledge of human anatomy to solve problems.

For instance, specialists in forensic anthropology work with law enforcement and other agencies where they help to identify human remains and identify the circumstances of death. For example, teams of forensic anthropologists exhumed human remains from graves in Bolivia, Guatemala, El Salvador and Haiti to identify victims of political assassination and determined their cause of death.

3. Write short note on

a. Erect bipedalism

b. Order primate

**Answer 3a: Erect bipedalism**

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.

### **Answer 3b: Order Primate**

Order Primate is divided into two broad categories. They are human and non-human primates. Non-human primates are mostly confined to the equatorial belt. In the western hemisphere, the Platyrrhini, commonly known as the New World Monkeys, an infraorder of the Primate, are distributed in Central and South America. The Catarrhini, called the Old World Monkeys, an infraorder of the Primate inhabit Asia and Africa.

#### **Characteristics:**

1. Prehensile limbs. Retention of primitive skeletal features including generalized limb structure and five fingers and five toes on each extremity. These have developed specially as grasping organs for better adaptation to arboreal habit.

2. Nails on digits. Digits on hand and feet bear flat nails and sensitive touch pads underneath in place of sharp claws of earlier mammals. This indicates modification of these parts for grasping instead of clawing. However, a claw known as 'toilet claw' is seen on one of the digits.
3. Opposability of the thumb and big toe.
4. Simple cusp pattern of grinding molars is retained by primitive mammalian dentitions have been lost.
5. Well-developed clavicle, Enlargement of brain, Omnivorous dentition, Longer life span, Longer postnatal growth, developed social behavior.

4. Define Evolution. Enumerate the hypothesis of Darwinism.

#### **Answer 4: Evolution**

Evolution is a gradual process of change. The study of human evolution is one of the most important aspects of physical anthropology. Evolution is the development of dissimilarities between the ancestral and the descendant population. The dissimilarities are caused by changes or modifications in characteristics through evolutionary processes.

Charles Robert Darwin (1809-1882) was an English naturalist born on 12th February, 1809 at Shrewsbury, England. He was appointed a Naturalist in 1831 upon a world survey-ship of British Government H.M.S. Beagle. He went on voyage for five years (1831 to 1836) and explored the fauna and flora of a number of continents and islands. The idea of evolution of new species by natural selection influenced his mind in the journey.

Darwin was much influenced by three publications namely the essay of T.R. Malthus, 1798, titled "*On the principles of populations*" which states that populations increase geometrically and the food sources increase arithmetically, the book written by Sir Charles Lyell entitled "*Principles of Geology*" which explained the gradualism (earth has changed slowly and gradually through ages) and uniformitarianism (fundamental laws operate today on the earth in the same way as they did in the past) and the paper titled "*On the tendency of varieties to depart from original types*" sent to him by Alfred Russel Wallace.

Darwin presented the summary of his theory in a joint paper titled, '*Origin of species*', in 1858 to the Linnean society. Again in 1859, Darwin published his findings in detail in his book titled **The Origin of Species by Natural Selection or The Preservation of Favoured races in the struggle for life.**

## **I. Darwin's theory of Natural Selection:**

- Darwin's theory of natural selection is based on several facts and observations.

### **1. Over production or enormous power of fertility:**

- Every organism tends to increase in geometrical proportions in its population, e.g. *Paramecium* divides by binary fission three to four times in a day. At this rate, the mass of protoplasm equals to 10,000 times of the volume of the earth at the end of 9000<sup>th</sup> generation.

**Salmon** produces 28 millions eggs and **starfish** one million eggs in a season. If all the eggs hatch and the larvae come to reproductive stage, all the seas will be filled with them in a few generations.

- A pair of elephants, the slowest breeder, in the absence of checks may have 29 million descendants at the end of 800th generation.

### **2. Constancy in population of each species in nature :**

However, an abnormal increase in the population of any species is not observed in nature. The population of each species remains more or less constant because the offspring die in large number before they become reproductively active.

The food and other sources do not increase in the same rate of population increase. As a result there is a danger of population over running the food and other facilities. Consequently, more number of individuals are eliminated, because available resources support only a limited number of organisms.

- A great competition exists wherein the individual tries to become better than the other to protect itself from the danger of being eliminated.

### **3. Struggle for existence :**

Over population results in severe competition. Darwin called it struggle for existence. These struggles are of three types.

**i. Intraspecific struggle:** It is the struggle found among the individuals of a species. It is most severe check of the rate of reproduction. This struggle is for food and mating.

**ii. Interspecific struggle:** It is found between different groups of animals. It is most common because most of the species have same food habits. This competition is for food and other needs. Usually the lower animals are more effected by this then the larger ones.

**iii. Struggle with the environment:** Living organisms struggle with the adverse environmental conditions like

floods, cold waves, heat waves, earthquakes etc. The gigantic reptiles, dinosaurs, struggled very much in cretaceous period and perished.

#### 4. Universal occurrence of variations :

- Variations exist in all organisms. These variations may be **useful** or **harmful** or useless. Harmful variations make the organism unfit in the struggle for existence. The variations may be **favoured** or **unfavoured** by the nature. **Beneficial** variations are favoured by the nature.
- Useful variations are quite significant and make the organism fit in the struggle for existence.
- Such variations are inherited by the progeny, so that the progeny has better chances of survival.

#### 5. Natural selection :

- According to Darwin during the struggle for existence, the organisms with beneficial variations alone will survive. Darwin hypothesised that these variations are sorted out by nature through competition. The organisms which are selected by nature are said to be the fittest. This idea of **survival of the fittest** was proposed by **Herbert Spencer**.
- Variations which are useful to the individual in a particular environment would increase that individual's ability to reproduce and leave fertile offspring. These are favoured by nature.
- Less favourable variations would be at disadvantage and organisms possessing them are reproductively less successful. Differential reproductive success exists among organisms.
- The concept of differential reproductive success of various forms is more accurate. Over period of time, the criterion for the success is the reproductive success. The organism that fails to reproduce cannot be represented in future generations however fit it may be in the struggle for existence.

#### 6. Origin of species :

- Darwin concluded that the struggle for existence leading to the survival of the fittest allows the successive generations to become better adapted to the environment.
- All the modifications caused by variations and selected by nature are accumulated from generation to generation till a generation is produced that is more adapted and has more chances of survival.
- Darwin considered that a permanent racial change is the product of fluctuating variations. He also believed that evolution is a gradual, rather than a sudden, biological event.
- Thus, as per natural selection, **new species** are evolved due to cumulative effect of fluctuating variations.



5. Who were the 'Neanderthals'? Write down the characteristic features and phylogenetic position of Neanderthal.

**Answer 5: 'Neanderthals'**

In the course of hominid evolution, three major stages are recognized. These are in sequence,

- a. The stage of Australopithecine
- b. The stage of Homo erectus
- c. The stage of Neanderthal man

The third stage, that is the stage of Neanderthal, is represented by the Neanderthal man, who lived in Europe, North Africa, the Near East and parts of Asia during the period from about 100,000 to 35,000 years ago. The Neanderthal stage is a stage intermediate between the stages of Homo erectus and modern man.

In 1856, a skull cap and some long bones were discovered at Neanderthal, in Germany. Since that time, subsequent discoveries of large number of skeletal materials were made in different parts of Europe. Each of these has a name derived from the locality where it was found. All these show a good number of common characters on the basis of which they may be grouped together and a name, Neanderthal race, may be given to them as a whole.

Hooton divided Neanderthals into two divisions-

- a. Conservative Neanderthals
- b. Progressive Neanderthals

The Neanderthal man flourished during the Mousterian period, which corresponds to the last glacial invasion. The Mousterian culture is represented by points and scrapers of various designs. The skeleton of La Chapelle-aux-saints is a typical example of the Neanderthal race.

In 1908 the skeletal materials were discovered in a small cave in the Correze district, France. A skull with lower jaw, a clavicle, two complete humeri, two incomplete radii, some bones of hand, ilia, femora, tibiae, foot, ribs were found.

**Characteristics:**

1. The cranial capacity is about 1600 cc. which is well above the average capacity of modern Englishman.
2. The skull is heavy-looking and large.

3. The supra orbital regions are of enormous size with large orbits
  4. Nose is broad (platyrrhine).
  5. There is no diastema, canine is of ordinary size.
  6. The vertebral column is short and stout.
6. Write short note on
- a. Old World monkeys
  - b. Genus Homo

### **Answer 6a: Old World monkeys**

The suborder Anthroidea is divided into two infraorders, Platyrrhini and Catarrhini. The Catarrhini also called as Old world monkey consists of two superfamilies, the Cercopithecoidea and Hominoidea.

The Cercopithecoidea (Old World Monkeys) 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 Pygethrix.**

#### **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.

#### **Cercocebus:**

The cercocebus monkeys are commonly called the Mangbeys. The mangabeys are mostly distributed in the swampy forest lands of Africa. They have well-developed ischial callosities, some sort of seat pads. Their tails are very long. Though they exhibit some terrestrial characteristics, they can adapt themselves to arboreal habit. Mostly they live on the ground. At night they take shelter on the trees.

### **Answer 6b: Genus Homo**

The family Hominidae is formed by one genus called Homo which has only one species, Homo sapiens. This Homo sapiens is represented by humans. Man has many diagnostic characteristics by which he is distinguishable from the other members of the suborder Anthroidea.

**General features:**

1. Man walks bipedally with fully erect posture, for which several modifications in the human skeleton have taken place.
2. Man has power of articulated speech
3. Man has long span of life. Growth period is long. Rate of growth development is slow.

**External features:**

1. Upper extremities are much shorter than lower extremities
2. Absence of ischial callosities
3. Absence of tactile hairs.
4. Highly rolled margins of ear.
5. Prominent nose,
6. Both transversely and anteroposteriorly arched foot.

7. Differentiate the characteristics between Man and Ape.

**Answer7:**

Humans walk bipedally with fully erect posture, but though apes can also walk bipedally, their posture is semierect. Moreover, they walk in that manner occasionally. Because of this type of habit many changes in human skeleton have taken place. In apes, upper extremities are greatly elongated in comparison to that in humans. In apes thumbs are short and as a result they have limited precision grip, while humans are capable of precision grip. Human brain is not only larger but also much highly developed than ape brain. It has complex cortical structure. In humans cranial capacity ranges from about 1300 to 1450 c.c., whereas in apes it is much less (Orangutan-365-424c.c.; Chimpanzee 400+500c.c.).

**Skull:**

- In humans cranium is enlarged and larger than facial portion. In apes, facial portion is comparatively larger than cranium. In apes facial portion is comparatively larger than cranium.
- In humans sutures are highly serrated and they continue to be so till later age of life. In apes, sutures are less serrated and become fused in earlier part of life.
- Foramen magnum is placed anteriorly at the base of the human skull. In apes, it is placed posteriorly. As a result in humans head is well-balanced and face is vertical.

**Mandible:**

- In humans mandible is slender and light with a distinct chin, ascending ramus is narrow and high. In apes, mandible is large, massive without chin, ascending ramus is broad, short and large.
- Roots of molars are convergent in humans and divergent in apes.
- In humans canines are small; their crowns are of the same level with those of the other teeth. In apes canines are large, pointed and sharp.

**Foot:**

Feet of humans resemble those of apes in general shape and arrangement of bones. But there are some structural differences because apes use their feet not only as organ for locomotion but also as grasping organ. On the other hand, in humans feet are used as grasping organ. Humans use feet for locomotion. Feet support and transmit the body weight.

- In apes great toe is opposable while in humans great toe is not opposable
- In apes the third toe is the longest and in humans, either the first or second toe is the longest.
- In apes lateral toes are well developed. In humans these toes show reduction in size. The fifth toe is the smallest one.

8.Explain the differences between Caucasoid and Mongoloid race?

**Answer 8:**

Racial classifications are made on the basis of certain genetic traits. Such types of traits used in classification of races are referred to as racial criteria. Some of the important characters used for racial determination are;

S.No.	Characters	Caucasoid race	Mongoloid race
1.	Skin color	Light reddish white to olive brown. Some are brown	Light yellow to yellow-brown. Some are reddish brown.
2.	Head hair	Light blond to dark brown in colour Fine to medium in texture Straight to wavy in form.	Brown to brown black in colour. Coarse in texture. Straight in form.
3.	Body hair quantity	Moderate to profuse.	Sparsely distributed.
4.	Eye	Colour is light blue to dark brown.	Brown to dark brown. Mongoloid eye fold is very often.
5.	Head form	Dolichocephalic to brachycephalic Height is medium to very high.	Predominantly brachycephalic. Height is medium
6.	Face	Narrow to medium broad	Medium broad to very broad. Cheek bones are high and flat.

7.	Nose	Leptorrhine to mesorrhine. Usually bridge is high.	Mesorrhine to platyrrhine. Usually bridge is low to medium.
8.	Stature	Medium to tall	Medium to short.