

AS-2955

Model Answer

B.A/B.Sc.- (Hon's) (First Semester)

Examination- 2013

Anthropology and Tribal Development

Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

Paper-I: Introduction to Physical/Biological anthropology

Full marks: 30

Passing Marks: 12

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

Section A

(Multiple choice questions)

Q1) Select the correct answer from the options: 10 x 1= 10

I) Who is pioneer of Synthetic theory of evolution?

i) G. J. Mendel; ii) C. Darwin; iii) Johanson; iv) Dobzhansky

Answer: iv) Dobzhansky

II) Who wrote the book "Duskimplasm"?

i) Darwin; ii) Lamarck; iii) Weismann; iv) Dobzhansky

Answer: iii) Weismann

III) Who is pioneer of organic evolution?

i) G. J. Mendel; ii) C. Darwin; iii) Johanson; iv) Robert Hook

Answer: ii) C. Darwin

IV) In which year the book "Philosophy Zoologique" was published.

i) 1819; ii) 1871; iii) 1809; iv) 1848

Answer: iii) 1809

V) Who wrote the book "The Origin of Species by means of natural selection".

i) G. J. Mendel; ii) Charls Darwin; iii) Lamarck; iv) Carolus Linnaeus

Answer: ii) Charls Darwin

VI) Who was 'Taung' baby?

i) Australopithecus aferencis; ii) Australopithecus africanus; iii) Australopithecus boisie; iv) None of the above

Answer: ii) Australopithecus africanus

VII) Who wrote the book 'Systema Nature'?

i) Darwin; ii) Lamarck; iii) Carolous Linnaeous; iv) None of the above

Answer: iii) Carolous Linnaeous

VIII) Who give the example of Giraffe as an inheritance of acquired character?

i) Darwin; ii) Mendel; iii) Lamarck; iv) Spencer

Answer: iii) Lamarck

IX) Who discovered Cro-magnon?

i) Raymond Dart; ii) Donald Johanson; iii) M.L. Lartet; iv) Leaky

Answer: iii) M.L. Lartet

X) In which year 'Taung baby' was discovered?

i) 1950; ii) 1924; iii) 1873; iv) 1868

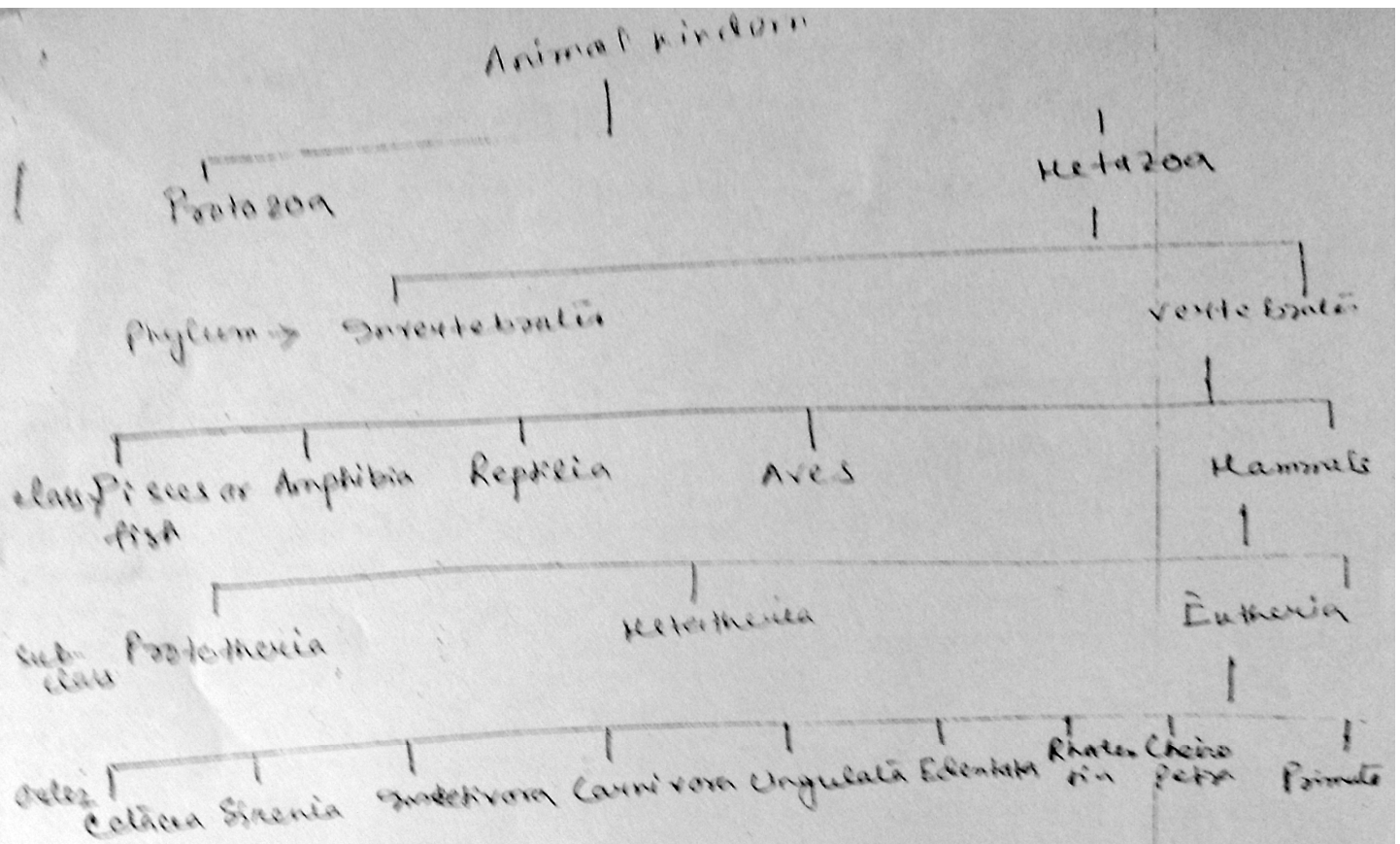
Answer: ii) 1924

Section B:

Long answer type questions (Attempt any Four) (4 x 5= 20)

2. Define primate. Write down the man's position in animal kingdom in details.

Q2. Answer: Primates are "Unguiculate, clavicate, placental mammals, with orbits encircled by bone; three kinds of teeth, at least at one time of life; brains always with a posterior lobe and calcarine fissure; the innermost digits of at least one pair of extremities opposable, hallux with a flat nail or none; a well-developed caecum; penis pendulous; testes scrotal; always two pectoral mammae."(Mivart, 1873).



Metazoa — Higher form of multicellular animals shows bisexual reproduction i.e. offspring gets chromosomes equally from both the parents.

Vertebrates —

- ① Well developed vertebral column
- ② The spine surrounded and protected by spinal cord.
- ③ Internal skeleton of bone or cartilage.

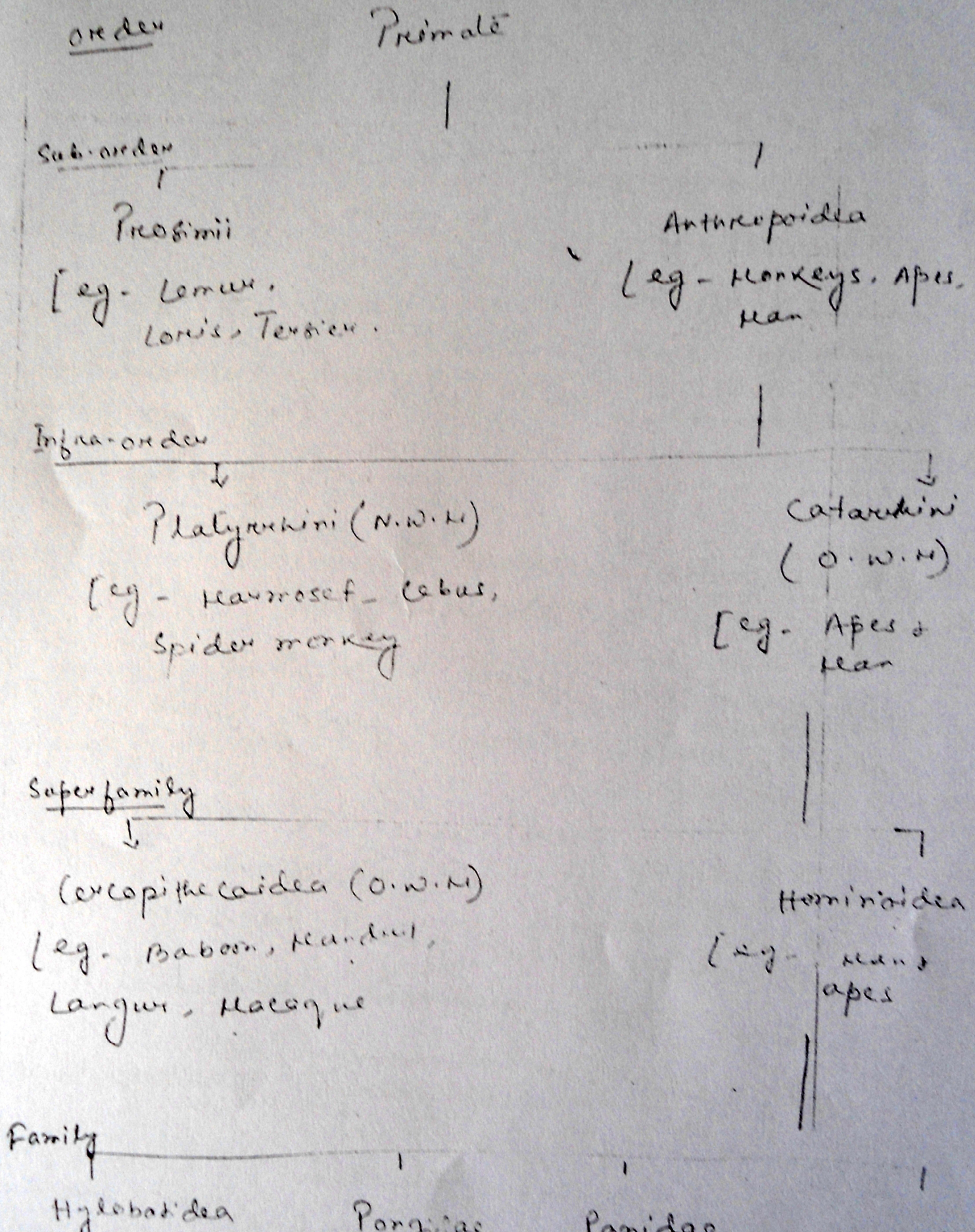
Mammals —

- ① Presence of mammary gland.
- ② " " sweat & sebaceous gland.
- ③ " " body hair
- ④ Heart divided into 4 part.

Eutheria —

- ① placental mammals.
- ② Eggs are shed from the mother's ovary.
- ③ After fertilization egg implants itself into womb

Assess the position of man in the order Primate.



Q3. Answer: Bipedalism is not unique to humans, though our particular form of it is. Whereas most other mammalian bipeds hop or waddle, we stride. *Homo sapiens* is the only mammal that is adapted exclusively to bipedal striding. Unlike most other mammalian orders, the primates have hind-limb-dominated locomotion. Accordingly, human bipedalism is a natural development from the basic arboreal primate body plan, in which the hind limbs are used to move about and sitting upright is common during feeding and rest.

The initial changes toward an upright posture were probably related more to standing, reaching, and squatting than to extended periods of walking and running. Human beings stand with fully extended hip and knee joints, such that the thighbones are aligned with their respective leg bones to form continuous vertical columns. To walk, one simply tilts forward slightly and then keeps up with the displaced centre of mass, which is located within the pelvis. The large muscle masses of the human lower limbs power our locomotion and enable a person to rise from squatting and sitting postures. Body mass is transferred through the pelvis, thighs, and legs to the heels, balls of the feet, and toes. Remarkably little muscular effort is expended to stand in place. Indeed, our large buttock, anterior thigh, and calf muscles are virtually unused when we stand still. Instead of muscular contraction, the human bipedal stance depends more on the way in which joints are constructed and on strategically located ligaments that hold the joints in position. Fortunately for paleoanthropologists, some bones show dramatic signs of how a given hominin carried itself, and the adaptation to obligate terrestrial bipedalism led to notable anatomic differences between hominins and great apes. These differences are readily identified in fossils, particularly those of the pelvis and lower limbs.

Although we are bipedal, our pelvis is oriented like that of quadrupedal primates. The early bipedal hominins assumed erect trunk posture by bending the spine upward, particularly in the lower back (lumbar region). In order to transfer full upper-body mass to the lower limbs and to reposition muscles so that one could walk without assistance from the upper limbs and without wobbling from side to side, changes were required in the pelvis—particularly in the ilia (the large, blade-shaped bones on either side), the ischia (protuberances on which body rests when sitting), and the sacrum (a wedge-shaped bone formed by the fusing of vertebrae). Hominin hip bones have short ilia with large areas that articulate with a short, broad sacrum. Conversely, great-ape hip bones have long ilia with small sacral articular areas, and sacra of the great apes are long and narrow. The human pelvis is unique among primates in having the ilia curved forward so that the inner surfaces face one another instead of being aligned sideways, as in apes and other quadrupeds. Curved ilia situate some of the gluteal muscles on the side of the hip joint, where they steady the pelvis as the foot swings forward during a step. This special mechanism allows us to walk smoothly, with only slight oscillations of the pelvis and without gross side-to-side motions of the upper body. Humans have short ischia (and long lower limbs), facilitating speedy actions of the hamstring muscles, which extend the thigh at the hip joint, while great apes have long ischia (and short hind limbs), which give them powerful hip extension for climbing up trees. Characteristically, a human

thighbone is long and has a very large, globular head and a short, round neck; at the knee a prominent lateral ridge buttresses the groove in which the kneecap lies. The femurs are farther apart at the hips than at the knees and slant toward the midline to keep the knees close together. This angle allows anthropologists to diagnose bipedalism even if the fossil is only the knee end of a femur. The femurs of quadrupedal great apes, on the other hand, do not converge toward the knees, and the femoral shafts lack telltale angling.

Human feet are distinct from those of apes and monkeys. This is not surprising, since in humans the feet must support and propel the entire body on their own instead of sharing the load with the forelimbs. In humans the heel is very robust, and the great toe is permanently aligned with the four diminutive lateral toes. Unlike other primate feet, which have a mobile midfoot, the human foot possesses (if not requires) a stable arch to give it strength. Accordingly, human footprints are unique and are readily distinguished from those of other animals.

Q4. Answer: The Synthetic Theory of evolution or Modern Synthetic emerged around the middle of the 20th century from the ideas of three authors specialized in different branches of the evolution: Theodosius Dobzhansky in genetics, Ernst Mayr in the species of living beings and George G. Simpson in the great categories of the organisms.

The Modern Evolutionary Synthesis has incorporated the latest advances of science in biology and genetics. If the neo-Darwinism or neo-Darwinian Theory explicitly incorporated the random variations or mutations within the population, the Synthetic Theory of evolution incorporates the random variations or mutations of the genetic information and accepts this mechanism as part of the evolution that, together with the mechanism of the natural selection, produce evolution as a whole.

The diversification emerges slowly, usually through gradual changes, and originates in the specialization. Therefore, it is part of the Gradualism trend as the initial Theory of Darwin.

The basis of this theory was provided by Dobzhansky in his book 'Genetics and Origin of Species' while the designation 'Synthesis Theory' was proposed by Huxley. Though many other scientists like Muller, Fisher, Wright, Mayr, etc. have contributed a lot other the final shape of the 'modern Synthetic Theory of Evolution' was given by Stebbins.

There are five basic factors involved in the process of organic evolution. These are (i) Gene mutation, (ii) Chromosomal mutation, (iii) Genetic recombination, (iv) Natural selection and (v) Reproductive isolation while the first three factors provide genetic variability; the last two are responsible for giving a direction to the evolutionary process.

Accessory Processes:

Besides the five factors described, there are two accessory processes as follows:

1. Migration and Hybridization:

2. Genetic Drift:

Concerning the evolutionary leaps and Modern Synthetic Theory, the controversy is currently present because of the fossil registry, about which there is not a clear position within the scientific community. (Explain briefly all factors).

Q5. Answer: Points to be covered:

- a. Brief introduction about erect posture.
- b. Changes due to erect posture in skull.
- c. Changes due to erect posture in vertebral column
- d. Changes due to erect posture in Thorax
- e. Changes due to erect posture in Pelvis
- f. Changes due to erect posture in Femur
- g. Changes due to erect posture in Foot.

Q6. Answer. Changes occurred in human due to the posture change in the course of biological evolution

- a. Brief introduction about biological evolution of man and human posture
- b. Changes due to bipedal gait in skull.
- c. Changes due to bipedal gait in vertebral column
- d. Changes due to bipedal gait in Thorax
- e. Changes due to bipedal gait in Pelvis
- f. Changes due to bipedal gait in Femur
- g. Changes due to bipedal gait in Foot

Q7. Answer: Distinguish between Dryopithecus & Ramapithecus.

Sl.No.	Dryopithecus	Ramapithecus
1	Incisors are small but canines are large.	Incisors and canine are smaller than molars.
2.	Penta cusp i.e., “Y-%” pattern was present which is well known as “Dryopithecus pattern”.	Penta cusp i.e., “Y-%” pattern was absent among Ramapithecus.
3	Dental archaed is not parabolic.	Dental archaed (palate) is parabolic.
4	Protruding face forwardly	Less protruding face
5	Forelimbs were not free and dentition	Forelimbs were free for hunting and

	pattern help them in defencing.	defence.
6	Possibly neither brachiator nor biped.	Probably biped and walking erectly

Q8. Answer: a. Mutation the sudden change in the genetic makeup of an organism. The concept was first introduced by Hugo-de-Vries during early twenties. It is of various types for example;

Gene Mutation: The heritable characters of an individual depend on the genes those control them. These genes are portions of DNA molecules which have a complex polymer of nucleotides. Any structural change occurring in the chemistry of DNA molecule is called gene mutation. Changes in the genes alter the phenotypic characters of the individuals.

Chromosomal Mutation (Chromosomal Aberration): Specific types of genes present in specific amount of DNA at specific location is the characteristics of a particular species. A change in the number of chromosomes (aneuploidy, polyploidy, etc) or in the structure due to deletion, duplication, addition, inversion, or translocation brings about variations in the organisms phenotypes etc.

b. **Theory of catastrophism & cataclysm: (George Cuvier; 19th Century) (1769-1832). Earth was formed by natural calamities (Viz. Earthquake, floods etc.) and the new higher creatures were created from time to time.** Extinction was not widely accepted before 1800. Extinction was established as a fact by Georges Cuvier In 1796, and was critical for the spread of uniformitarianism inspite of the fact that Cuvier viewed extinctions as evidence in favor of catastrophism and opposed Lamarckian evolution theories. Over 99% of all species that have ever existed are now extinct. Extinctions occur at an uneven rate. There have been 6 major and many minor (up to 20) extinctions observed in the fossil record. Nearly all divisions among geological eras, eons and Periods are marked by extinctions and originations.

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