

**U.G. 6th Semester Examination - 2022**

**ZOOLOGY**

**[HONOURS]**

**Course Code : ZOOL-H-CC-T-14**

**[Evolutionary Biology]**

Full Marks : 40

Time : 2½ Hours

*The figures in the right-hand margin indicate marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

1. Answer any **five** questions of the following:

2×5=10

- a) Write down any two characteristics of *Eohippus*.
- b) What is meant by an extinction event? Which extinction event brought about the age of dinosaurs?
- c) How does stabilizing selection differ from disruptive selection?
- d) Define fitness in terms of natural selection. How is fitness related with adaptation?
- e) Define genetic drift with an example.

- f) Point out any two areas of ambiguity inherent in the statement of the Biological Species' Concept.
- g) Write down two specific points of difference between hominid and primate skeletons.
- h) Define phylogeny. How does a phylogeny differ from a cladogram?

2. Answer any **two**: 5×2=10

- a) Write short notes on any **two**: 2½+2½
  - i) Adaptation in Galapagos finches
  - ii) Founder Effect
  - iii) Heterozygous superiority
- b)
  - i) Give examples of premating and postmating isolating mechanisms (two of each).
  - ii) Explain the effect of post mating isolating mechanisms on formation of hybrids in natural populations.
  - iii) Define selection coefficient. How is it calculated? (1+1)+1+(1+1)
- c)
  - i) Define and differentiate between homology and homoplasy. Which one is

more important in the context of constructing a phylogeny? Why?

- ii) What is an outgroup? Explain what is meant by the term “rooting a tree”.

$$(1+\frac{1}{2})+1+(1+1\frac{1}{2})$$

- d) i) What are the assumptions that must hold true for Hardy-Weinberg equilibrium to exist?

- ii) At what allelic frequency is the heterozygous genotype (Aa) twice as frequent as the homozygous genotype (aa) in a H-W population? Show your working.

- iii) What is parsimony? 1+3+1

3. Answer any **two**: 10×2=20

- a) i) White wool is dependant upon a dominant allele **B** and black wool upon its recessive allele **b**. If 9 black sheep are detected in a population of 900, estimate the allelic frequencies. 4

- ii) What is meant by speciation? Differentiate between allopatric, sympatric and parapatric modes of speciation. 6

- b) Explain, briefly, the concept of neutral evolution. Add a note on molecular clock. Give examples. 6+4

- c) i) Trace the development of the horse sequentially through its various evolutionary stages with particular reference to changes in its limbs and skull. 6

- ii) Give a brief idea of construction and interpretation of a phylogenetic tree using distance methods. 4

- d) i) Given gene *A* is at frequency 0.2 and gene *B* is at frequency 0.6, find the equilibrium frequencies of the gametes AB, Ab, aB, ab. 4

- ii) Contrast the characters of *Sahelanthropus* with *Homo* and comment on their differences. 6

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