B.Sc. 6th Semester (Honours) Examination, 2024 (CBCS)

Subject : Zoology

Course : CC-XIV

(Evolutionary Biology)

Time: 2 Hours **Full Marks: 40**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Group – A

1. Answer *any five* questions of the following: 2×5=10

(a) Briefly mention the arguments, why RNA is considered as initial genetic material instead of DNA.

(b) Define mass extinction with one example.

(c) What is meant by 'bottle neck' phenomenon?

(d) What is meant by 'hitchhiking' phenomenon in evolution?

(e) Mention two similarities of Darwinism and Lamarckism.

(f) Write the four conditions of Hardy–Weinberg Law.

(g) Explain adaptive radiation in Darwin's finches.

(h) Distinguish between parapatric and allopatric modes of speciation.

Group – B

2. Answer *any two* of the following questions: 5×2=10

(a) Define gene frequency. What are the forces (according to New-Darwinism or Modern Synthetic Theory) those can change gene frequency? Write basic differences of natural selection and genetic drift as they forces (mechanisms) of evolution. 1+2+2

(b) What are the trends in the line of evolution of *Homo sapiens*? Which one character is said as key character in this line of evolution and why? 3½+1½

(c) What is Geological Times Scale (G.T.S.)? Write the evolutionary history of Ordovician and Silurian period of Paleozoic era. 2½+2½

(d) Explain phylogenetic tree. Define root, node and terminals/taxa of a phylogenetic tree. Write the significance of maximum parsimony. 1+3+1

Group – C

3. Answer *any two* of the following questions: 10×2=20

(a) Define and explain in brief absolute fitness, relative fitness and selection coefficient with real or hypothetical examples. Explain the mechanism of 'Kin Selection' taking W. D. Hamilton's formula. 6+4

(b) Under condition of random mating (panmixia) in a large population where all genotypes are equally viable, which statement/statements is/are true?

(i) 'Gene frequencies' of a particular generation depends on the 'gene frequencies' of the previous generation and not on the 'genotype frequencies'.

(ii) 'Genotype frequencies' of a particular generation depend on the 'genotype frequencies' of the previous generation, not on the 'gene frequencies'.

(iii) The frequencies of different genotypes produced through random mating depend only on the 'gene frequencies', not on 'genotype frequencies'.

Explain in favour of your selected statement/statements taking hypothetical or real example. You may take this data

In human population taster of phenylthiocarbamide gene is dominat and denoted as 'T' and nontaster as 't'. Genotype frequencies of two population 'A' & 'B' are here given.

Population 'A' : TT = ·45, Tt = ·30, tt = ·25

Population 'B' : TT = ·40, Tt = ·40, tt = ·20

Mention in brief the algebraic relation in H-W equilibrium condition. 8+2

(c) Briefly elucidate the evolutionary history of Modern day Humans. What is Human Genome Project? How does it help in studying molecular evidence? 5+1+4

(d) Define 'Neutral Theory' of Evolution. Explain it and provide evidences in favour of this theory. Explain 'Molecular Clock' hypothesis taking D = 2rt. 2+4+2+2