2021

ENVIRONMENTAL SCIENCE— HONOURS

Paper : CC-12

(Organismal and Evolutionary Biology)

Full Marks : 50

The figures in the margin indicate full marks.

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

1. Answer ***any five*** questions: 2×5

(a) State Mendel's law of segregation.

(b) What do you mean by fibrous proteins and globuler proteins?

(c) What is population bottleneck?

(d) State Hardy-Weinberg equilibrium.

(e) Define unsaturated fatty acids with one example.

(f) What is the difference between mis-sense mutation and nonsense mutation?

(g) Briefly state molecular clock hypothesis.

2. Write short notes on ***any two***: 5×2

(a) RNA world hypothesis

(b) Genetic drift

(c) Modern synthetic theory of evolution

(d) Secondary structural motifs of protein.

3. Answer ***any three*** questions:

(a) State four most important assumptions of Hardy-Weinberg principles. An autosomal locus has two alleles—a wild type (M) and a recessive mutant (m). In a population of 2000 individuals, 2 were found to show the mutant phenotype. 10 individuals were found to be heterozygote. Calculate the frequency of 'm' allele in this population. The population is not in H-W equilibrium.
Explain the concept of reproductive isolation in relation to speciation. 3+4+3

(b) What is convergent evolution and how is it related to the evolution of analogous organs? How does population size affect rate of evolution? Give an example of neutral evolution. 4+4+2

(c) Write the basic tenets of the theory of natural selection. Compare the concept of variation as proposed by Darwin and Lamarck. Explain the concept of inheritance acquired characters. 4+3+3

(d) Write the theories of origin of life. Explain the Oparin-Haldane model of origin of life. What do you mean by primodial soup? 4+4+2

(e) What is a test cross? If two heterozygous 'Tt' tall sweet pea plants are crossed to produce 1000 offsprings, then deduce the expected number of tall (two genotypes separately) and dwarf progeny. Explain the concept of independent assortment with a suitable example. 2+4+4

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