

U.G. 5th Semester Examination - 2020

ENVIRONMENTAL SCIENCE

[HONOURS]

Course Code : ENVS(H)CC-P-12/PR

[PRACTICAL]

(Evolutionary Biology)

Full Marks : 20

Time : 2 Hours

The figures in the right-hand margin indicate marks.

Answer **any two** of the following : $10 \times 2 = 20$

1. In a population that is in the Hardy-Weinberg equilibrium, 38% of the individuals are recessive homozygotes for a certain trait. In a population of 14500, calculate the percentage of homozygous dominant individuals and heterozygous individuals.
2. In a study with mice a researcher found 26 albino individuals in a total population of 6000. This form of albinism is controlled by a single gene with two alleles: albinism is recessive to normal skin coloration. Calculate the expected allele frequencies and genotype frequencies if the population was in the Hardy-Weinberg equilibrium.

3. A group of scientists is studying a certain gene in a population of fish. This gene has two alleles: a dominant allele (F), and a recessive allele (f). The scientists collected allele frequency data for the gene twice over a 12 year period. The results are presented in the following table.

Year	Frequency of allele F	Frequency of allele f
2006	0.43	0.57
2018	0.16	0.84

After analyzing the data, the scientists determined that because the allele frequencies changed, the fish population was not in the Hardy-Weinberg equilibrium during the time period studied.

Comment on the most probable reason for the population to have deviated from the Hardy-Weinberg equilibrium.

4. A group of scientists is studying a certain plant species. Previous genetic analysis has shown that flower colour in this species is controlled by a single gene that has two alleles: a dominant allele (B) that is associated with light blue flowers, and a recessive allele (b) that is associated with white flowers. The

scientists collected data about a population of these plants to determine the population's flower colour allele frequencies. They found that out of 800 plants in the population, 288 plants had white flowers.

Assuming that the population is in the Hardy-Weinberg equilibrium, calculate the number of plants in the population that have the genotype BB ?
