Name **26P257**

Reg. No .....

M. Sc. DEGREE END SEMESTER EXAMINATION - APRIL 2026

SEMESTER 2 : BOTANY

COURSE : **24P2BOTT08 : GENETICS AND EVOLUTION**

(For Regular 2025 Admission and Improvement/Supplementary 2024 Admission)

Time : Three Hours Max. Weights: 30

PART A

Answer any 8 questions **Weight: 1**

1.	Define mutualism with an example.	(A, CO 4)
2.	Differentiate between convergent and divergent evolution with examples.	(U)
3.	Define epigenetic mark.	(U, CO 3)
4.	Why is recombination frequency used to calculate map distance?	(A, CO 1, CO 2)
5.	Differentiate between physical mapping and genetic mapping.	(U)
6.	Give a comparative account on Macro and micro evolution.	(A, CO 4, CO 6)
7.	What is Hamilton's rule in Kin Selection?	(U)
8.	What is the rationale for random mating in Hardy-Weinberg populations?	(U, CO 1, CO 2)
9.	Explain the Biogenesis experiment of Miller (1953).	(A, CO 4)
10.	Discuss about the molecular phylogeny and enlist the tools for the phylogeny studies.	(A, CO 5)

(1 x 8 = 8)

PART B

Answer any 6 questions **Weights: 2**

11.	Write an short essay on coevolution with suitable examples.	(A, CO 3)
12.	Signify the phenomenon of genetic drift in natural selection.	(A, CO 4, CO 6)
13.	Explain the patterns of speciation with suitable examples.	(A, CO 4, CO 6)
14.	Discuss how DNA methylation and chromatin remodelling regulate gene expression.	(U)
15.	Explain the chromosome theory of linkage.	(U, CO 1, CO 2)
16.	What is Lyon hypothesis? How does it relate to 'X' Chromosome inactivation?	(U)
17.	Explain the mechanism of balancing selection and its role in maintaining genetic diversity.	(A, CO 1, CO 2)
18.	Discuss the implications of the Hardy-Weinberg law for understanding evolutionary processes.	(An, CO 1, CO 2)

(2 x 6 = 12)

PART C

Answer any 2 questions **Weights: 5**

19.	Discuss the various factors that may affect the Hardy-Weinberg equilibrium in a population.	(E, CO 1, CO 2)
20.	Explain the significance and mechanism of X-chromosome inactivation in humans.	(An, CO 3)
21.	Genomic imprinting happens prior to fertilization; it involves a change in a single gene or chromosome during gamete formation. Explain this process with an example.	(An, CO 3)
22.	Sepia eyes, spineless bristles, and striped body are three recessive mutations in Drosophila found on chromosome 3. A genetics student crosses a fly homozygous for the alleles encoding sepia eyes, spineless bristles, and striped body with a fly homozygous for the wild-type alleles—encoding red eyes, normal bristles, and solid body. The female progeny are then testcrossed with males that have sepia eyes, spineless bristles, and striped body. Assume that the interference between these genes is 0.2 and that 400 progeny flies are produced by the testcross. If the genes for sepia eyes, spineless bristles, and striped body are located at map positions 26.0, 58.5, and 62.0 on chromosome 3, predict the phenotypes and proportions of the progeny resulting from the testcross.	(An, CO 1, CO 2)

(5 x 2 = 10)

OBE: Questions to Course Outcome Mapping

CO	Course Outcome Description	CL	Questions	Total Wt.
CO 1	Explain the Hardy-Weinberg equilibrium and evolutionary forces responsible for shaping the gene pool.	A	4, 8, 15, 17, 18, 19, 22	18
CO 2	Analyze and solve problems related to map distance, gene order, Coefficient of Coincidence, Interference and population genetics.	An	4, 8, 15, 17, 18, 19, 22	18
CO 3	Explain the effect of epigenetic in inheritance of characters.	A	3, 11, 20, 21	13
CO 4	Explain the process of evolution.	A	1, 6, 9, 12, 13	7
CO 5	Describe modern theories of evolution.	U	10	1
CO 6	Discuss adaptive radiation and speciation.	U	6, 12, 13	5

Cognitive Level (CL): Cr - CREATE; E - EVALUATE; An - ANALYZE; A - APPLY; U - UNDERSTAND; R - REMEMBER;