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M.Sc. Examination 2022
Semester - I
Biotechnology
Core Course - III
(Genetics and Molecular Biology)

Time: 3 hours

Full Marks: 40

Questions are of value as indicated in the margin

Answer any *four* questions:

1. What is retroposons? How they differ from retro virus like elements? Briefly describe the genetic basis of coloured mosaic kernel of maize. Describe the role of transposable genetic elements in spread of resistance traits in Bacteria.

2+2+3+3=10
2. Describe how molecular markers are employed in QTL mapping. What is genetic polymorphism? How DNA fingerprinting is done with DNA based molecular markers? Describe in details with proper diagram using a single marker system.

2+2+2+4=10
3. What are the main proponents Hardy-Weinberg principle? Mention the conditions for which a genetic population follow this principle? Describe the genetic basis of Alzheimer's disease. Briefly describe the procedure of genetic mapping followed in interrupted mating experiment on conjugation process of *E. coli* with proper diagram.

2+2+3+3=10
4. Draw a neatly labelled diagram showing attenuation control of tryptophan operon in *E. coli* (no description necessary). Briefly state four major examples of post-translational modifications of proteins that are known to undergo in an eukaryotic system. Define the basic function of transcription factors?

4 + 4 + 2 = 10
5. Briefly explain how GAL4 protein coordinately regulates transcription of Gal 1,10 genes in yeast. Draw a suitably labeled diagram to show the Kakidani & Ptashne experiment that indicate modular nature of eukaryotic transcription factors (no description necessary).

5 + 5 = 10
6. Write short notes on any four:

2.5 X 4 = 10

 - i) Hybrid dysgenesis in *Drosophila*
 - ii) Biological species concept
 - iii) Suppressor gene
 - iv) Homeo domain
 - v) Synthetic lethality