M.Sc. Examination, 2016
Semester-I
Biotechnology
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 Law of independent assortment? How does this concept linked with the linkage phenomenon? How many different types of gametes may be generated from a male through gametogenesis? How can you test whether two genes are linked or not? What are the different extensions of typical Mendelian Principles? Discuss each with proper example. 2+1+1+2+4=10
2. How does monogenic trait differ from polygenic trait? How can the number of genes be calculated controlling a polygenic trait? What do you mean by a molecular marker? How does a molecular marker differ from a gene? What do you mean by QTL? How QTL mapping is done with molecular marker? 2+1+2+1+1+3=10
3. What do you mean by "Hary Weinberg Law"? In a segregating F_2 population (segregating for two gene A and a) out of 1000 individuals 490 are AA, 420 are Aa and 90 are aa. Find out the frequency of each genes A and a among the F_2 individuals?
   What is the definition of a species in genetics? Describe in details the mechanism of speciation with proper example. 2+3+2+3=10
4. "Induction of lytic cycle requires derepression of cro gene" – explain briefly (no diagram needed). Explain feedback inhibition with the help of a schematic diagram and examples. Draw a labelled schematic diagram to show the assembly of transcription initiation complex as it occurs in a typical mammalian system. 3+3+4=10
5. Briefly mention some of the protein products of a proto-oncogene. Mention how a proto-oncogene is converted into an oncogene. Draw a labelled diagram to show the mechanism by which p53 gene product exerts its anti-tumour roles. Briefly explain how the HIV-1 virus destroys the immune system of a mammalian host. 3+2+3+2=10
6. Write short notes on ***any four*** **:** 2.5×4=10
   (a) Tumor suppressor gene
   (b) Okazaki fragments
   (c) Genetic polymorphism
   (d) Hfr strain in *E.coli*
   (e) C-value paradox
   (f) Morphogen

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