2062

M.Sc. (Biotechnology) Second Semester

MBIO-201: Molecular Biology

Time allowed: 3 Hours Max. Marks: 80

NOTE: *Attempt five questions in all, including Question No. I which is compulsory and selecting one question from each Unit.*

x-x-x

I. Attempt the following:-

a) Explain Griffith's transformation experiments. Highlight the conclusion.

b) What is sigma factor? If a cell has deletion in sigma factor gene, how it will affect transcription? Discuss.

c) How Rb regulates the cell cycle? Discuss.

d) How RFLP is different from AFLP? Discuss. (4x4)

UNIT - I

II. a) Why DNA replication is said to be bidirectional and discontinuous? Explain.

b) What is telomerase and how it works?

c) What is PCR? Discuss its basic requirements and various steps to carry out the PCR reaction. What is Tm of the primers and how is it calculated? What property of Taq polymerase makes it useful for PCR and what is its drawback? (4,5,7)

III. a) There is a double strand break in DNA. How many ways are possible to resolve the Holliday junction for successfully repairing it by homologous recombination? Explain with help of diagram.

b) Differentiate between FLP/FRT and Cre/Lox recombination. (9,7)

UNIT - II

IV. a) What is a promoter? Discuss and differentiate basic promoters and initiation of transcription in prokaryotes and eukaryotes? How is a eukaryotic primary transcript different from finished mRNA? Discuss the process.

b) How does aminoacyl tRNA synthetases carry out Proof reading? How many aminoacyl-tRNA synthetase are there for each amino acid? Discuss the two step aminoacylation reaction. How it differentiates between the aminoacids of valine and isoleucine? (8,8)

V. Write in brief about:-

a) Proteolytic cleavage in post translational modification

b) How many ATPs and GTPs are utilized for incorporation of one amino acid in peptide chain?

c) Describe two distinctly different ways in which the *lac* operon is controlled by the overall availability of glucose.

d) Role of E, A and P site on ribosome during translation (4x4)

UNIT - III

VI. a) How the fusion of cancer cells with normal cells often suppresses the expression of the tumprigenic phenotype. Explain.

b) How proto-oncogenes are converted into oncogenes? Differentiate between c-oncogene and v-oncogene with help of example.

c) Why P53 is known as guardian of the genome? Is it oncogene or antioncogene? How it regulates the cell division? Discuss in detail. (4,5,7)

VII. a) What is ribozyme? Discuss its properties. Which was the first ribozyme to be discovered? The ribosome is ribozyme. True or false. Give reason.

b) What is antisense technology? Discuss any two strategies of gene silencing including one for development of Flavr Savr tomato. (8,8)

UNIT - IV

VIII. a) What is YAC? In which type of cloning experiments these vectors are preferred? Discuss the method for gene cloning in a YAC vector and screening of transformants.

b) What is NGS and how is it different from Sanger's sequencing method? Discuss in detail about pyrosequencing. (8,8)

IX. a) What is the difference between genome mapping and gene sequencing? What type of information we get from genetic and physical genome maps? How it can be correlated with the diagnosis of disease? Discuss.

b) Describe flourescence *in situ* hybridization and its application to study gene location. (8,8)

x-x-x