Register Number: ……

M.TECH. DEGREE EXAMINATIONS: APRIL/MAY2010

Second Semester

BIOTECHNOLOGY

BTY507: Advanced Molecular Biology and Genetic Engineering

Time: Three hours **Maximum Marks: 100**

Answer All Questions:

PART A (10 x 2 = 20 Marks)

1. Draw and mention the tertiary structure of tRNAs.
2. What are the three forms of DNA and their prevalence?
3. Which enzyme is involved in 5' capping of mRNA? Also write which technique allows you to identify the primary transcript with 5' cap.
4. List atleast five post-translational modifications with their importance.
5. What are DNA modifying enzymes? How are they different from manipulating enzymes?
6. What are the unique features of M13 Phage vectors.
7. What is the difference between a reporter gene and selectable marker? Explain with suitable examples.
8. In DNA probe preparation, what does end labeling refer to? Explain the technique with enzymes needed.
9. Why chemical method of sequencing is less popular than Sangers method?
10. Write the National level regulations governing GMO release in India.

PART B (5 x 16 = 80 Marks)

11. (a) (i) Draw the detailed molecular structure of a single strand DNA. (8)

(ii) What are replisomes? Describe the DNA replication process in prokaryotes. (8)

(OR)

(b) Explain all the different systems of DNA repair in detail.

12. (a) (i) Narrate the steps involved in nuclear pre mRNA splicing in eukaryotes with suitable diagrams. (8)

(ii) List the factors involved in prokaryotic transcription initiation and explain the steps. (8)

(OR)

(b) (i) Describe the structure and importance of trp operon and explain how RNA secondary structure is involved in regulation of trp operon. (8)

(ii) What are ribozymes? Which types of introns have self splicing nature? Give details.(8)

13. (a) (i) What are the basic features of a eukaryotic expression vector ? Draw the map of one such vector with its features labeled. (8)

(ii) Differentiate Southern, northern and western blots, the transfer techniques and their importance. (8)

(OR)

(b) (i) Explain the PCR techniques that are used in obtaining flanking sequences/regulatory sequences of a gene? (8)

(ii) Differentiate a binary vector and a cointegrate vector of Ti plasmid just by giving their map and cloning strategy. (8)

14. (a) (i) What are fusion proteins? Give their advantages with specific examples for each category. (8)

(ii) How a genomic library is constructed? How many colonies or plaques need to be screened to get one positive clone of a single copy gene from a human genomic (3 billon bp) library having an average insert size of 15 kb? (8)

(OR)

(b) (i) If you want to express a human protein in a heterologous system to get ample quantity, what is the choice of vector, organism/expression system and purification strategy? Justify your answer. (8)

(ii) What is site directed mutagenesis? Describe the plasmid vector system available to do site directed mutation with suitable diagrams. (8)

15. (a) Differentiate the two gene isolation methods positional cloning and functional cloning.

(OR)

(b) (i) What are the various methods by which a transgenic mouse can be produced? (8)

(ii) List the regulatory procedures governing rDNA research and release of GMOs at the international level. (8)

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