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**St Aloysius (Deemed to be University)**

**Mangaluru**

**Semester II – P.G. Examination - M.Sc. Biotechnology**

ST.ALOYSIUS COLLEGE

PG Library

MANGALORE-575 003

**April – 2025**

**GENETIC ENGINEERING**

**Time: 2½ Hours**

**Max. Marks: 60**

**Note: Draw neat labeled diagrams/schematic sketches/structures wherever necessary.**

**I. Write short notes on any FIVE of the following: (5x3=15)**

1. What are Restriction endonucleases? Add a note on its discovery.
2. List three types of DNA modifying enzymes commonly used in molecular biology. Briefly describe the function of each enzyme and provide an example.
3. Discuss electroporation as a method of gene transfer.
4. What do you understand by binary vectors? What is their utility?
5. How do pET-based vectors achieve high-level protein expression?
6. List out the various chemical methods of gene transfer.
7. Discuss the importance of primer specificity in PCR and how to avoid non-specific amplification during primer design.
8. Write a short note on reverse transcriptase PCR.

**II. Write explanatory notes on any FIVE of the following: (5x5=25)**

9. Describe the basic steps involved in the construction of a recombinant DNA molecule.
10. Explain the purpose of using linkers in the construction of recombinant DNA molecules.
11. Explain Microinjection method for gene transfer.
12. Describe the principles and advantages of RNA-Seq using the MinION nanopore platform.
13. Discuss the essential features of expression vectors.
14. Describe the principle of site-specific mutagenesis using PCR and how it enables the introduction of precise genetic changes into a target DNA sequence.
15. Explain Insertional inactivation and blue/white selection of recombinants.
16. Discuss the construction of SV40 based vectors.

**III. Answer any TWO of the following: (2x10=20)**

17. Discuss the steps involved in construction of cDNA library.
18. Discuss the construction of gene probes. Add a note on their applications.
19. Explain the principles and functions of long noncoding RNAs (lncRNAs) and their roles in gene regulation, chromatin remodeling, and cellular processes.
20. Give an account of essential features of cloning vectors. Explain the development of pBR322.

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