

**GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR  
(GIET UNIVERSITY)**



M. Sc. (Fourth Semester) Regular Examinations, April - 2025  
**20LSPE402 – Biotechnology and Genetic Engineering**  
(Life Science)

Time: 3 hrs

Maximum: 70 Marks

(The figures in the right hand margin indicate marks.)

**PART – A****(2 x 10 = 20 Marks)**Q.1. Answer **ALL** questions

	CO #	Blooms Level
a. How would you use alkaline phosphatase during vector preparation in genetic engineering?	CO1	K3
b. Compare the roles of DNA polymerase and terminal deoxynucleotidyl transferase in DNA synthesis.	CO1	K4
c. Explain how restriction endonucleases are used in the construction of recombinant DNA molecules.	CO1	K3
d. Illustrate the properties of an ideal vector with example.	CO2	K3
e. What is the role of adapters in the cloning process?	CO2	K3
f. Differentiate between plasmid and cosmid vectors in terms of structure and capacity.	CO2	K4
g. What is the role of reverse transcriptase in cDNA synthesis?	CO3	K3
h. List two applications of cDNA synthesis in molecular biology.	CO3	K3
i. Define DNA fingerprinting and mention one application.	CO4	K3
j. Differentiate between somatic hybridization and traditional plant breeding.	CO4	K4

**PART – B****(10 x 5 = 50 Marks)**Answer **ANY FIVE** questions

	Marks	CO #	Blooms Level
2. Describe in detail the various molecular tools (enzymes) used in genetic engineering and explain their specific roles in recombinant DNA technology.	10	CO1	K3
3.a. Analyze the significance of major milestones in the evolution of genetic engineering.	5	CO1	K4
b. Illustrate the steps involved in the purification and yield analysis of isolated DNA.	5	CO1	K4
4. a. Analyze the role of expression vectors in gene cloning and how they differ from simple cloning vectors.	5	CO2	K4
b. Explain the process of generating sticky and blunt ends in DNA cloning. What enzymes are involved?	5	CO2	K3
5. Describe the different types of gene cloning vectors: plasmids, bacteriophages, and cosmids include their structural features and uses.	10	CO2	K3
6. Explain the process of cDNA library construction and compare it with genomic library construction in terms of steps and utility.	10	CO3	K3
7.a. Describe the procedure for preparing a molecular probe and its use in gene identification.	5	CO3	K3
b. Discuss the techniques and applications of protoplast fusion and somatic hybridization in crop development.	5	CO4	K3
8. Describe in detail the hybridoma technology process and evaluate its applications in diagnostics and therapeutics.	10	CO4	K4

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