Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET UNIVERSITY)

M.Sc. (Second Semester – Regular/Supplementary) Examinations, May – 2026

24MBIPC12001–Genetic Engineering

Biotechnology

Time: 3 hrs Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Mention the role of alkaline phosphatase in recombinant DNA technology.	CO1	K2
b. A plant scientist wants to introduce a foreign gene into dicot plants. Which vector system is most suitable? Justify your answer.	CO2	K3
c. If only 80% efficiency is achieved in each PCR cycle, what is the amplification after 5 cycles from one DNA molecule?	CO3	K3
d. A bacterial cell fails to take up recombinant plasmid DNA during transformation. What could be the possible reasons?	CO4	K4
e. A researcher wants to amplify multiple target genes in a single reaction. Which PCR method should be used and why?	CO5	K3

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2. a. Illustrate how restriction enzymes and DNA ligase are used together in recombinant DNA formation.	5	CO1	K3
b. Discuss the steps involved in Southern blotting technique.	5	CO1	K2
(OR)			
c. Analyze the significance of linkers and adaptors in recombinant DNA technology.	5	CO1	K3
d. Explain the nick translation method for DNA labelling with diagram.	5	CO1	K2
3.a. Discuss the method of cloning using COSMID with suitable diagram.	5	CO2	K2
b. How to apply the principle of His-tag purification method for recombinant protein purification?	5	CO2	K4
(OR)			
c. Discuss the methods used to reduce formation of inclusion bodies.	5	CO2	K3
d. How mammalian expression system is useful for expression of heterologous protein? Explain with suitable diagram.	5	CO2	K3
4.a. Evaluate the use of real-time PCR in gene expression studies and mention its significance.	5	CO3	K5
b. Explain chemical degradation method of DNA sequencing with its limitations.	5	CO3	K2
(OR)			
c. Illustrate the PCR-based site-directed mutagenesis with suitable diagram.	5	CO3	K3
d. List the essential components required for a PCR reaction?.	5	CO3	K1
5.a. Compare and discuss various method transformation techniques used in gene cloning.	5	CO4	K4

b.	Design and develop the steps involved in the construction of cDNA libraries.	5	CO4	K6
	(OR)			
c.	How reverse transcriptase can be applied for the cDNA synthesis?	5	CO4	K4
d.	Explain the principle and applications of Electrophoretic Mobility Shift Assay (EMSA).	5	CO4	K2
6.a.	How does methyl interference assay help in identifying protein-binding sites on DNA?	5	CO5	K3
b.	Explain the principle and procedure of Chromatin Immunoprecipitation (ChIP).	5	CO5	K4
	(OR)			
c.	What is therapy and discuss different types of gene therapy?	5	CO5	K1
d.	Discuss the principle and applications of gene silencing technology in biotechnology.	5	CO5	K4

--- End of Paper ---