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MBC–006

M. SC. (HONOURS)

(BIOCHEMISTRY) (MSCBCH)

Term-End Examination

June, 2026

MBC-006 : RECOMBINANT DNA TECHNOLOGY AND ITS APPLICATIONS

Time : 3 Hours *Maximum Marks : 100*

Note : *(i) Answer any* ***five*** *questions. All questions carry equal marks.*

(ii) Draw diagrams/flowchart wherever required.

1. (a) Explain the mechanism of action of S1 nuclease and list its applications (any *three*) in rDNA technology. 4+6

(b) What are the characteristics of a plasmid vector ? How does pBR322 differ from pUC ? 5+5

2. (a) What are Cosmids ? Describe their advantages and limitations. 4+3+3

(b) Draw the structure and explain the features and functions of plant cloning vector *Agrobacterium tumefaciens*. 10

3. (a) Describe the chemical method of gene transfection. 10

(b) What is polymerase chain reaction ? Describe the process of PCR and mention its limitations. 2+4+4

4. (a) What are the essential elements of an expression vector ? 5

(b) Discuss the characteristics of lac operon that make it suitable for the construction of expression vectors. 5

(c) Differentiate between real time PCR (qPCR) and Reverse Transcription PCR (RT-PCR). 10

5. (a) Define oligonucleotide probes and describe the steps involved in their synthesis. 10

(b) Explain colony hybridization technique. 10

6. (a) Elucidate the Maxam and Gilbert method of DNA sequencing and the principle working behind the technique. 6+4

(b) Explain Next Generation Sequencing (NGS). 10

7. (a) Describe the applications of site-directed mutagenesis in the field of medicine. 10

(b) Illustrate the production of recombinant human insulin. 10

8. (a) Discuss any *five* applications of plant genetic engineering in the field of agriculture. 10

(b) Discuss the various regulatory frameworks in India for rDNA research. 10

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