

BIOTECHNOLOGY

PAPER 1

(THEORY)

(Maximum Marks: 70)

(Time allowed: Three hours)

(Candidates are allowed additional 15 minutes for **only** reading the paper.

They must NOT start writing during this time.)

Answer **Question 1** (compulsory) from **Part I** and **five** questions from **Part II**.

The intended marks for questions or parts of questions are given in brackets [].

PART I (20 Marks)

Answer *all* questions.

Question 1

- (a) Mention *any one* significant difference between each of the following: [5]
- (i) Nucleotide and Nucleoside
 - (ii) Gene and Genome
 - (iii) Finite cell lines and Continuous cell lines
 - (iv) Primer and Primase
 - (v) Micronutrients and Macronutrients
- (b) Answer the following questions: [5]
- (i) What are *Polylinker sites*?
 - (ii) What is *Subtilisin*?
 - (iii) Name two types of phage vectors.
 - (iv) What is the role of *Agrobacterium tumefaciens* in genetic engineering?
 - (v) Why is DNA replication called *semi-discontinuous*?
- (c) Write the full form of each of the following: [5]
- (i) DDBJ
 - (ii) HEPA
 - (iii) RFLP
 - (iv) VNTR
 - (v) MS Medium

- (d) Explain briefly the following: [5]
- (i) Reverse transcription
 - (ii) Electroporation
 - (iii) Biolistic
 - (iv) Synthetic seeds
 - (v) Flavr savr tomatoes

PART II (50 Marks)

Answer **any five** questions.

Question 2

- (a) Describe the double helical structure of DNA. Mention *two* differences between RNA and DNA. [4]
- (b) List the role of the following in protein synthesis: [4]
- (i) mRNA
 - (ii) rRNA
 - (iii) tRNA
 - (iv) Ribosomes
- (c) Why are cDNA libraries preferred over genomic libraries? [2]

Question 3

- (a) Differentiate between each of the following: [4]
- (i) *Blunt end* and *Sticky end*
 - (ii) *Hybrid* and *Cybrid*
- (b) Discuss the role of Biotechnology in making the following: [4]
- (i) Humulin
 - (ii) Hepatitis B vaccine
- (c) What is FBS? What is its role in animal cell culture? [2]

Question 4

- (a) What is SCP? Describe the advantages and disadvantages of SCP. [4]
- (b) Explain the role of *any four* enzymes in the process of DNA replication. [4]
- (c) What is *micropropagation*? Write its use. [2]

Question 5

- (a) Draw a neat and labelled diagram of a bioreactor. [4]
- (b) How did Messelson and Stahl prove the semi conservative mode of replication? [4]
- (c) What is the use of haemocytometer? [2]

Question 6

- (a) Give *four* points of difference between *inducible operon* and *repressible operon*. [4]
- (b) Write short notes on the following: [4]
 - (i) Western blotting
 - (ii) Tissue engineering
- (c) What is *embryo rescue*? [2]

Question 7

- (a) Explain the role of the following in biotechnology: [4]
 - (i) *Thermus aquaticus*
 - (ii) *Bacillus thuringiensis*
 - (iii) *Escherichia coli*
 - (iv) CaMV
- (b) Explain the methodology involved in the creation of the first mammalian clone, Dolly. [4]
- (c) What is Golden rice? Why is it considered to be nutritionally superior to the normal rice? [2]

Question 8

- (a) Enumerate the steps involved in the extraction and purification of DNA from bacterial cell. [4]
- (b) Write short notes on the following: [4]
 - (i) EMBL
 - (ii) SWISS-PROT
- (c) Write the difference between *defined media* and *differential media*. [2]

Question 9

- (a) What is *somatic hybridization*? Explain the steps involved in this technique with the help of an example. [4]
- (b) What is *genomics*? What are the basic criteria in selecting the organism for its genome sequencing? Write the names of *any two* types of DNA used for sequencing. [4]
- (c) Write a short note on *Taxonomy Browser*. [2]