

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) Purines and pyrimidines.
 - (ii) Triploids and haploids.
 - (iii) Lac operon and Trp operon
 - (iv) Blunt end and sticky end.
 - (v) Genomics and proteomics.
- (b) Answer the following questions: [5]
- (i) Name the scientists who discovered the genetic code.
 - (ii) Name *any two* growth regulators used in a culture medium.
 - (iii) What are *cell lines*?
 - (iv) Name the vitamin present in golden rice.
 - (v) What is *gynogenesis*?
- (c) Write the full form of each of the following: [5]
- (i) ICMR
 - (ii) FBS
 - (iii) BAC
 - (iv) IEF
 - (v) PAGE

- (d) Explain briefly the following: [5]
- (i) Polyadenylation
 - (ii) Reverse transcription
 - (iii) Edible vaccine
 - (iv) De differentiation
 - (v) Seedless crops

PART II (50 Marks)

Answer *any five* questions.

Question 2

- (a) Briefly explain the structure of tRNA. Write its function in protein synthesis. [4]
- (b) Write the use of the following instruments: [4]
- (i) Centrifuge
 - (ii) LAF
 - (iii) T flask
 - (iv) Co₂ incubator
- (c) What is a DNA probe? [2]

Question 3

- (a) Explain the process involved in the transcription of DNA to mRNA. [4]
- (b) What are *stem cells*? Explain the various types of stem cells. [4]
- (c) State the significance of Evan's blue test. [2]

Question 4

- (a) Explain the following methods of selection of recombinant cells: [4]
- (i) Insertional inactivation.
 - (ii) Blue white colony
- (b) Enumerate the steps involved in regenerating a plant from a single cell. [4]
- (c) What is *wobble effect*? [2]

Question 5

- (a) Discuss the working of PCR technique in detail. [4]
- (b) Explain the principle working and application of FACS. [4]
- (c) Write *two* differences between *Southern* and *Northern blotting techniques*. [2]

Question 6

- (a) Describe the procedure of sequencing of DNA by Sanger's method. [4]
- (b) Name and explain *any two* chemical methods used to synchronize suspension cultures. [4]
- (c) Name *any two* industrial enzymes and give their uses. [2]

Question 7

- (a) Briefly explain the essential features of a vector. [4]
- (b) What is the principle of cryopreservation? Mention the steps of cryopreservation. [4]
- (c) What is the importance of pH and solidifying agents in cell cultures? [2]

Question 8

- (a) Explain how rDNA technology has been used to create the following: [4]
 - (i) Tomatoes with delayed ripening.
 - (ii) Bt crops
 - (iii) Dolly sheep
 - (iv) Oil eating bacteria
- (b) List the functions of the following bioinformatics tools: [4]
 - (i) GENSCAN
 - (ii) ENTREZ
 - (iii) FASTA
 - (iv) PIR
- (c) Name *any two* media used in plant tissue culture. [2]

Question 9

- (a) What are *restriction enzymes*? How do they work? What are the different types of restriction enzymes? [4]

- (b) Draw a well labelled diagram of a bioreactor. [4]
- (c) Differentiate between the following: [2]
- (i) *Local alignment* and *Global alignment*.
 - (ii) *EST* and *STS*.