

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) *Reducing sugar* and *non-reducing sugar*.
 - (ii) *Triploids* and *haploids*.
 - (iii) *Lac operon* and *Trp operon*
 - (iv) *Blunt end* and *sticky end*.
 - (v) *Spectroscopy* and *colorimetry*.
- (b) Answer the following questions: [5]
- (i) Who developed the microbe called *super bug*, which was designed to degrade spilled oil?
 - (ii) Name *any two* growth regulators used in a culture medium.
 - (iii) What is an *apoenzyme*?
 - (iv) How is the disease *albinism* caused?
 - (v) State *any one* limitation of gynogenesis.
- (c) Write the full form of each of the following: [5]
- (i) AFLP
 - (ii) SSBs
 - (iii) BAC
 - (iv) CIMAP
 - (v) PAGE

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- (d) Explain briefly: [5]
- (i) Polyadenylation
 - (ii) Lock and key model of enzyme action
 - (iii) Edible vaccine
 - (iv) Vascular 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) With reference to lipids, explain its: [4]
- (i) Building blocks.
 - (ii) Any two chemical properties.
- (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) Name *any two* chemicals used to determine the amino acid sequence in protein. [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 and *any two* applications of each of the following biochemical techniques: [4]
- (i) Iso electric focussing.
 - (ii) Centrifugation.
- (c) Where do we find the following carbohydrates: [2]
- (i) Glycogen
 - (ii) Chitin

Question 6

- (a) Describe the procedure of sequencing of DNA by Sanger's method. [4]
- (b) Explain *any two* physical and *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 DNA technology has been used to create the following: [4]
- (i) Tomatoes with delayed ripening.
 - (ii) Bt crops
 - (iii) Virus free crops
 - (iv) Biodegradable plastic
- (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) Define the term *proteomics*. Explain the various types of proteomics. [4]
- (c) Differentiate between the following: [2]
- (i) *Local alignment* and *Global alignment*.
 - (ii) *EST* and *STS*.