

# 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.)

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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 [ ].

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### 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*.