

BIOTECHNOLOGY

PAPER – 1

(THEORY)

(Three hours)

Maximum Marks: 70

(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) *Electrophoresis* and *electroporation*.
 - (ii) *Glucose* and *fructose*.
 - (iii) *Crystallography* and *centrifugation*.
 - (iv) *Shuttle vectors* and *expression vector*.
 - (v) *Gene* and *genome*.
- (b) Answer the following questions: [5]
- (i) What type of plants are obtained by distant hybridization?
 - (ii) What is the role of Eco R1 in genetic engineering?
 - (iii) Why is the amino acid valine said to be optically active?
 - (iv) Who proposed the 'one gene one enzyme' hypothesis?
 - (v) Why was the bacteria *E. Coli* chosen for genome sequencing projects?

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- (c) Write the full forms of the following: [5]
- (i) MGD
 - (ii) ddNTP
 - (iii) BAC
 - (iv) STS
 - (v) GM
- (d) Explain briefly : [5]
- (i) Single nucleotide polymorphism
 - (ii) Chargaff's law
 - (iii) Palindromic sequences
 - (iv) Codon
 - (v) Microprocessor

PART II (50 Marks)

Attempt *any five* questions.

Question 2

- (a) With reference to the nucleic acids mRNA and DNA, explain: [4]
- (i) Their physical structures.
 - (ii) The functions they perform in a cell.
- (b) Mention the steps involved in charging of amino acids for the process of translation. [4]
- (c) Write *any two* properties of genetic code. [2]

Question 3

- (a) Enumerate *any four* factors affecting the activity of enzymes. [4]
- (b) Write short notes on: [4]
- (i) Primary and secondary proteins
 - (ii) Coenzymes
- (c) What are the building blocks of lipids? [2]

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Question 4

- (a) Explain the following innovations using modern biotechnological tools: [4]
(i) Oil eating bacteria.
(ii) Recombinant insulin.
- (b) Name and explain the characteristics of *four* different types of vectors used in genetic engineering. [4]
- (c) What is insertional inactivation? [2]

Question 5

- (a) How are biomolecules separated using the biochemical techniques given below: [4]
(i) Partition chromatography
(ii) Spectroscopy
- (b) List the steps involved in each cycle of Polymerase chain reactions. Also state the principle on which the technique is based. [4]
- (c) Name *any two* low resolution mapping techniques. [2]

Question 6

- (a) Explain *any three* ways by which the laboratory apparatus and instruments can be sterilized. Why is it important to maintain sterile conditions for tissue culture work? [4]
- (b) Enumerate the steps involved in the regeneration of a single cell to whole plant. [4]
- (c) Write *two* points of significance of germplasm conservation? [2]

Question 7

- (a) What is freeze preservation? Explain *any three* types of freeze preservation methods. [4]
- (b) Discuss the following traits that can be developed in crop plants with the help of biotechnology: [4]
(i) Seedlessness in fruits
(ii) Drought resistance
- (c) What is the importance of pH during media preparation? [2]

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Question 8

- (a) Write short notes on: [4]
- (i) Cellular totipotency
 - (ii) Zygotic embryo culture
- (b) Write a note on different types of sequence analysis programs. [4]
- (c) List *two* methods of isolating single cells from plant tissues. [2]

Question 9

- (a) Mention the significance and applications of bioinformatics. [4]
- (b) Enumerate the functions of following bioinformatics tools: [4]
- (i) Taxonomy browser
 - (ii) BLAST
- (c) Name *any four* centres or funding agencies which deal with biotechnology in India. [2]