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.)

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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 [ ].

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?

(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]**

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]**

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]**