

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) *Anticodon* and *codon*
 - (ii) *Intrinsic fluorescence* and *extrinsic fluorescence*
 - (iii) *Introns* and *Exons*
 - (iv) *Genomic DNA library* and *cDNA library*
 - (v) *RAM* and *ROM*
- (b) Answer the following questions: [5]
- (i) Which amino acid is optically inactive and why?
 - (ii) What is meant by *exponential phase*?
 - (iii) What are *designer oils*?
 - (iv) What is *palindromic sequence*?
 - (v) Which substance is used in diploidization of haploid plants?
- (c) Write the full form of each of the following: [5]
- (i) NBRI
 - (ii) NBTB
 - (iii) BLAST
 - (iv) PIR
 - (v) YAC

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- (d) Explain briefly the following terms: [5]
- (i) Callus
 - (ii) SNPs
 - (iii) Lyophilisation
 - (iv) Gene cloning
 - (v) Cybrids

PART II (50 Marks)

Answer **any five** questions.

Question 2

- (a) With reference to *composition of culture medium*, answer the following: [4]
- (i) Cytokinins
 - (ii) Auxins
- (b) Explain the induced fit hypothesis of enzyme action with the help of suitable illustrations. [4]
- (c) Write a note on quaternary structure of proteins. [2]

Question 3

- (a) Explain the important postulates of central dogma. [4]
- (b) Name and explain the method used to sterilize the following: [4]
- (i) Vitamins
 - (ii) Forceps and Scalpels
 - (iii) Nutrient Media
 - (iv) Explant
- (c) What is the Chargaff's rule of equivalence? [2]

Question 4

- (a) Differentiate between *oils* and *fats*. Discuss hydrolysis, rancidity and hardening shown by lipids. [4]
- (b) Using tissue culture method one can produce disease free plants. Discuss the method used to produce virus free plants. [4]
- (c) Write the main objectives of HGP. [2]

Question 5

- (a) Discuss the mechanism of lac operon model of regulation of gene expression. [4]
- (b) Give *four* points of difference between *southern blotting technique* and *northern blotting technique*. [4]
- (c) Give *four* characteristics of genetic code. [2]

Question 6

- (a) With reference to vectorless methods of gene transfer explain each of the following: [4]
 - (i) Liposome mediated gene transfer
 - (ii) Electroporation
 - (iii) Transfection
 - (iv) Transformation
- (b) With reference to *application of tissue culture techniques*, explain the following: [4]
 - (i) Haploid production
 - (ii) Triploid production
- (c) What is meant by *DNA probe*? [2]

Question 7

- (a) Explain how biotechnology helps in developing following traits in crops: [4]
 - (i) Biodegradable plastic
 - (ii) Pest resistance
 - (iii) Drought resistance
 - (iv) Salinity resistance
- (b) Write the principle and applications of the following techniques: [4]
 - (i) Hydrophobic interaction
 - (ii) Colorimetry
- (c) What are *start and stop codons*? [2]

Question 8

- (a) List *any four* responsibilities carried out by NCBI. [4]
- (b) Give a comparative account of cell differentiation, dedifferentiation, redifferentiation and vascular differentiation. [4]
- (c) What is the difference between dNTP and ddNTP? [2]

Question 9

- (a) Proteins have many important functions in an organism. Justify the statement giving its various roles with an example of each. [4]
- (b) With reference to screening strategies, explain the following: [4]
 - (i) Insertional Inactivation method
 - (ii) Blue – White method
- (c) How was insulin obtained before the advent of rDNA technology? [2]