

**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) *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]