

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) *Plasmids* and *cosmids*
 - (ii) *Nucleotide* and *Nucleoside*
 - (iii) *Lagging strand* and *leading strand*
 - (iv) *Multipotent cells* and *unipotent cells*
 - (v) *Microinjection* and *biolistic*
- (b) Answer the following questions: [5]
- (i) Who coined the term *vitamin*? Write the chemical name of vitamin D.
 - (ii) Why is amino acid said to be amphoteric?
 - (iii) What is *Bioremediation*?
 - (iv) What is a *primer*?
 - (v) What are *cryoprotectants*?
- (c) Write the full form of each of the following: [5]
- (i) NBPGR
 - (ii) ARS
 - (iii) RFLP
 - (iv) HEPA
 - (v) SCP

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- (d) Explain briefly: [5]
- (i) Gene splicing
 - (ii) Supramolecular assembly
 - (iii) Interferon
 - (iv) Gene scan
 - (v) Saponification

PART II (50 Marks)

Answer *any five* questions.

Question 2

- (a) Explain in detail, how Dolly, the sheep was created. [4]
- (b) Mention *any two* chemical properties of each of the following: [4]
- (i) Proteins
 - (ii) Carbohydrates
- (c) What are *Okazaki fragments*? How are they joined? [2]

Question 3

- (a) Describe the effect of each of the following factors on enzyme activity: [4]
- (i) pH
 - (ii) Temperature
 - (iii) Enzyme concentration
 - (iv) Concentration of products
- (b) With reference to suspension culture, explain the following: [4]
- (i) A chemostat
 - (ii) A turbidostat
- (c) What is *genomics*? What are its different types? [2]

Question 4

- (a) What are the basic facilities that should be available for tissue culture in a biotechnology laboratory? [4]
- (b) Explain the experiment which proves the semi-conservative mode of replication. [4]
- (c) What is cDNA? [2]

Question 5

- (a) Explain *any four* methods employed to induce haploid production. [4]
- (b) Describe the automated method of DNA sequencing. [4]
- (c) What is the difference between *gel electrophoresis* and *gel permeation*. [2]

Question 6

- (a) What is *in vitro* pollination? Why is it done? Write the steps involved in this process. [4]
- (b) Why is *Agrobacterium* called a natural genetic engineer? How does it help in creating transgenic plants? [4]
- (c) Write a short note on *site directed mutagenesis*. [2]

Question 7

- (a) What is HGP? Name *any two* scientists involved in this. Write *any two* achievements of HGP. [4]
- (b) List the functions of the following in Bioinformatics: [4]
 - (i) ENTREZ
 - (ii) PDB
 - (iii) FASTA
 - (iv) MGD
- (c) Mention *two* differences between the organisation of prokaryotic and eukaryotic genomes. [2]

Question 8

- (a) Briefly describe the steps involved in the Southern blotting technique. [4]
- (b) What is the need of germplasm conservation? Give an account of the in-situ and ex-situ conservation of germplasm. [4]
- (c) What is *peptidoglycan*? Where is it found? [2]

Question 9

- (a) How are biomolecules separated by the following techniques: [4]
- (i) Ion exchange chromatography.
 - (ii) Partition chromatography.
- (b) What is the cause and the symptoms of the following diseases: [4]
- (i) Sickle cell anaemia
 - (ii) Alkaptonuria
- (c) What is the difference between *peptide bond* and *phosphodiester bond*? [2]