

2021

MICROBIOLOGY — HONOURS

Fifth Paper

Group-B

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Part-A

Answer **Question No. 1** and **any two** from the rest.

1. Answer **any five** of the following questions: 3×5
- (a) What is cryopreservation?
 - (b) Define downstream processing using a flow diagram.
 - (c) What are the criteria for selecting microbial strains for industrial fermentation?
 - (d) What are auxotrophic mutants? Describe their importance in industrial processes using a suitable example.
 - (e) Describe three uses/applications of yeast in industry.
 - (f) What is 'mother of vinegar'? How can you preserve an industrially important fungal strain?
 - (g) What are the advantages and limitations of continuous fermentation in industry?
 - (h) What are the differences between penicillin and semisynthetic penicillin?
 - (i) Why are antibiotics termed as secondary metabolites?
 - (j) What is a HET strain? State its significance in fermentation industry.
2. Write short notes on **any two**: 2½×2
- (a) Lyophilisation techniques
 - (b) Entrapment in Immobilization
 - (c) Industrially important *Aspergillus* species
 - (d) Centrifugation
 - (e) Cheap substrate for bioethanol production.
3. (a) Name one microorganism for the production of each of the following products: 1×4
- (i) Vit B₁₂
 - (ii) Glutamic acid
 - (iii) Ethanol
 - (iv) Vinegar.
- (b) What is fed-batch fermentation? 1

Please Turn Over

4. (a) Give a flow diagram of industrial production of α -amylase mentioning the following: 1+1+2
- (i) Microorganism(s) involved
 - (ii) Carbon source used in the medium
 - (iii) Detection of α -amylase in crude fermentation broth.
- (b) Mention the name of one cross-linking agent used in enzyme immobilization. 1
5. Mention the use of the following in industrial processes: 1×5
- (a) Na-alginate
 - (b) Glycerol
 - (c) Fusogen
 - (d) DMSO
 - (e) Silica gel.

Part-B

Answer *Question No. 6* and *any two* from the rest.

6. Answer *any five* from the following: 3×5
- (a) Describe the advantages of plasmid as cloning vectors.
 - (b) What is the role of phenol, chloroform and isoamyl alcohol mixture in DNA purification?
 - (c) How would you check the purity of plasmid DNA?
 - (d) What precaution will you take to prevent DNA degradation during isolation?
 - (e) What is PCR? Give its importance.
 - (f) How would you concentrate a solution of DNA?
 - (g) Why is it important to denature DNA into single stranded form, before setting up transfer in Southern blot?
 - (h) What are isoschizomers? Discuss with example.
 - (i) Describe briefly the co-integration strategy for cloning foreign DNA fragments in a Ti vector for expression in a dicotyledonous plant.
 - (j) Comment on the use of alkaline phosphatase in cloning DNA.
7. Write short notes on *any two*: 2½×2
- (a) YAC vector
 - (b) RFLP
 - (c) Southern blotting
 - (d) Klenow fragment.

8. (a) What are the features necessary to be present in a plasmid to be used as a protein expression vector?
(b) What do you mean by the term 'shuttle vector'? Give one example. 3+2
9. (a) What are restriction endonucleases?
(b) What do you mean by the 'star activity' of enzymes?
(c) Give example of a Restriction Enzyme that generates 5' overhang after digestion. 2+2+1
10. (a) How would you get rid of genomic DNA during plasmid isolation?
(b) How can you prevent self ligation of plasmid DNA during cloning? 2½+2½
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