

**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 B<sub>12</sub>
  - (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  $\alpha$ -amylase mentioning the following: 1+1+2
- (i) Microorganism(s) involved
  - (ii) Carbon source used in the medium
  - (iii) Detection of  $\alpha$ -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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