INDUSTRIAL MICROBIOLOGY & ENZYME TECHNOLOGY
(BIOT 2204)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

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

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Alkaline protease is mainly used in
(a) leather industry (b) detergent industry
(c) paper industry (d) none of these.

(ii) Large vessel containing all the conditions necessary for growth of desired microbes is called
(a) bioreactor (b) impellor
(c) autoclave (d) none of these.

(iii) Amylase is commercially synthesized by
(a) Ashbya gossypii (b) Pseudomonas ovalis
(c) Bacillus subtilis (d) None of these.

(iv) Immobilization technique where enzyme molecules are confined within a semi-permeable membrane is known as
(a) entrapment (b) covalent bonding
(c) encapsulation (d) cross-linking.

(v) Phenylacetic acid is essential for industrial production of
(a) lysine (b) penicillin
(c) ascorbic acid (d) none of these.

(vi) Most common food preservative is
(a) glutaraldehyde (b) acetic acid
(c) cyanogen bromide (d) acetic anhydride.

(vii) Design of _____ does not allow for control of pH
(a) CSTR (b) packed bed reactor
(c) bubble column reactor (d) hollow fibre reactor.

(viii) The first and the most widely used commercial biosensor is
(a) penicillin biosensor (b) glucose biosensor
(c) urea biosensor (d) DNA biosensor.

(ix) Thermistors are used in _____ biosensor
(a) calorimetric biosensor (b) piezo-electric biosensor
(c) amperometric biosensor (d) optical biosensor.

(x) Biosensor which detect changes in mass is known as
(a) calorimetric biosensor (b) piezo-electric biosensor
(c) amperometric biosensor (d) optical biosensor.

Group – B

2. (a) Schematically illustrate vitamin B_{12} production with flow diagram.

(b) Name producer organisms for penicillin production.

(c) How xanthan is recovered?

7 + 2 + 3 = 12

3. (a) What are alcoholic beverages ? Give example.

(b) Briefly discuss malolactic acid fermentation.

(c) Write down different steps involved in beer production.

2 + 4 + 6 = 12

Group – C

4 . Write notes on -
(i) Analogue resistant mutant
(ii) Screening technique
(iii) Protoplast fusion

(4 + 4 + 4) = 12

5. (a) Define biotic and abiotic factors for microbial fermentation. Give example.

(b) Explain in detail the concept of aeration and agitation in a bioreactor.

(c) What is base analogue? Give example.

3 + 5 + 4 = 12

Group – D

6. (a) Define extremophile microbes. Why are they important in industry?

(b) Write note on enzymes used for blood urea and blood glucose estimation.

4 + 8 = 12

7. (a) Write note on enzymes hydrolyzing starch polysaccharides into glucose.

(b) What do you mean by site directed mutagenesis?

(c) Cite two examples whereby stability of the enzymes were improved by chemical modification.

5 + 3 + 4 = 12

Group – E

8. (a) How can you immobilize enzymes with the help of covalent bonds? Write it's advantages and limitations.

(b) Describe the working principle of bubble column reactor as reactor of immobilized enzymes.

(3 + 4) + 5 = 12

9. (a) Discuss the working principle of calorimetric biosensor.

(b) Explain how enzyme biosensors can be used in defence.

6 + 6 = 12