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) Cellulase mainly used in
(a) leather industry (b) paper industry
(c) textile industry (d) none of these.

(ii) Catabolite repression is eliminated by
(a) Analogue resistant mutant (b) Auxotrophic mutant
(c) Fed batch fermentation (d) None of these.

(iii) Iron is essential for industrial production of
(a) Citric acid (b) Glysine
(c) Alanine (d) Aspartic acid.

(iv) Role of hop is essential for production of
(a) Beer (b) Gluconic acid
(c) Wine (d) None of these.

(v) Activation of the polysaccharide matrix for enzyme immobilization is done by
(a) Glutaraldehyde (b) Acetic acid
(c) Cyanogen bromide (d) Acetic anhydride.

(vi) Role of pectinase is essential for production of
(a) Beer (b) Gluconic acid
(c) Wine (d) None of these.

(vii) Biosensor which detects the change in mass is known as
(a) Piezo-electric biosensor (b) Calorimetric biosensor
(c) Amperometric biosensor (d) Potentiometric biosensor.

(viii) Which of the following reactor does allow the control of pH?
(a) Packed Bed Reactor (b) CSTR
(c) Hollow Fibre Reactor (d) None of the above.

(ix) Immobilization technique where enzyme molecules are trapped by calcium alginate is known as
(a) Entrapment (b) Covalent Bonding
(c) Encapsulation (d) Cross-linking.

(x) Which of the following is not a Bio-recognition element?
(a) Enzymes (b) Antibody
(c) Nucleic acid (d) Mercury.

Group- B

2. (a) Schematically illustrate any one amino acid production. [(CO1)(Illustrate/HOCQ)]
(b) Discuss the process of recovery of gluconic acid. [(CO2)(Discuss/IOCQ)]
(c) Analyze continuous fermentation. [(CO1)(Analyze/IOCQ)]
6 + 4 + 2 = 12

3. (a) Mention any two suitable nitrogen sources with proper function. [(CO2) (Remember/LOCQ)]
(b) Discuss analogue resistant mutant. [(CO2)(Understand/LOCQ)]
(c) Analyze the role of non ionaizing radiation. [(CO1)(Analyse/IOCQ)]
4 + 6 + 2 = 12

Group - C

4. (a) Mention the role of aerator and agitator in bioreactor. [(CO3)(Remember/LOCQ)]
(b) Distinguish transition and transversion. [(CO2)(Distinguish/IOCQ)]
(c) What is lignocelluloses? [(CO3)(Remember/LOCQ)]
5 + 5 + 2 = 12

5. (a) Discuss downstream processing method with suitable example. [(CO3)(Understand/LOCQ)]
(b) Discuss ethyl alcohol production by genetic modification method. [(CO2)(Discuss/HOCQ)]
(c) What are semisynthetic antibiotics? [(CO1)(Analyze/IOCQ)]
5 + 5 + 2 = 12

Group - D

6. (a) Illustrate the process of immobilizing enzymes by Encapsulation method? Write its advantages and limitations. [(CO1)(Illustrate/IOCQ)]
(b) Describe the working principle of Bubble Column as reactor of immobilized enzymes. [(CO1)(Describe/HOCQ)]
(3 + 4) + 5 = 12

7. (a) What is neoglycosylation and mention its mode of action. [(CO3) (Remember/LOCQ)]
   (b) Mention the mode of action of pectinase. [(CO4) (Understand/LOCQ)]
   (c) Analyze the effect of temperature on enzyme activity by chemical modification. [(CO3)(Analyze/IOCQ)]

4 + 4 + 4 = 12

Group - E

8. (a) How purity of enzyme can be checked ? [(CO4)(Remember/LOCQ)]
   (b) Compare the mode of action between hydrolase and transferase. [(CO3)(Compare/IOCQ)]
   (c) Mention how blood glucose level is estimated by two different methods. [(CO4)(Analyse/IOCQ)]

4 + 5 + 3 = 12

9. (a) Discuss the working principle of Amperometric Biosensor. [(CO5)(Discuss/HOCQ)]
   (b) Illustrate the schematic representation of a biosensor. Describe it's different components. [(CO5)(Illustrate/IOCQ)]

6 + (2 + 4) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	25	45.83	29.17

Course Outcome (CO):

After completing this course, students will be able to:
1. Describe different methods for immobilization of enzymes.
2. Apply enzymes in various industries that can benefit human life
3. Produce different useful secondary metabolites by microbes.
4. Modify the enzymes for better stability.
5. Design different biosensors for applications in biotechnology.
6. Develop the fermentation techniques and downstream processes.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question