INDUSTRIAL MICROBIOLOGY & ENZYME TECHNOLOGY
(BIOT 2204)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) Elimination of iron is important for production of
(a) Citiric acid (b) Gluconic acid
(c) Lactic acid (d) None of these

(ii) Two steps fermentation is required for production of
(a) Acetic acid (b) Lactic acid
(c) Gluconic acid (d) None of these

(iii) Incomplete oxidation process is required for production of
(a) Organic acid (b) Amino acid
(c) Ethanol (d) None of these

(iv) For sterilization of bioreactor the essential is
(a) Steam (b) Filtered air
(c) Buffer (d) None of these

(v) Pilot plant is used for preparation of
(a) Starter culture (b) Production media
(c) Recovery of product (d) None of these

(vi) Bradford reagent is used for determination of
(a) Total carbohydrate (b) Reducing sugar
(c) Total protein (d) None of these

(vii) Ethidium bromide is used for modification of
(a) Penicillin acylase (b) Protease
(c) Lipase (d) None of these

(viii) On the basis of mode of action enzymes can be classified into number of categories
(a) Five (b) Six (c) Three (d) None of these

(ix) Which of the following reactor is also known as Plug Flow Reactor
(a) Packed Bed Reactor (b) CSTR
(c) Bubble Column Reactor (d) All of the above

(x) Biosensors which measures the heat generation is known as
(a) Amperometric biosensor (b) Electrochemical biosensor
(c) Calorimetric biosensor (d) Piezoelectric biosensor.

Fill in the blanks with the correct word

(xi) Flavouring agents are produced by _____.

(xii) _____ is essential for recovery of gluconic acid.

(xiii) _____ is used for clarification of fruit juice.

(xiv) Semisynthetic penicillin is _____.

(xv) Tranversion is type of _____ mutation.

Group - B

2. (a) Explain the screening method for industrial production. *[(CO2)(Explain/HOCQ)]*
(b) Describe the different industrial applications of microbial exopolysaccharides. *[(CO3)(Illustrate/IOCQ)]*

6 + 6 = 12

3. (a) Comment on point mutation. *[(CO2)(Comment/IOCQ)]*
(b) Why pilot plant is used? *[(CO2)(Analyze/IOCQ)]*
(c) Mention the role of fed batch fermentation in xanthan production. *[(CO2)(Remember/LOCQ)]*

5 + 2 + 5 = 12

Group - C

4. (a) Analyze the separation of enzymes from mixture. *[(CO3)(Analyse/HOCQ)]*
(b) Discuss the mode of action of iron in citric acid production. *[(CO4)(Remember/LOCQ)]*
(c) Define semisynthetic antibiotics. *[(CO2)(Apply/IOCQ)]*

5 + 4 + 3 = 12

5. (a) Illustrate the downstream processing method for vitamins. *[(CO3)(Analyse/HOCQ)]*
(b) Discuss pre fermentation steps for beer production. *[(CO4)(Remember/LOCQ)]*
(c) Describe briefly the role of glucose oxidase in wine production. *[(CO2)(Apply/IOCQ)]*

6 + 4 + 2 = 12

Group - D

6. (a) Analyse neoglycosylation with suitable example. *[(CO3)(Analyse/HOCQ)]*
(b) Briefly discuss the effect of temperature on modification of enzyme. *[(CO4)(Remember/LOCQ)]*

(c) What is purity of enzyme? *[(CO2)(Apply/IOCQ)]*

4 + 6 + 2 = 12

7. (a) Compare the mode of action between oxidoreductase and transferase. *[(CO3)(Analyse/HOCQ)]*

(b) Briefly discuss the name with industrial applications of any three enzymes. *[(CO4)(Remember/LOCQ)]*

(c) What is the mode of action of amylase? *[(CO2)(Apply/IOCQ)]*

4 + 4 + 4 = 12

Group - E

8. (a) Illustrate the process of immobilizing the enzymes by Entrapment method. Write its advantages and limitations. *[(CO1)(Illustrate/IOCQ)]*

(b) Describe the working principle of Bubble Column Reactor as reactor of immobilized enzymes. *[(CO1)(Describe/IOCQ)]*

6 + 6 = 12

9. (a) Discuss the working principle of Calorimetric Biosensor. *[(CO5)(Discuss/HOCQ)]*

(b) Explain how enzyme biosensors can be used in detecting bacteria in food samples. *[(CO5)(Analyze/IOCQ)]*

6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	23.95	43.75	32.39

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.*