53 (FPT 711) IMET

2019

INDUSTRIAL MICROBIOLOGY AND ENZYME TECHNOLOGY

Paper : FPT 711

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer ***any five*** *questions.*

1. *(a)* Define fermentation. Explain the layout of fermentation technology employed in industry. How air sterilization occurs in an aerobic fermentation process ? Cite *one* example each of aerobic and anaerobic fermentation process. 2+4+2+2=10

   (b) Describe the beneficial role of lactic acid bacteria (LAB). Classify LAB with suitable examples on the basis of mode of action. Discuss the fermentative production and purification of lactic acid. 2+2+6=10

Contd.

2. *(a)* Mention the name of inoculum in citric acid fermentation. What is the equivalent weight of citric acid? Differentiate between surface culture and submerged culture production of citric acid. How is it recovered from fermentation broth? 1+1+3+5=10

(b) What is vinegar? Mention the name and character of organism used in vinegar production. Explain the role of enzymes in vinegar fermentation. How itaconic acid is recovered from fermentation broth? 1+2+3+4=10

3. *(a)* Give the structure of fumaric acid. Mention the name of isomer of fumaric acid. How this acid is linked with TCA cycle? Describe the fermentative production and purification of fumaric acid. 2+1+2+5=10

(b) Explain the enzymatic conversion of gluconic acid with structure. How pure gluconic acid is obtained from fermentation broth? Mention the important use of gluconic acid salt of calcium (calcium gluconate). 3+6+1=10

4. *(a)* What is antibiotic? Classify antibiotic on the basis of activity with example. How is it ingested in human body? How antibiotic prevents the attack of disease producing organism in human body? 1+2+1+6=10

(b) How Pen-G is structurally represented? Mention the name of penicillin producer. Discuss the pathway of production of penicillin. How is it recovered? 2+1+3+4=10

5. *(a)* How 6-APA is produced from Pen-G? What is semisynthetic penicillin? Explain the synthesis of semisynthetic penicillin with suitable example. What is penicilloic acid? 3+1+4+2=10

(b) What is biosurfactant? Is biosurfactant and microbial lipid same? Differentiate between microbial lipid and lipid. How bisurfactant is produced and purified? 1+1+2+6=10

6. *(a)* Differentiate between surface culture and submerged culture fermentation techniques for the production of enzyme. Which one is commercially suitable? What is Koji? How is it prepared? 3+1+1+5=10

(b) What is saccharifying amylase ? Which amylase is responsible for starch to glucose conversion ? What is it's another name ? Describe the isolation and recovery of alpha amylase from fermentation broth. State the mode of action of pectinase upon substrate.

1+1+1+5+2=10

7. (a) Draw a net sketch of continuous stirred tank fermenter (CSTF) with its component parts. What are the standard design criteria of a CSTF ? A fermenter of diameter 3*m* is cylindrical in shape. Calculate the height, volume, working volume, impeller diameter and baffle width of the fermenter.

3+2+5=10

(b) Describe the process of protein purification techniques. How protein is characterized ? Define proteomics.

7+2+1=10

8. (a) What do you understand by enzyme immobilization ? What is support *or* carrier molecule ? Explain the role of support/carrier molecules with examples. Compare physical and chemical methods of immobilization.

1+1+2+6=10

(b) Briefly describe some potential applications of immobilized enzyme technology (IMT) in industrial purpose. How enzymes are employed clinically ? Cite *two* examples of enzymes employed in food processing. Explain with examples microbial pigment.

3+3+2+2=10

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