Total number of printed pages–5

53 (FPT 714) IMET

2021

INDUSTRIAL MICROBIOLOGY AND ENZYME TECHNOLOGY

Paper : FPT 714

Full Marks : 100

Time : Three hours

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

*Answer **any five** questions.*

1. *(a)* Describe the layout of fermentation technology with the importance of inoculum development and supply of air. Mention about different aeration device in fermenter and function of foam controlling agent. 6+2+2=10

   (b) Write down the structures of two optically active isomers. Mention *one* example each of two different types of LAB. How purification of crude lactic acid is carried out? 2+2+6=10

Contd.

2. *(a)* Find out the equivalent weight of citric acid. Describe the fermentative production and purification of citric acid by submerged culture fermentation. 2+4+4=10

(b) Discuss the biochemical reactions occurs during vinegar fermentation with the influence of enzymes. Describe the fermentative production and purification of Gluconic acid. 4+3+3=10

3. *(a)* Briefly describe the medium composition and fermentation conditions during production of fumaric acid. How is it recovered from fermentation broth? 5+5=10

(b) Give the name and type of producer organism of itaconic acid production during fermentation. Mention the name of enzyme responsible for itaconic acid production. Describe the isolation and recovery of itaconic acid from fermented liquor. 2+1+7=10

4. *(a)* Define antibiotic. Give *one* example each of narrow and broad spectrum antibiotic. Describe the mechanism of action of antibiotics against human pathogens. 1+2+7=10

(b) Write down the structure of Pen-G. What do you understand by 1 lac unit of Pen-G? Describe the fermentative production and purification of Benzyl-penicillin (Pen-G). 2+1+7=10

5. (a) Give the action of KOH and penicillinase upon penicillin. Define semisynthetic penicillin. Describe the synthesis of semisynthetic penicillin with suitable example. 2+2+1+5=10

(b) Give the name and type of producer organism in streptomycin fermentation. How streptomycin is recovered from fermentation broth? 2+8=10

6. (a) What is Koji? How is it prepared? Why submerged culture fermentation process is important? Differentiate between surface culture and submerged culture fermentation process. 1+4+1+4=10

(b) State the action of saccharifying amylase upon starch molecule. How alpha amylase is produced by surface culture fermentation process? Describe the isolation and recovery of alpha amylase from fermentation broth. 2+4+4=10

7. *(a)* What is bioreactor? Give some examples of fermenter. Draw a neat sketch of continuous stirred tank fermenter (CSTF) with its component parts. What are the standard design considerations of a CSTF? 1+2+4+3=10

(b) What is meant by GRAS? What is pI? Describe the permeation chromatography of purification of protein. Explain dialysis with diagram. 1+1+5+3=10

8. *(a)* Differentiate between DNA and RNA. Explain recombinant DNA technology with examples. 3+7=10

(b) Describe *one* suitable and efficient protein characterization technique. State the importance of proteomics in protein engineering. 6+4=10

9. *(a)* What is immobilization of enzymes? What are the different properties of support materials? Discuss entrapment technique of enzyme immobilization methods. Differentiate between ionic adsorption and covalent bonding of enzyme immobilization. 1+3+3+3=10

(b) Explain with suitable example of CLEA technology. Explain the demerits of enzyme immobilization. Give *two* potential commercial applications of immobilized enzyme technology with biochemical conversion. 3+3+4=10