53 (FPT 711) IMET

2018

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)* Describe the layout of fermentation technology with the importance of inoculum development and supply of air. Define primary and secondary metabolites. Cite *one* example each of primary and secondary metabolites. 6+2+2=10

   (b) Describe the action of the different types of LAB on milk sugar with examples. How purification of crude lactic acid is carried out? Mention different grades of lactic acid with utility. 3+5+2=10

2. *(a)* How culture medium is selected during fermentative production of citric acid? Describe the fermentative production and purification of citric acid. 2+8=10

(b) Discuss the biochemical reactions occurs during vinegar fermentation with the influence of enzymes. Describe the fermentative production and purification of Gluconic acid. 3+7=10

3. *(a)* Briefly describe the medium composition and fermentation conditions during production of fumaric acid. How it is 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 acid/alkali and Gram negative bacteria upon penicillin. Differentiate between penicillin and semisynthetic penicillin. Describe the synthesis of semisynthetic penicillin with suitable example. 2+2+2+4=10

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

6. *(a)* How enzyme productions are carried out by surface culture and submerged culture fermentation process? Differentiate between surface culture and submerged culture fermentation process. 7+3=10

(b) State the action of different amylases upon starch molecule. How alpha amylase is produced by submerged culture fermentation process? Describe the isolation and recovery of alpha amylase from fermentation broth. 3+3+4=10

7. *(a)* What do you understand by the term fermenter? Give some examples of fermenter. Draw a neat sketch of Continuous Stirred Tank Fermenter (CSTF). What are the standard design considerations of a CSTF? 1+2+4+3=10

(b) What is meant by GRAS? Describe the extraction and purification of protein in context to protein engineering. How protein is characterized? Define proteomics. 1+6+2+1=10

8. What is immobilization of enzymes? Give some examples of support materials for the purpose of enzyme immobilization. What are the criterias for selection of support materials? Discuss enzyme immobilization methods. Give the industrial applications of immobilized enzyme technology. 1+3+3+8+5=20

9. Write short notes on : ***(any four)*** 4×5=20

(i) Enzymes in food processing

(ii) Microbial polysaccharides

(iii) Microbial pigments

(iv) Microbial lipids

(v) Enzymes in medical application

(vi) Recombinant DNA technology.
