Total No. of printed pages = 4

PG/1st Sem/PFET 103

2021

RECENT ADVANCES IN ENZYME AND MICROBIAL TECHNOLOGY

Full Marks – 100

Time – Three hours

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

Answer any *five* questions.

1. (a) Briefly elaborate on the structure of DNA using a simple schematic diagram. 10

   (b) Write short notes on any *five* of the following : 2×5=10

   (i) Genetic engineering

   (ii) Mutation

   (iii) Plasmid

   (iv) Gene

   (v) mRNA

   (vi) rDNA.

[Turn over

2. (a) Describe the principle of DNA microarray technology using a simple schematic flow diagram to explain the major steps involved in the analysis. 10

(b) Explain the working principles of a piezo-electric biosensor. Use a simple schematic diagram to describe how the analytical procedure is carried out. 10

3. (a) What are microbial insecticides ? List two advantages and two disadvantages of microbial insecticides. Elaborate on nematodes as a microbial insecticide, and explain their mode of action. 2+3+5=10

(b) Describe the fermentation process involved in vinegar fermentation, including the biochemical reactions. How does malolactic fermentation help in wine fermentation ? What is malt, and for which fermented alcoholic beverage is it used as a raw material ? 6+3+1=10

4. (a) Discuss the fermentative production and purification of a lipolytic enzyme. Explain the action of this enzyme on lipid. 8+2=10

(b) What is koji and how it is prepared? Describe ion-exchange chromatography. Describe PAGE. 2+5+3=10

5. (a) Give the action of different amylases on the starch molecule. How does α-amylase is prepared by submerged culture fermentation? 4+6=10

(b) Give one industrial application each of carbohydrate, protein and fat splitting enzymes. Discuss some important whole cell immobilization techniques with potential applications. 3+7=10

6. (a) Draw only the layout of the fermentation technology. Describe the standard design criteria of a fermenter with its diagram. State the different aeration devices and their functions in a fermenter. 3+4+3=10

(b) What do you understand by biogas? Give some examples of RDF. What is meant by 3R in waste management strategy? Mention only the biohydrogen production technique. Describe the different stages of the anaerobic digestion process of solid waste. 1+1+1+1+6=10

7. (a) Cite two examples each of natural and synthetic support/matrix materials for enzyme immobilization. State the advantages and demerits of immobilized enzyme technology. Describe the reversible methods of enzyme immobilization. 2+3+5=10

(b) Explain the CLEA method by citing one suitable reagent. Briefly describe two potential industrial applications of IMET. How protein is characterized ? What do you understand by proteomics ? 3+3+3+1=10