63/1 (SEM–6) DSE4/BOTHE6046

2024

BOTANY

Paper : BOTHE6046

(Industrial and Environmental Microbiology)

Full Marks : 60

Pass Marks : 24

Time : Three hours

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

1. Choose the correct answer from the following : ***(any five)*** 1×5=5

   (a) Which of the following fermenters is characterized by height to diameter ratio ?

   (i) Tower fermenter

   (ii) Fixed bed fermenter

   (iii) Fluidized bed fermenter

   (iv) Perfusion bioreactor

Contd.

(b) In World War II, the fermentation was used for the mass production of

(i) alcohol

(ii) antibiotics

(iii) wine

(iv) beer

(c) Citric acid is related to

(i) *Clostridium butyricum*

(ii) *Lactobacillus*

(iii) *Saccharomyces cerevisiale*

(iv) *Aspergillus niger*

(d) Mycorrhiza are classified into seven distinct types by

(i) Peterson and Farquhar (1994)

(ii) Scannerini (1988)

(iii) Vittadini (1842)

(iv) Frank (1885)

(e) Which of the following is a downstream process ?

(i) Media formulation

(ii) Sterilization of media

(iii) Selection of microorganism

(iv) Product purification

(f) Rhizobium is

(i) aerobic gram-negative bacteria

(ii) anaerobic gram-negative bacteria

(iii) aerobic gram-positive bacteria

(iv) anaerobic gram-positive bacteria

(g) Primary treatment of sewage is a

(i) physical treatment

(ii) biological treatment

(iii) chemical treatment

(iv) All of the above

(h) Which os the following water has highest BOD value ?

(i) Pond water

(ii) Tap water

(iii) Distilled water

(iv) Drain water

(i) Which of the following enzymes is responsible for starch hydrolysis ?

(i) Cellulase

(ii) Lipase

(iii) Amylase

(iv) Hydrolase

(j) The group of bacteria found in rhizosphere is

(i) Rhizobium

(ii) Rhizobacteria

(iii) Mycorrhiza

(iv) Lichen

2. Answer the following questions : ***(any five)*** 2×5=10

(a) What is fluidized Bed Bioreactor ? What are its advantages ?

(b) Write briefly the applications of lyophilization.

(c) What is osmotic shock ? On what type of cell it is used ?

(d) Write how a sparger help in aeration system of a bioreactor.

(e) Write briefly about symbiotic nitrogen fixing bacteria.

(f) Define an indicator organism. Is indicator organism helpful in determining the water quality ?

(g) What is solid-state fermentation ? What are the types of solid state fermentor ?

3. Answer the following questions : ***(any five)*** 5×5=25

(a) Based on which principle centrifuge is made ? Write briefly the types of centrifuge used in fermentation process. 1+4=5

(b) What is optimization of fermentation process? Describe the main factors controlling fermentation process. 2+3=5

(c) What is sewage? Write the effects of sewage and control measures.

(d) Write the harmful effects of microbes on environment.

(e) What is downstream processing? Why is downstream processing needed? Write about the equipments necessary for downstream processing.

(f) Why is lyophilisation? How is bacterial culture preserved by lyophilisation? 2+3=5

(g) Define BOD and COD. What is the significance of BOD and COD? Write the advantages of COD over BOD in wastewater.

(h) Define bioremediation. Write about the advantages and disadvantages of bioremediation.

(i) Define ectomycorrhizae and endomycorrhizae. What are the differences between ectomycorrhiza and endomycorrhiza?

4. Answer the following questions : ***(any two)*** 10×2=20

(a) Discuss batch and continuous fermentation processes. Give their advantages and disadvantages.

(b) Describe the industrial process for production of glutamic acid. Write the uses of glutamic acid. 8+2=10

(c) Write briefly the distribution of microbes in air. How are microorganisms isolated from air by Exposure Plate Techniques? Mention the impact of air-borne microorganisms on living beings. 2+6+2=10

(d) What is water pollution? Discuss the causes and control measures of water pollution. 2+8=10