

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted during the academic year 2019 - 2020 & thereafter)

M. Sc. DEGREE EXAMINATION - NOVEMBER 2023
BIOTECHNOLOGY
THIRD SEMESTER

COURSE : CORE
PAPER : BIOPROCESS AND FERMENTATION TECHNOLOGY
SUBJECT CODE : 19BY/PC/BF34
TIME : 3 HOURS **MAX. MARKS: 100**

SECTION – A

ANSWER ALL QUESTIONS

(10 x 2 = 20)

1. Which sterilization method is suitable for heat-sensitive materials and is often used for culture media?
 - a) Continuous sterilization
 - b) Filter sterilization
 - c) Batch sterilization
 - d) Medium sterilization
2. Which type of fermentation involves the growth of microorganisms on a solid substrate with limited free water?
 - a) Continuous fermentation
 - b) Feedback fermentation
 - c) Fed-batch fermentation
 - d) Solid state fermentation
3. Immobilized cell bioreactors are commonly used in which application?
 - a) Biofuel production
 - b) Antibiotic synthesis
 - c) Wastewater treatment
 - d) Cell culture expansion
4. What type of bioreactor relies on a gas column and air injection for mixing and aeration?
 - a) Stirred tank bioreactor
 - b) Packed bed bioreactor
 - c) Fluidized bed bioreactor
 - d) Air lift bioreactor
5. What is the purpose of flocculation in downstream processing?
 - a) To remove dissolved solutes
 - b) To enhance microbial growth
 - c) To separate solid particles from the liquid
 - d) To sterilize the bioproduct
6. Which type of chromatography elutes larger molecules more quickly than smaller ones?
 - a) Ion-Exchange Chromatography
 - b) Affinity Chromatography
 - c) Gel Permeation Chromatography
 - d) Gas Liquid Chromatography
7. What is the driving force behind molecular diffusion in mass transfer?
 - a) Temperature difference
 - b) Concentration gradient
 - b) Pressure difference
 - d) Viscosity variation
8. Film theory in mass transfer deals with the:
 - a) Movement of solid particles in a fluid medium
 - b) Transfer of heat in a solid material
 - c) Transfer of mass across a stagnant fluid layer near the interface
 - d) Heat transfer in a fluid medium
9. Single cell protein (SCP) is primarily derived from:
 - a) Bacteria
 - b) Algae and fungi
 - c) Milk products
 - d) Edible mushrooms
10. What is the primary role of microorganisms in mineral beneficiation processes?
 - a) Enhancing mineral production
 - b) Reducing mineral waste
 - c) Contaminating mineral resources
 - d) Accelerating soil erosion

SECTION – B**ANSWER ALL QUESTIONS****(5 x 8 = 40)**

11. (a) Compare and contrast batch sterilization and continuous sterilization.
(or)
(b) How does the principle of media design & media optimization contribute to bioprocess efficiency?
12. (a) Discuss stirred tank bioreactors and packed bed bioreactors.
(or)
(b) Analyse the various immobilization techniques for microbial enzymes.
13. (a) Compare microfiltration and ultrafiltration in membrane separation.
(or)
(b) Explain the various cell distribution methods for intracellular products.
14. (a) Provide a concise description on the different types of mass transfer processes.
(or)
(b) Discuss the microbial growth kinetics and its significance in bioprocessing.
15. (a) Explain the stages involved in the production, harvest, and recovery of microbial products. How are these stages common across various microbial products?
(or)
(b) Explain the production, harvest, and recovery processes for baker's yeast.

SECTION – C**ANSWER ANY TWO QUESTIONS****(2x20 = 40)**

16. Outline the basic configuration of a fermenter and give the salient features of the 5 different types of fermenters.
17. Analyze the role of various purification methods in achieving high enzyme purity in bioprocessing.
18. Create a flowchart illustrating the steps involved in downstream processing, from cell harvesting to final product formulation.
19. Describe the formulation of biofertilizers and biopesticides.
