



45582

**BRAINWARE UNIVERSITY**

LIBRARY
Brainware University
Barasat, Kolkata -700125

Term End Examination 2025-2026**Programme – M.Sc.(BT)-2025****Course Name – Bioprocessing and Fermentation Technology****Course Code - MBT27504B (T)****(Semester II)****Full Marks : 40****Time : 2:0 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 10=10

1. Choose the correct alternative from the following :

- (i) Bubble column bioreactors are preferred mainly due to:
 - a) High shear
 - b) Mechanical agitation
 - c) Simple design and low energy use
 - d) High viscosity handling
- (ii) MBRs are extensively used in:
 - a) Solid-state fermentation
 - b) Wastewater treatment
 - c) Dry heat sterilization
 - d) Downstream crystallization
- (iii) The specific growth rate (μ) represents:
 - a) Biomass concentration
 - b) Product concentration
 - c) Rate of biomass increase per unit biomass
 - d) Rate of substrate uptake only
- (iv) Organic nitrogen sources are preferred because they:
 - a) Are cheaper than inorganic
 - b) Supply growth factors and vitamins
 - c) Reduce enzyme activity
 - d) Inhibit metabolism
- (v) Centrifugation is preferred over sedimentation because it:
 - a) Requires less energy
 - b) Uses gravity
 - c) Provides faster separation
 - d) Eliminates shear stress
- (vi) Foam fractionation can be integrated directly with fermentation to:
 - a) Increase contamination
 - b) Remove intracellular products
 - c) Allow continuous product recovery
 - d) Reduce aeration
- (vii) Adjusting pH during extraction of organic acids improves recovery because it:
 - a) Denatures proteins
 - b) Changes acid ionization state
 - c) Increases viscosity
 - d) Promotes emulsions
- (viii) Fermentation-based chemical production supports sustainability primarily by:
 - a) Using fossil fuels
 - b) Reducing reaction time
 - c) Using renewable substrates
 - d) Increasing waste generation
- (ix) Over-oxidation of acetic acid is mainly a problem with:

- a) Lactobacillus
- b) Acetobacter
- c) Streptomyces
- d) Corynebacterium
- (x) Penicillium chrysogenum requires which condition for penicillin synthesis?
- a) High phosphate
- b) Nitrogen limitation
- c) Anaerobic growth
- d) High pH

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Define a bioreactor and state its primary role in an industrial bioprocess. (3)
3. Why is minimizing the lag phase important in industrial fermentation, and how can it be achieved? (3)
4. Explain why cell removal is a necessary first step in downstream processing for extracellular products. (3)
5. Why must nitrogen and phosphorus be limited during citric acid fermentation? (3)
6. Differentiate between biotransformation and de novo biosynthesis with reference to perfumery chemicals. (3)

OR

Why are microbial routes preferred for antibiotic production over chemical synthesis? (3)

Group-C

(Long Answer Type Questions)

5 x 3=15

7. Discuss the concept of specific growth rate (μ) and explain how growth kinetics influence the selection of fermentation modes and feeding strategies. (5)
8. Discuss the various methods of cell disruption used for intracellular product recovery and explain how method selection depends on cell type and product stability. (5)
9. Discuss the isolation, preservation, and maintenance of industrial microorganisms, emphasizing the importance of genetic stability and cell banking systems. (5)

OR

Describe the components of an industrial fermentation medium and discuss how media composition influences microbial metabolism and product formation. (5)

LIBRARY
Brainware University
Barasat, Kolkata -700125