



## BRAINWARE UNIVERSITY

Term End Examination 2023-2024

Programme – M.Sc.(BT)-2022

Course Name – Bioprocessing and Fermentation Technology

Course Code - MBTC302

( Semester III )

Full Marks : 60

Time : 2:30 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 15=15

1. Choose the correct alternative from the following :

- (i) Describe the primary goal of bioprocess engineering?
- a) To study the environment  
b) To optimize biological processes  
c) To design mechanical systems  
d) To develop new chemical reactions
- (ii) You are operating a fed-batch fermentation process and you have to add nutrients in the fermenter to continue the process. Choose the phase you will add the nutrient.
- a) Only during the exponential growth phase  
b) Continuously throughout the entire fermentation  
c) Only during the lag phase  
d) Only during the stationary phase
- (iii) Choose from of the following that not a bioprocess application?
- a) Brewing beer  
b) Producing biofuels  
c) Building bridges  
d) Manufacturing antibiotics
- (iv) You have been given a set of criteria to run a bioreactor and you have to get purified product on the basis of those criteria. The process you will employ to get final product will be...
- a) Upstream processing  
b) Downstream processing  
c) Bioreactor  
d) Fermenter
- (v) You have a high-density cell culture in suspension in a bioreactor. Predict the product from the following.
- a) Animal protein  
b) Ethanol  
c) Plant cell suspension  
d) Aspergillus niger
- (vi) Select the environment in which bioconversion of organic waste occurs into methane rich biogas
- a) Oxygen-rich  
b) Anaerobic  
c) Aerobic  
d) Hydroponic
- (vii) Bioprocess parameter estimated using a spectrophotometer is
- a) Agitation speed  
b) Microbial growth



- c) Nutrient concentration  
 (viii) Focus of batch fermentation primarily on?  
 a) Continuous addition of nutrients and removal of products  
 c) Fixed culture volume and initial nutrient addition  
 (ix) Select the main difference between a bioreactor and a fermenter?  
 a) The size of the vessel  
 c) The type of microorganisms used  
 (x) In bioprocess engineering, determine, what does "upstream processing" refer to?  
 a) The processing of raw materials and culture preparation  
 c) The analysis of bioreactor data  
 (xi) Which of the key advantage justify the use of batch fermentation over continuous fermentation  
 a) Higher product yields  
 c) Reduced risk of contamination  
 (xii) Identify the key components of a typical bioreactor system?  
 a) Pump, filter, and compressor  
 c) Furnace, pressure gauge, and valve  
 (xiii) Select the phase of batch fermentation, characterized by the highest microbial growth rate and exponential increase in cell numbers  
 a) Lag phase  
 c) Stationary phase  
 (xiv) In batch fermentation, predict the stage where microbial growth typically occur  
 a) Only during the initial phase  
 c) Only in the stationary phase  
 (xv) Describe among the following a critical parameter in bioprocess engineering for cell growth and product formation.  
 a) Temperature  
 c) Vibration frequency
- d) pH  
 b) Continuous monitoring of microbial growth  
 d) Continuous sterilization of the fermentation vessel  
 b) The presence of oxygen  
 d) There is no difference; they are the same  
 b) The final stage of a bioprocess  
 d) The removal of impurities from a product  
 b) Simplicity and flexibility in handling diverse products  
 d) Lower energy consumption  
 b) Stirrer, pH monitor, and dissolved oxygen probe  
 d) Computer, keyboard, and monitor  
 b) Exponential (log) phase  
 d) Decline phase  
 b) Throughout the entire fermentation process  
 d) Microbial growth is not relevant in batch fermentation  
 b) Electrical conductivity  
 d) Humidity

### Group-B

(Short Answer Type Questions)

3 x 5=15

2. Explain the difference between immobilized and soluble enzyme (3)
3. Differentiate the two main types of fermentation (3)
4. Name three important products commonly obtained through fermentation (3)
5. Evaluate biotransformation reactions in drug metabolism (3)
6. Evaluate the challenges associated with maintaining uniform conditions in SSF (3)

OR

Explain the significance of using protease enzymes in the leather industry (3)

### Group-C

(Long Answer Type Questions)

5 x 6=30

7. Contrast advantages and disadvantages of immobilized enzymes (5)

8. Continuous fermentation contribute to increased productivity and the efficient utilization of resources in bioprocess industries. Explain (5)
9. Assess Phase II biotransformation. (5)
10. Justify the use of bioconversion in production of biofuels (5)
11. Describe the steps involved converting agro-based biomass into biofuels (5)
12. Analyze antibiotic production from microorganisms. (5)

**OR**

Explain anaerobic wastewater treatment in detail (5)

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