



BRAINWARE UNIVERSITY

Term End Examination 2023-2024
Programme – B.Sc.(BT)-Hons-2023
Course Name – Industrial Fermentations
Course Code - VAC00009
(Semester II)

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) State the following is correct with respect to Fermentation
- | | |
|--|---|
| a) A process involving the mass culture of micro-organisms | b) It is a fast process |
| c) Fermented food products are always healthy | d) Oxygen is produced during fermentation |
- (ii) Describe the fermented product of milk
- | | |
|-----------|---------------|
| a) Yogurt | b) Sauerkraut |
| c) Tempeh | d) Kombucha |
- (iii) Identify the batch culture or fermentation can be used to produce
- | | |
|------------------------|----------------|
| a) Organic acids | b) Amino acids |
| c) Single Cell Protein | d) Antibiotics |
- (iv) Fermentation starts with
- | | |
|---------------------------|-------------------------|
| a) Down stream processing | b) Up stream processing |
| c) Filtration | d) All of these |
- (v) Interpret in a batch fermentor, pH control is achieved by
- | | |
|-------------------|--------------------|
| a) A water jacket | b) An autotitrator |
| c) An impeller | d) A blade |
- (vi) Identify which process was discovered in the late 19th century, involves the controlled use of microorganisms to produce valuable products in industrial settings.
- | | |
|------------------------|--------------------------|
| a) Bioremediation | b) Fermentation |
| c) Genetic Engineering | d) Antibiotic production |
- (vii) Explain during alcoholic fermentation, pyruvic acid is first converted to.....
- | | |
|------------------|---------------------|
| a) Ethyl alcohol | b) Succinic acid |
| c) Acetaldehyde | d) Oxaloacetic acid |
- (viii) Define which of the polymer is popularly used for cell immobilisation?

- a) Agarose
c) Calcium alginate
- (ix) Choose the ethanol fermentation with the source_____
- a) starch
c) fat
- (x) Explain the full form of DO
- a) Developed Oxygen
c) Dissolved Oxygen
- (xi) Identify the phase where microorganisms adapt to the new environment
- a) Log phase
c) Death phase
- (xii) State where number of dying cells equals numbers of new cells
- a) Death phase
c) Lag phase
- (xiii) Choose the type of reaction from which butanol is produced from butyric acid
- a) Oxidation
c) Acidogenesis
- (xiv) Choose the phase of microbial growth that is associated with the synthesis of primary metabolites
- a) Lag phase
c) Stationary phase
- (xv) Determine the process where the resin is packed into the column
- a) HPLC
c) SDS PAGE
- b) Chitin
d) Myoglobin
- b) lipids
d) fiber
- b) Diffusion Oxygen
d) Dissolved Oxygen
- b) Lag phase
d) All of these
- b) Log phase
d) Stationary phase
- b) Reduction
d) Alkilogenesis
- b) Log phase
d) Death phase
- b) Ion exchange chromatography
d) Agarose Gel Electrophoresis

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Describe the terms acidogenesis and solventogenesis in aceto-butanol fermentation (3)
3. Examine one commonly utilized method of enzyme immobilization among the various techniques available. (3)
4. Cite 8 main types of fermentations (3)
5. Write three main areas of upstream processing (3)
6. Calculate the mathematical derivation of a Batch Fermentation (3)

OR

Calculate the mathematical derivations of a continuous fermentation (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Discuss the four main types of industrial centrifuges. (5)
8. Describe how enzymes are immobilized through entrapment and discuss the advantages of this technique over adsorption. (5)
9. Summarize the batch fermentation. (5)
10. Assess the three types of fermentation based on the end products obtained from pyruvate (5)
11. Explain the steps of ethanol production by fermentation (5)
12. Deduce the microbial growth kinetics. (5)

OR

Evaluate the methodology for measuring k_{la} (mass transfer coefficient) in a Continuous-Stirred-Tank Bioreactor. (5)