BRAINWARE UNIVERSITY

Term End Examination 2024-2025

Programme – B.Sc.(BT)-Hons-2023/B.Sc.(BT)-Hons-2024

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) Select which industry extensively utilizes microbial enzymes in processes such as food processing, textile manufacturing, and biofuel production.

a) Information Technology b) Automotive
c) Pharmaceutical d) Industrial Biotechnology

(ii) Predict which of the following is continually refined in modern industrial microbiology to enhance productivity, reduce costs, and increase the range of products synthesized by microorganisms.

a) Antibiotic production b) Genetic engineering
c) Metabolic pathways d) Bioprocessing technologies

(iii) List who observed the fermentation of grape juice to wine?

a) Louis Pasteur b) John Needham
c) Spallanzani d) Waxman

(iv) Cite which of the following is NOT integral to Down stream processing?

a) Cell disruption b) Cell harvesting
c) Product purification d) Media sterilisation

(v) A test tube contains 9ml distilled water. 1g of soil is added to that test tube and the soil is allowed to settle down. Now, 1ml of that stock solution is taken and transferred to the 2nd test tube containing 9ml of distilled water. The process is repeated several times until the requirement is met. Construct, it may be said that the solution was diluted _____

a) 100-fold b) 10-fold
c) 1000-fold d) 2-fold

(vi) Choose in which of the following the microorganisms grow on the surface of the medium?

a) Submerged fermentation b) Surface fermentation
c) Solid state fermentation d) Batch fermentation

(vii) Explain which of the following method of chromatography separates based on molecular size of products?

a) Ion exchange chromatography b) Bio-Affinity Chromatography
c) High performance Liquid Chromatography d) Gel filtration

(viii) Discover which of the following method of immobilisation ensures protection of the enzyme from microbial attack?

a) Entrapment b) Adsorption
c) Covalent binding d) Absorption

(ix) Identify the process which is beneficial for products that are secreted extracellularly

a) Batch fermentation b) Fed batch fermentation
c) Continuous fermentation d) All of these

(x) Select the process of breaking down of complex sugars into fermentable sugars

a) Purification b) Hydrogenation
c) Saccharification d) Translation

(xi) Determine the immobilization technique involving the physical binding of enzymes on the surface of an inert support

a) Cross-linking b) Covalent binding
c) Adsorption d) Encapsulation

(xii) Choose the method of immobilization involving the formation of spherical particles with semipermeable membranes

a) Cross-linking b) Covalent binding
c) Microencapsulation d) Ionic bonding

(xiii) Classify microbial secondary metabolites

a) Low molecular mass products b) High weight polymers
c) High weight single molecule d) All of these

(xiv) Determine the process where larger molecules separate faster than smaller molecules

a) Ion-Exchange Chromatography b) Affinity Chromatography
c) Size-Exclusion Chromatography d) Reverse Phase Chromatography

(xv) Determine the technique which uses polar stationary phase and a non-polar mobile phase

a) Reverse Phase Chromatography b) Normal Phase Chromatography
c) Ion Exchange Chromatography d) Gas Chromatography

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Develop the various ways by which over production of microbial metabolite can be done (3)
3. Examine the advantages of using a single stage CSTR (3)
4. Define the term bioremediation with a suitable example. (3)
5. Determine the key steps in citric acid fermentation (3)
6. Explain the possible differences in aerobic and anaerobic fermentation techniques (3)

OR

Explain six different types of chromatographic techniques based on their function (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Describe how has charcoal and activated carbon been utilized in enzyme immobilization processes, and what are the specific advantages of using charcoal as a support material. (5)
8. Explain microbial polysaccharides. How do microorganisms synthesize them through fermentation processes.Discuss the production, properties, and applications of xanthan gum (5)
9. Explain the distinct phases involved in batch processing. How do they contribute to the overall production of desired products? (5)
10. Estimate the various uses of citric acid,lactic acid and ethanol in industry (5)
11. Deduce the mathematical fornulation of growth kinetics in microbiology. (5)

12. Estimate the challenges associated with downstream processing, and how can they be addressed to optimize the overall process. (5)

OR

Plan out the development of an experimental model for designing fermentation systems. (5)

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