31472-35528-44613

BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – B.Sc.(BT)-Hons-2023/B.Sc.(BT)-Hons-2024/B.Sc.(BT)-Hons-2025

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) Show that The Fed-batch culture is a/an _____ culture system

a) Open b) Closed
c) Isolated d) Semi-closed

(ii) Recall what technology developed in the 1970s, opened new avenues in industrial microbiology by manipulating the genetic material of microorganisms.

a) Fermentation b) Antibiotic production
c) Genetic engineering and recombinant DNA technology d) Enzyme production

(iii) Identify which field does industrial microbiology showcase potential for environmentally friendly solutions, using microorganisms to clean up pollutants and contaminants.

a) Agriculture b) Bioremediation
c) Aerospace d) Mining

(iv) Select which of the following allows researchers to optimize metabolic pathways in microorganisms for efficient production of desired compounds in industrial microbiology.

a) Bioremediation b) Systems Biology
c) Genetic Engineering d) Fermentation

(v) Explain during alcoholic fermentation, pyruvic acid is first converted to.....

a) Ethyl alcohol b) Succinic acid
c) Acetaldehyde d) Oxaloacetic acid

(vi) Interpret the fermentation media is generally

a) Sourced from byproducts or waste products of other industries b) Of laboratory grade to be suitable for fermentation
c) Not readily available in the market and therefore influences overall cost of d) Devoid of carbon and Nitrogen sources

production

(vii) Determine that For industrial purposes, acetone and butanol solvents are produced using which organism?

a) E.coli
b) Clostridium
c) Saccharomyces
d) Pseudomonas

(viii) Carefully examine, which of the following is used for commercial production of Penicillin?

a) Streptomyces griseus
b) Penicillium notatum
c) Streptomyces lavendulae
d) Penicillium chrysogenum

(ix) Define which of the polymer is popularly used for cell immobilisation?

a) Agarose
b) Chitin
c) Calcium alginate
d) Myoglobin

(x) Infer what happens to cell after treatment with sodium dodecyl sulphate

a) Enzymatic cell disruption
b) Plasmolysis
c) Non mechanical cell disruption
d) Deplasmolysis

(xi) Match, Immobilisation often leads to loss of enzyme activity due to

a) Immobilisation of active site
b) Crosslinking of the enzyme
c) Occupation of the active site by inhibitor
d) Occupation of the enzyme active site by substrate

(xii) Chose the group of microorganisms used for ABE fermentation

a) Amoeba
b) Clostridia
c) Paramecium
d) Yeast

(xiii) 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

(xiv) State the general oxygen transfer rate equation.

a) OTR = μX
b) OTR = $Ka(C - C^*)$
c) OTR = $Ka(C^* - C)$
d) OTR = KsS

(xv) Select the microorganism used for citric acid production.

a) Penicillium
b) Saccharomyces
c) Rhizobium
d) Aspergillus niger

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Derive the mathematical expression for Batch Fermentation. (3)
3. Explain the role of microorganisms in fermented food production. (3)
4. Develop the steps for biogas production by fermentation (3)
5. Interpret the four main types of industrial centrifuge (3)
6. Examine the advantages of using a single stage CSTR. (3)

OR

Construct how an experimental setup can be organized for generating fermented products (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Define strain improvement and name eight different methods that can be used for microbial strain improvement by using foreign DNA. (5)
8. Define microbial metabolites. Explain any 3 factors involved in the overproduction of microbial metabolites. (5)
9. Explain the main objectives of downstream processing and why is it essential in fermentation. (5)

10. Determine the stages involved in large-scale microalgae cultivation and lipid extraction for biodiesel production. (5)
11. Compare biophotolysis, photofermentation, and dark fermentation as biological routes for hydrogen production. (5)
12. Explain how does the strategy of mutation and recombinant DNA technology contribute to the overproduction of metabolites in microbial fermentation processes. (5)

OR

Illustrate and explain how does heterologous expression of entire gene clusters facilitate the production of bioactive compounds in microbial systems. (5)

****