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M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2025.

Fourth Semester

Microbiology – Core

FERMENTATION AND INDUSTRIAL
MICROBIOLOGY

(For those who joined in July 2021-2022 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Which of the following is a commonly used carbon source in industrial fermentation?
(a) Peptone (b) Molasses
(c) Yeast extract (d) Ammonium sulfate

2. Which technique is used to preserve industrially important microbes for long-term use?
(a) Pasteurization (b) Lyophilization
(c) Autoclaving (d) Sonication
3. Which growth phase in microbial kinetics is characterized by a constant growth rate?
(a) Lag phase
(b) Log phase
(c) Stationary phase
(d) Decline phase
4. Which of the following is NOT a basic component of a fermenter?
(a) pH probe (b) Sparger
(c) Impeller (d) Thermocycler
5. Which type of fermenter uses a central draft tube to circulate fluids?
(a) Bubble column fermenter
(b) Airlift bioreactor
(c) Shake flask fermenter
(d) Plug flow reactor

6. Which factor is crucial in maintaining foam control during fermentation?
- (a) Addition of antifoaming agents
 - (b) Increasing temperature
 - (c) Reducing oxygen supply
 - (d) Lowering pH
7. Which separation technique is commonly used to remove microbial cells from the fermentation broth?
- (a) Crystallization
 - (b) Centrifugation
 - (c) Lyophilization
 - (d) Chromatography
8. Which method is commonly used to purify proteins after fermentation?
- (a) Membrane filtration
 - (b) Distillation
 - (c) Chromatography
 - (d) Lyophilization

9. Which microorganism is used for the industrial production of penicillin?
- (a) *Penicillium notatum*
 - (b) *Aspergillus niger*
 - (c) *Streptococcus the thermophilus*
 - (d) *Saccharomyces cerevisiae*
10. Which immobilization technique involves the entrapment of microbes in a polymer gel?
- (a) Adsorption
 - (b) Encapsulation
 - (c) Covalent bonding
 - (d) Cross-linking

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain the role of raw materials such as molasses, cellulose and soybean meal in industrial fermentation.

Or

- (b) Differentiate between primary and secondary screening of industrial microbes.

12. (a) Describe the process of inoculum development for large-scale fermentation.

Or

- (b) Explain microbial growth kinetics with a diagram of the growth curve.

13. (a) Compare and contrast submerged and solid-state fermentation.

Or

- (b) Describe the working principle of an airlift bioreactor.

14. (a) Explain the principle and application of solvent extraction in downstream processing.

Or

- (b) What are the different methods used for cell disruption in fermentation?

15. (a) Discuss the industrial production of L-glutamic acid.

Or

- (b) Explain the principle and significance of enzyme immobilization in biotechnology.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the different methods of industrial sterilization used for fermenters, media, and air.

Or

- (b) Discuss strain improvement strategies and their significance in industrial microbiology.

17. (a) Describe the various stages of fermentation and the factors affecting large-scale fermentation.

Or

- (b) Discuss the basic components, design and working principles of a fermenter.

18. (a) Explain the different types of fermenters based on their nature and applications.

Or

- (b) Discuss the role of computers in the process control of fermentation

19. (a) Explain the different techniques involved in downstream processing, including purification and polishing.

Or

(b) Describe the principles and methods used in the membrane processing technique for product recovery.

20. (a) Describe the production process of beer, including raw materials and fermentation conditions.

Or

(b) Explain the large-scale production of amylase and its industrial applications.
