KAMARAJ COLLEGE (Autonomous)

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(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

THOOTHUKUDI – 628 003

(6 Pages) **Reg. No: ……**

Question Code No: 25O01607 **Course Code: 24PMMB33**

PG Degree - End Semester Examinations, November 2025

Third Semester

M.Sc. MICROBIOLOGY

Fermentation Technology and Pharmaceutical Microbiology

(For those who joined in July 2024 onwards)

Time: 3 Hours **Maximum: 75 Marks**

PART – A (10 × 1 = 10 Marks)

Answer ALL Questions

Choose the correct answer:

1. Solid-state fermentation is mainly employed for _____.

   (a) Enzyme production (b) Antibiotic production

   (c) Vaccine production (d) Alcohol fermentation

2. The first stage in upstream processing is _____.

   (a) Media formulation (b) Inoculum development

   (c) Product recovery (d) Sterility testing

3. The instrument used to monitor dissolved oxygen in a fermenter is _____.

   (a) Thermistor (b) pH probe

   (c) Clark electrode (d) Manometer

4. Productivity of a fermenter is expressed as

   (a) Product/time (b) Product/cell mass/time

   (c) Cell mass/volume (d) Cell mass/time

5. Which of the following is a physical method of cell disintegration?

   (a) Sonication (b) Solvent extraction

   (c) Enzymatic lysis (d) Detergent treatment

6. Aqueous two-phase extraction involves _____.

   (a) Salt precipitation

   (b) Polymer–polymer phase separation

   (c) Solvent partitioning

   (d) Filtration through membranes

7. Contamination in sterile injectable preparations is commonly due to _____.

   (a) *Bacillus subtilis spores* (b) *Clostridium tetani*

   (c) *Escherichia coli* (d) *Staphylococcus aureus*

8. Cleanroom classification in pharmaceuticals is based on _____.

(a) Viable particle count

(b) Non-viable particle count

(c) Both viable and non-viable counts

(d) Microbial toxin levels

9. The primary metabolite penicillin is produced by _____.

(a) *Aspergillus niger*

(b) *Streptomyces griseus*

(c) *Penicillium chrysogenum*

(d) *Bacillus subtilis*

10. Sterility testing of pharmaceuticals is done by _____.

(a) Pour plate method

(b) Direct inoculation method

(c) Agar diffusion method

(d) Slide culture method

PART – B (5 X 5 = 25 Marks)

Answer ALL Questions choosing either (a) or (b).
Answer should not exceed 250 words.

11. (a) Explain the different types of fermentation (batch, continuous, solid state, submerged).

(OR)

(b) Write short notes on the stages of upstream processing.

12. (a) Describe the design and components of a typical stirred-tank fermenter.

(OR)

(b) Discuss the role of aeration and agitation in fermentation.

13. (a) Explain any three methods of cell disintegration used in downstream processing.

(OR)

(b) Write notes on drying and crystallization of fermentation products.

14. (a) Explain contamination and spoilage of pharmaceutical products with examples.

(OR)

(b) Write short notes on design and layout of sterile manufacturing units.

15. (a) Discuss the production of antibiotics – Penicillin and Griseofulvin.

(OR)

(b) Write notes on quality assurance and in-process control in pharmaceuticals.

PART – C (5 X 8 = 40 Marks)

Answer ALL Questions choosing either (a) or (b).
Answer should not exceed 600 words.

16. (a) Discuss the process of strain isolation, screening, preservation and improvement of industrially important microbes.

(OR)

(b) Explain media formulation and optimization strategies for industrial fermentation.

17. (a) Discuss in detail instrumentation and control in fermentation technology.

(OR)

(b) Evaluate the role of computer applications in fermentation process control.

18. (a) Explain downstream recovery and purification steps for extracellular products with examples.

(OR)

(b) Critically analyse the methods of solvent extraction and aqueous two-phase extraction.

19. (a) Discuss the ecology of microorganisms in pharmaceutical environments (air, water, workers, raw materials).

(OR)

(b) Explain contamination and control measures in sterile injectable and ophthalmic preparations.

20. (a) Describe the production of immunodiagnostics, immunoglobulins and vaccines with emphasis on quality control.

(OR)

(b) Critically evaluate regulatory aspects in pharmaceuticals (BIS, ISI, ISO, WHO, US certification).