

MSc DEGREE EXAMINATION MAY 2026
(Second Semester)

Branch – **APPLIED MICROBIOLOGY**

FERMENTATION & BIOPROCESS TECHNOLOGY

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	The main purpose of using a multistage chemostat is to (i) Maintain different growth conditions (ii) Increase contamination (iii) Stop microbial growth (iv) Reduce aeration	K1	CO1
	2	Batch cultivation differs from continuous cultivation because it (i) Requires chemostat (ii) Operates without inflow and outflow during growth (iii) Has no defined phases (iv) Maintains steady state growth	K2	CO1
2	3	The primary purpose of adding antifoaming agents in fermentation (i) Increase microbial growth (ii) Enhance oxygen toxicity (iii) Reduce foam formation (iv) Increase medium viscosity	K1	CO2
	4	The main application of Box–Behnken design in bioprocess optimization (i) Microbial identification (ii) Medium sterilization (iii) Culture preservation (iv) Process parameter optimization	K2	CO2
3	5	The effect of excess dissolved oxygen on some microbial products (i) Product inhibition (ii) Enhanced anaerobiosis (iii) Foam elimination (iv) Medium sterilization	K1	CO3
	6	Flocculation as a process involving (i) Cell lysis (ii) Cell aggregation (iii) Cell sporulation (iv) Cell staining	K2	CO3
4	7	Where exopolysaccharides are located in microbial cells? (i) Cell membrane (ii) Cytoplasm (iii) Outside the cell wall (iv) Nucleus	K1	CO4
	8	Why whole microbial cells are often used in transformations? (i) Lack enzymes (ii) Provide complete enzyme systems (iii) Prevent reactions (iv) Reduce specificity	K2	CO4
5	9	GMP guidelines are regulated by (i) Quality regulatory authorities (ii) Farmers (iii) Retailers (iv) Transport agencies	K1	CO5
	10	ML-based monitoring systems help to (i) Ignore process deviations (ii) Enable real-time control (iii) Reduce aeration completely (iv) Stop biomass formation	K2	CO5

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SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Analyze the short-term and long-term preservation techniques employed for maintaining industrial microbial cultures.	K4	CO1
		(OR)		
	11.b.	Examine the industrial outcomes of strain improvement with respect to yield, stability, and process efficiency.		
2	12.a.	Evaluate the efficiency of submerged fermentation and solid state fermentation in industrial production processes.	K5	CO2
		(OR)		
	12.b.	Critique the role of medium composition in influencing microbial yield and product formation.		
3	13.a.	Design a strategy to evaluate mixing efficiency in stirred fermenters by integrating the concepts of Power number and Reynolds number.	K6	CO3
		(OR)		
	13.b.	Develop a purification workflow by integrating various chromatography techniques for microbial products.		
4	14.a.	Explain the process involved in ethanol production by microbial fermentation.	K2	CO4
		(OR)		
	14.b.	Summarize the role of microbial strains and substrates used for amylase production.		
5	15.a.	Apply biosensors for monitoring key environmental parameters in fermentation processes.	K3	CO5
		(OR)		
	15.b.	Organize fixed and variable costs involved in industrial fermentation processes.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Analyze the criteria for selection and preparation of inoculum used in large-scale fermentation processes.	K4	CO1
2	17	Evaluate the design and operational efficiency of Air lift fermentor and Deep jet fermentor in industrial fermentation.	K5	CO2
3	18	Design an automated fermentation system by integrating the concepts of Industry 4.0 in modern bioprocess industries.	K6	CO3
4	19	Explain the production process of Tetracycline antibiotics in industrial fermentation.	K2	CO4
5	20	Demonstrate how AI-based real-time monitoring can control pH, temperature, and aeration in a bioreactor.	K3	CO5

Z-Z-Z

END