

**PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**MSc DEGREE EXAMINATION MAY 2025
(Fourth Semester)**

**Branch – BIOTECHNOLOGY
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 most widely used control system in modern bioreactors is ----- a) Open-loop control b) Manual control c) Feedback control d) All the above	K1	CO1
	2	The function of a sparger in a fermentor is to ---- a) Control temperature b) Supply sterile air or oxygen c) Maintain pH balance d) Prevent contamination	K2	CO1
2	3	Inoculum development is important because ----- a) It ensures a pure and active culture b) It increases the efficiency of product purification c) It reduces contamination during downstream processing d) It is used only for industrial enzymes	K1	CO2
	4	In a batch culture, the exponential phase of microbial growth is characterized by ----- a) Constant cell concentration b) Maximum specific growth rate c) Nutrient depletion d) Accumulation of toxic byproducts	K2	CO2
3	5	Which of the following is NOT a common scale-up criterion in bioprocess technology? a) Constant power per unit volume b) Constant oxygen transfer rate c) Constant pH level d) Constant mixing time	K1	CO3
	6	Power consumption per unit volume in a bioreactor is mainly influenced by _____. a) Substrate concentration b) Inlet gas flow rate c) Temperature and pH d) Agitator speed and impeller diameter	K2	CO3
4	7	----- technique is commonly used for cell disruption in intracellular product recovery. a) Filtration b) Chromatography c) Precipitation d) Homogenization	K1	CO4
	8	Affinity chromatography is based on -----. a) Molecular weight differences b) Specific binding interactions between biomolecules c) Charge differences d) Solubility differences	K2	CO4
5	9	Which of the following does not have the property of production of secondary metabolites? a) Sporing bacteria b) Filamentous bacteria c) Filamentous fungi d) Enterobacteria	K1	CO5
	10	----- is the main industrial application of shikonin a) Anti-diabetic drug b) Anticancer and wound healing agent c) Insecticide d) Food preservative	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.	Summarize the process optimization of bioreactors.	K3	CO1
	(OR)			
	11.b.	Describe the bioprocess design for animal cell reactor.		
2	12.a.	Explain the methods involved in strain development and preservation of microorganisms.	K3	CO2
	(OR)			
	12.b.	Elucidate the kinetics of cell growth using structured and unstructured models.		
3	13.a.	Explain the significance of rheology and fluid type (Newtonian vs non-Newtonian) in fermentation scale-up.	K3	CO3
	(OR)			
	13.b.	Summarize the effect of scale on oxygenation and nutrient availability in fermentation processes.		
4	14.a.	Describe the techniques for removing microbial cells and solid matter in downstream processing.	K4	CO4
	(OR)			
	14.b.	Illustrate the key aspects of product stabilization, formulation and storage in downstream processing.		
5	15.a.	Summarize the applications of bioprocessing technology in converting starch and high-fructose corn syrup.	K3	CO5
	(OR)			
	15.b.	What are the key steps involved in the production of monoclonal antibodies using mammalian cells.		

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	Elaborate the types of fermentor.	K6	CO1
2	17	Discuss aerobic and anaerobic fermentation process.	K5	CO2
3	18	How can bioreactor scale-up be optimized by maintaining constant power input per volume, impeller tip speed and ensuring efficient oxygen transfer?	K5	CO3
4	19	How do filtration, centrifugation and precipitation contribute to product purification in downstream processing?	K4	CO4
5	20	Describe the process of Hepatitis B surface antigen production using yeast as a host system.	K5	CO5

Z-Z-Z

END.