LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **BIOTECHNOLOGY**

THIRD SEMESTER – **NOVEMBER 2024**

PBT3MC03 – BIOPROCESS AND ENZYME TECHNOLOGY

Date: 12-11-2024 Dept. No. Max. : 100 Marks

Time: 01:00 pm-04:00 pm

	SECTION A – K1 (CO1)	
	Answer ALL the questions	**(5 x 1 = 5)**
1	**Choose the best option**	
a)	Which of the following is the final electron acceptor of the lactic acid fermentation? i) Lactic acid ii) Oxygen iii) Pyruvate iv) NAD	
b)	The bioreactor system that possess the length scales that are well matched to the physical dimensions of most cells and microorganisms is i) Continuous stirred tank ii) Microfluidic iii) Packed bed iv) Rotating wall vessel	
c)	The sterilization in double spiral heat exchanger is done through _____ i) Countercurrent mechanism ii) Counter mechanism iii) Symporter mechanism iv) Antiporter mechanism	
d)	Which of the following is not a typical step in downstream processing? i) Cell disruption ii) Filtration iii) Chromatography iv) Strain development	
e)	The common method for immobilizing enzymes are i) Adsorption ii) Covalent bonding iii) Entrapment iv) All of the above	
	SECTION A – K2 (CO1)	
	Answer ALL the questions	**(5 x 1 = 5)**
2	**Answer in one or two sentences**	
a)	How is specific growth rate expressed?	
b)	Give the reaction that takes place during alcohol fermentation.	
c)	Differentiate anionic and cationic detergents.	
d)	Give examples of any two mechanically resistant materials.	
e)	Write the significance of SGOT and SGPT.	
	SECTION B – K3 (CO2)	
	Answer any THREE of the following	**(3 x 10 = 30)**
3	Describe the steps of inoculum development to prepare an active culture for a large-scale industrial fermentation process	

4	Explain the working principle of a photobioreactor and describe its key components. How does it differ from traditional bioreactors in terms of design and application?
5	Relate with an example affinity chromatography.
6	Discuss the industrial applications of enzymes.
7	Explain regulation of enzyme biosynthesis.
SECTION C – K4 (CO3)	
	Answer any TWO of the following **(2 x 12.5 = 25)**
8	Given a *Saccharomyces cervisiae* strain for fermentation, apply your understanding of the fermentation media components to select and justify the appropriate carbon and nitrogen sources required for optimal growth and product yield.
9	Analyze the different types of aerators and agitators used in bioreactors. Suggest the most suitable type for a high-oxygen-demand fermentation process and justify your choice.
10	Compare the downstream processing methods involved for an intracellular pressure sensitive and extracellular temperature sensitive amino acid.
11	Categorize enzyme immobilization methods.
SECTION D – K5 (CO4)	
	Answer any ONE of the following **(1 x 15 = 15)**
12	Evaluate the different types of fermentation processes used in industrial production. Compare and contrast their advantages and limitations.
13	Evaluate the significance of enzymes in medical applications.
SECTION E – K6 (CO5)	
	Answer any ONE of the following **(1 x 20 = 20)**
14	Develop an experimental plan using the Plackett-Burman design to identify key factors influencing the yield of a target metabolite in a fermentation process. Detail the methods to determine the optimum level of each key independent variable.
15	Design and rewrite an overall scheme for the properties, classification, and numbering of enzymes with databases for enzymes.

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