Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 90020

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2024
Fifth Semester
Biotechnology
U19BTV51 – FERMENTATION TECHNOLOGY
(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	How does strain improvement optimize fermentation processes?	2	K4	CO1
2.	Define cryopreservation and lyophilization.	2	K1	CO1
3.	What are the uses of baffles in a fermentor?	2	K1	CO2
4.	Mention different probes used in the fermenter to monitor the condition.	2	K2	CO2
5.	What are the mechanisms involved in fibrous filters used to sterilize air?	2	K2	CO3
6.	Compare and contrast the chemical and radiation sterilization of air.	2	K3	CO3
7.	Which fermentation factors affect downstream processing?	2	K2	CO4
8.	What are the parameters that influence the rate and degree of cell disruption in High-pressure homogenizers?	2	K2	CO4
9.	Contrast Pesticide formulations, and Wettable powder.	2	K1	CO5
10.	List out the uses of Neem plant extract for pest control.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)		Explain industrial fermentation. Write in detail about the raw materials and medium requirements for the fermentation process.	13	K4	CO1
			(OR)			
	b)		Describe and discuss the different stages of the fermentation process.	13	K1	CO1
12.	a)		Discuss the design, operation, and uses of air-lift bioreactor.	13	K2	CO2
			(OR)			
	b)		Differentiate between a packed bed bioreactor and a fluidized bed bioreactor with schematic diagrams.	13	K4	CO2
13.	a)	i.	Discuss the different methods of continuous sterilization, including schematic diagrams to illustrate each type.	7	K3	CO3
		ii.	During sterilization of a fermentation medium in a given bioreactor $\nabla_{heating}$= 12.56, ∇cooling= 7.48 and the total value of $\nabla_{required}$ for the whole sterilization process is 52, where, ∇ is the design criteria. What is the value of $\nabla_{holding}$? and what is the holding period (min) at a k value of 3.36min^{-1}?	6	K5	CO3
			(OR)			
	b)	i.	Describe the thermal death kinetics of microorganisms, including the relevant equations.	7	K4	CO3
		ii.	For a 50-hour fermentation, a 100 m^3 fermenter requires air at a rate of 20 m^3/min. An investigation of the filter material to be used showed that the optimum linear air velocity was 0.15 m/s, at which the value of K was 1.535 cm^{-1}. The air in the fermentation plant contained 400 microorganisms per m^3. Calculate the filter's thickness using the standard contamination risk as 10^{-3}.	6	K5	CO3
14.	a)	i.	Explain the mechanism of cell disruption by ultrasonication. Write their advantages and disadvantages.	7	K4	CO4
		ii.	A tubular bowl centrifuge is used to recover yeast cells from a fermentation broth. At the flow rate of 10 liters/min and 5000 rpm, 50% of the cells can be recovered. Your manager now asks you to increase the recovery to 90% using the same equipment. What flow	6	K5	CO4

		rate should you use? and how much does the centrifugation velocity change if you double the rotation speed?			
		(OR)			
b)	i.	Discuss the principle and practice of batch extraction in bioseparation.	6	K3	CO4
	ii.	Explain the factors affecting chromatography column efficiency and the critical parameters to be considered when selecting the chromatography separation process.	7	K2	CO4
15. a)		With the help of flowsheets, explain the fermentation for the production of Beer and Wine.	13	K2	CO5
		(OR)			
b)		Discuss systemic and non-systemic Pesticides. Discuss in detail the biopolymers.	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16. a)		What are the various steps in downstream processing? Explain them in detail with a neat schematic diagram.	15	K2	CO4
		(OR)			
b)		Draw the outlines of an integrated fermentation process and derive the design equation of a batch bioreactor.	15	K4	CO2