

Total number of printed pages: Programme(UG)/VII/UFET712

2022

Fermentation Technology

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer any five questions.

1.	a)	What is fermentation? What is stoichiometry? Draw a schematic diagram of a fermenter and mention all accessories and how control unit works?	2.5+2.5+10 =15
	b)	What is sterilization factor ? How it is determined?	5
2.	a)	Write cell growth rate equation and draw cell growth curve and discuss different phase of growth. What is doubling time? How by graphical plot, maximum specific cell growth rate is calculated?	4+6+5+5=20
3.	a)	What is plug flow reactor? How it is useful for immobilized enzyme conversion? Discuss mathematically with Michaelis Menten equation.	12
	b)	An enzyme was assayed at initial substrate concentration 2×10^{-5} moles. In 6 min, half of the substrate was used. Calculate K_m . K_m is 5×10^{-3} moles. Calculate V_{Max} . Calculate the concentration of product produced after 15 min. What fraction of V_{Max} is observed at $S=4K_m$	8
4.	a)	Immobilized lactase is used to hydrolyse lactose in dairy waste to glucose and galactose. The enzyme is immobilized in resin and packed in to 0.5m ³ column. K_m is 1.32 kg/m ³ and V_{Max} is 45 kg/m ³ h. Lactose in feed stream 9.5 kg/m ³ and 98% substrate conversion is required. The column is operated under plug flow condition for 310 days/ year.	20

		Calculate At what flow rate should the reactor be operated? How many tonnes of glucose is produced per year?	
5.	a)	What is Monode equation? Discuss with plot?	12
	b)	Mention disadvantages of batch culture and how that is overcome in CSTR operational strategy?	8
6.	a)	What is catabolite repression? How Fed batch culture is advantageous?	5+5
	b)	What is maintenance coefficient?	5
	c)	Why How oxygen is transferred from gas bubble to microbial cell in suspension culture?	5
7.	a)	Why aeration and agitation is required in fermentation?	6
	b)	Why sterilization of nutrient medium is required for fermentation?	6
	c)	Write the environmental parameters in fermentation.	4
	d)	How inoculum is prepared for fermentation ? Mention inoculum size to transfer to fermentation medium.	4

Central Institute of Technology Pokrajhar