



Continuous Assessment Test -2 (CAT-2) Fall Semester (2023-24)

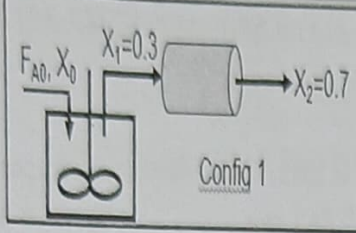
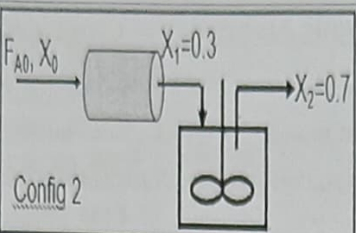
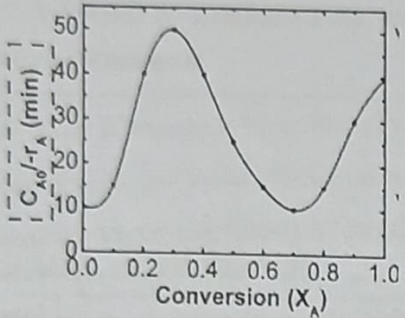
Course code & Title : BBIT304L & Biochemical Engineering
Programme Name & Branch : B.Tech., Biotechnology
Class Number(s): VL2023240100159; VL2023240100160; VL2023240100174; VL2023240100176
VL2023240100397. Slot : B1+TB1 & B2+TB2
Faculty Name : DR. K. RAMANATHAN, DR. V. SHANTHI & MS. DHANYA V
Exam Duration : 90min Maximum Marks: 50

General instruction(s):

Write and explain the assumptions whenever made

Any other specific instruction: -NA-

Q. No.	Question	Max Marks	CO	BL
1. a.	Predict in which of the following entropy increases/decreases: i) A liquid crystallizes into solid ii) Temperature of crystalline solid is raised from 0 K to 115 K. iii) $2\text{NaHCO}_3 (\text{s}) \rightarrow \text{Na}_2\text{CO}_3 (\text{g}) + \text{CO}_2 (\text{g}) + \text{H}_2\text{O} (\text{g})$	3	1	4
b.	Express the change in internal energy of a system when w amount of work is done by the system and q amount of heat is supplied to the system. What type of system would it be?	3		
c.	The value of ΔG° for the phosphorylation of glucose in glycolysis is 13.8 kJ/mol. Find the value of K_{eq} at 298 K	4		
2. a.	A swimmer coming out from a pool is covered with a film of water weighing about 30 g. How much heat must be supplied to evaporate this water at 298 K. $\Delta_{\text{vap}}H^\circ$ for water at 298 K is $44.01 \text{ kJ mol}^{-1}$.	5	4	5
b.	A product is produced by a nonisothermal, nonelementary, multiple-reaction mechanism. Assume the volumetric flow rate is constant & same in both reactors. Data for this reaction is shown in the graph (page 2). Use this graph to determine which of the 2 configurations that follow give the smaller total reactor volume. Justify your results.	5		

	 Config 1  Config 2 			
3.	Derive the kinetic expression for enzyme substrate reaction. Mention the different methods by which one can determine the kinetic parameters.	10	6	6
4.	Characterize plug flow reactor and develop the design equation with the help of neat diagram. Explain each term in the system.	10	5	6
5.	In an isothermal batch reactor, the conversion of liquid reactant A is 70% in 13 min. Find the space time and space velocity necessary to effect this conversion in a mixed flow reactor. Consider first order kinetics.	10	4	4