

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-VII (NEW) EXAMINATION – WINTER 2024

Subject Code:3170407

Date:04-12-2024

Subject Name:Biochemical Engineering

Time:10:30 AM TO 01:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		Marks
Q.1	(a) Explain the terms system, surrounding and batch process.	03
	(b) Humid air enriched with oxygen is prepared for gluconic acid fermentation. The air is prepared in a special humidifying chamber. 1.5 l/hr liquid water enters the chamber at the same time as dry air and 15 gmol / min dry oxygen gas. All the water is evaporated. The outflowing gas is found to contain 1%(w/w) water. Draw and label the flowsheet for this process.	04
	(c) Classify the fluids based on its rheological behaviour.	07
Q.2	(a) Explain the terms degree of reduction, product yield and biomass yield.	03
	(b) 50 g benzaldehyde vapor is condensed at 179°C. What is the enthalpy of the liquid relative to the vapor?	04
	(c) Explain cone and plate viscometer and its applications.	07
	OR	
	(c) Explain radial and axial flow impeller.	07
Q.3	(a) What is steady state flow process and adiabatic process?	03
	(b) Explain film theory with diagram.	04
	(c) Explain various factors affecting broth viscosity.	07
	OR	
Q.3	(a) Explain distribution, dispersion, and diffusion.	03
	(b) Enlist the steps for oxygen transfer from liquid phase to cell.	04
	(c) Explain diffusion theory and role of diffusion in bioprocessing.	07
Q.4	(a) Write a note on antifoam agents and its application in biosystems.	03
	(b) Draw a neat diagram of stirred tank bioreactor.	04
	(c) Explain kinetics of substrate uptake in cell culture.	07
	OR	
Q.4	(a) Explain Lineweaver Burk Plot.	03
	(b) Explain heat sterilization and filter sterilization of liquids.	04
	(c) Explain typical growth curve of bacteria.	07
Q.5	(a) Write a note on economics of downstream process.	03
	(b) Draw diagram to represent substrate uptake for production formation coupled with energy metabolism and not coupled with energy metabolism.	04

- (c) Explain principle, working and application of flow injection analysis. **07**
- OR**
- Q.5** (a) What do you mean by scale up and scale down process? **03**
- (b) Enlist different components of biosensor and its role. **04**
- (c) Derive equation for derivation of time for kinetics of cell death. **07**
