GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2020

Subject Code:2170407   **Date:25/01/2021**
Subject Name:Biochemical Engineering-I
Time:10:30 AM TO 12:30 PM   **Total Marks: 56**
Instructions:
1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	How are cells classified?	**03**
	(b)	What is central dogma of life? Explain in brief.	**04**
	(c)	Derive the equation for batch reaction time required to reduce the substrate concentration from s_0 to s_f in an enzymatic process.	**07**
Q.2	**(a)**	What do you mean by recycle stream, bypass stream and purge stream?	**03**
	(b)	A continuous process is set up for treatment of wastewater. Each day, 10^5 kg cellulose and 10^3 kg bacteria enter in the feed stream, while 10^4 kg cellulose and 1.5×10^4 kg bacteria leave in the effluent. The rate of cellulose digestion by the bacteria is 7×10^4 kg d^{-1}. The rate of bacterial growth is 2×10^4 kg d^{-1}; the rate of cell death by lysis is 5×10^2 kg d^{-1}. Write balances for Cellulose and bacteria in the system.	**04**
	(c)	Explain different modes of sterilization of liquids.	**07**
Q.3	**(a)**	What do you mean by state properties?	**03**
	(b)	Draw a neat diagram of stirred tank reactor with proper annotations.	**04**
	(c)	Classify the fluids according to their rheological behaviour. Also show their flow curve.	**07**
Q.4	**(a)**	Compare packed bed, fluidized bed and trickel bed reactors.	**03**
	(b)	What is Reynold's number? Give its equation and significance.	**04**
	(c)	Explain various factors affecting broth viscosity.	**07**
Q.5	**(a)**	Explain the terms bubble formation, gas dispersion and coalescence	**03**
	(b)	Explain Michaelis Menten Kinetics.	**04**
	(c)	Explain role of diffusion in a bioprocess.	**07**
Q.6	**(a)**	What is total reaction rate, volumetric reaction rate and specific reaction rate?	**03**
	(b)	Compare Lineweaver-Burk plot, Eadie-Hofstee plot, Langmuir plot and Direct liner plot.	**04**
	(c)	Explain film theory in detail.	**07**
Q.7	**(a)**	How the Cell Senses Its Extracellular Environment?	**03**
	(b)	What do you mean by overall yield, instantaneous yield, theoretical and observed yield?	**04**
	(c)	Draw and explain Typical batch growth curve and state values of μ in different phases.	**07**

Q.8 **(a)** What is μ_{max} and k_s? Give relation between them. **03**

(b) What is k_{La}? What are ways to measure it? **04**

(c) Explain principle and working of Cone-and-Plate Viscometer. **07**

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