Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – WINTER 2013

Subject Code: 170404 Date: 28-11-2013

Subject Name: Bioprocess Engineering - I

Time: 10:30 TO 01:00 Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain the control of hydronium ion in a bioreactor.	**07**
	(b)	Define: growth rate limiting, stoichiometrically limiting, yield factor, Respiratory coefficient, metabolic energy stoichiometry.	**07**
Q.2	**(a)**	Enlist basic functions of a fermentor.	**07**
	(b)	Calculate : (a) the cell formula for the growth of yeast on sugar when it is observed to give the following balance (assume 1 mole of cell produced): (100g) $C_6H_{12}O_6$ +(5.1 g) NH_3 + (46.63 g) O_2 → (43.23 g) cell mass + (41.08g) H_2O + (67.42g) CO_2 (b)If the above reaction produces 0.30017 mole of cell, what cell formula results?	**07**
		OR	
	(b)	Give the merits and demerits of membrane Bio-reactor.	**07**
Q.3	**(a)**	Discuss the classification of various pumps for biotech industries.	**07**
	(b)	Compare and Contrast: Bubble column reactor and air lift reactor.	**07**
		OR	
Q.3	**(a)**	Explain the importance of bioreactor scale up and explain in detail.	**07**
	(b)	Compare various methods for determining k_la.	**07**
Q.4	**(a)**	Narrate the major mass transfer resistances for gas bubble in a nutrient medium for fermentation.	**07**
	(b)	Give the functions of Impeller, Baffles, Stirrer shaft and its contribution in aeration or agitation.	**07**
		OR	
Q.4	**(a)**	How artificial intelligence and genetic algorithm help in controlling fermentor operations?	**07**
Q.4	**(b)**	Briefly explain Interaction between cells and turbulent eddies and Discuss on damage caused by shear.	**07**
Q.5	**(a)**	Explain characteristics of population models and segregated models.	**07**
	(b)	What ways can aseptic conditions be achieved in a fermentor?	**07**
		OR	
Q.5	**(a)**	How does mixing occur in a reactor? What precautions or care is to be taken for animal cells?	**07**
	(b)	Write the functions of following parts: Gate valve, Globe valve, Butterfly valves, Diaphragm valves, Check valves, Pressure control valves, Safety valves.	**07**

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