Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – SUMMER • 2015

Subject Code: 170404 **Date: 04/05/2015**

Subject Name: Bioprocess Engineering-I

Time:02.30pm-05.00pm **Total Marks: 70**

Instructions:

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

Q.1	**(a)**	Give the equations for physical designing of fermentor, including impeller.	**07**
	(b)	How mixing in fermentor will affect mass transfer efficiency?	**07**
Q.2	**(a)**	Write down the gas hold up correlations and discuss its importance.	**07**
	(b)	Compare- stirred bioreactors and fluidized bed bioreactors.	**07**
		OR	
	(b)	Explain the role of vales and steam traps in fermentor.	**07**
Q.3	**(a)**	What are the modes of fermentation? Give an account.	**07**
	(b)	Discuss the types of fermentation system.	**07**
		OR	
Q.3	**(a)**	Justify the statement: "Bioreactor scale up is a crucial job". Give technical comments.	**07**
	(b)	Explain the role of major controllers in controlling operations of fermentor.	**07**
Q.4	**(a)**	Discuss the principle and applications of photo-bioreactor and membrane bio-reactor.	**07**
	(b)	Explain incubation control in detail with parameters.	**07**
		OR	
Q.4	**(a)**	Differentiate between kinetic models and population models, giving examples.	**07**
	(b)	Enlist the methods to determine k_La. Discuss any one of current practice out of them.	**07**
Q.5	**(a)**	Differentiate clearly between distribution, dispersion and diffusion as a mass transfer phenomenon in fermentor.	**07**
	(b)	Anaerobic fermentations typically produce a variety of partially oxygenated compounds in addition to cell mass. If the cell molecular formula is given by $C_6H_{10}O_3N$, Calculate the unknown coefficients for the following typical equation where coefficients are given as mole quantities and not in mass.	**07**

5.56 (Glucose) + A(NH_3) → B (cell mass) + C(Butanol) + D(Succinic acid) +2.20 (glycerol) +3.40 (H_2O) +3.75 CO_2 +1.08 (ethanol).

OR

Q.5	**(a)**	How genetic algorithm and artificial neural network makes difference in controlling variables?	**07**
	(b)	Enlist all physical and chemical methods to control microorganism.	**07**

****