Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E SEM-VII Examination-Nov/Dec.-2011

Subject code: 170404 **Date: 26/11/2011**

Subject Name: Bio Process Engineering-I

Time: 10.30 am-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.**

Q.1	**(a)**	Give advantages of non-mechanically agitated bioreactor system over mechanically agitated bioreactor system. Explain any two non-mechanically agitated bioreactor.	**07**
	(b)	What is Kla? How to determine Kla.	**07**
Q.2	**(a)**	Differentiate between Structured model and unstructured model. Explain unstructured model and compartment model.	**07**
	(b)	i) Explain Black box model.	**3.5**
		ii) Explain the factors affecting Kla in fermentation vessel.	**3.5**
		OR	
	(b)	i) Explain molecular mechanistic model.	**3.5**
		ii) What is the role of shear in stirred fermentor? Explain.	**3.5**
Q.3	**(a)**	Define scale-up. Explain the steps in scale up.	**07**
	(b)	Write short notes on imperfectly mixed bioreactor systems.	**07**
		OR	
Q.3	**(a)**	What is fermentor? Explain the basic functions of fermentor for microbial and animal cell culture.	**07**
	(b)	With the help of neat diagram explain the tower fermentor and cylindro-conical vessels.	**07**
Q.4	**(a)**	Derive dynamic mass balance equation	**07**
	(b)	Explain the types of mixing equipments and their mechanism of mixing.	**07**
		OR	
Q.4	**(a)**	i) What are the types of reactions involved for cellular metabolism as proposed by Neidhart et al. Explain them.	**04**
		ii) Write short notes on stiochiometry of the reactions involved in cellular metabolism.	**03**
Q.4	**(b)**	What is rheology. What is the effect of medium and culture rheology on Kla.	**07**
Q.5	**(a)**	What is artificial neural network? Explain its learning process.	**07**
	(b)	What is genetic algorithm?	**07**
		OR	
Q.5	**(a)**	What is adaptive control approach? Explain its experimental design and process modeling.	**07**
	(b)	Explain Boolean control and rule generation.	**07**

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