

**M. TECH. DEGREE EXAMINATIONS: NOVEMBER 2009**

Second Semester

**BIOTECHNOLOGY**

P07BTE21: Bioreactor Engineering

**Time: Three Hours**

**Maximum marks: 100**

**Answer ALL Questions:-**

**PART A (10 x 2 = 20 Marks)**

1. What are the factors affecting transport resistances in the gas liquid mass transfer?
2. How you will define properties of Non-Newtonian fluid?
3. What are the biochemical parameters that needed to control in the bioprocess?
4. What is biosensor? Give some examples.
5. State any two methods for the stabilization of recombinant cells.
6. What are the common features of animal cell bioreactors?
7. What is a fed batch reactor?
8. What is needed to know minimum fluidization velocity?
9. What is power number and how you will calculate?
10. What is similitude in scale up?

**PART B (5 x 16 = 80 Marks)**

- 11 (a). Describe the various methods for measuring  $k_L a$ .

**(OR)**

(b) Derive and explain the thermal death kinetics of microorganisms.

- 12 (a) Discuss in details about the online analysis for measurement of physiochemical parameters.

**(OR)**

(b) (i) Explain in details about online and offline biomass estimation. (8)

(ii) Explain the working principles of microbial calorimeter (8)

13 (a) Write detail notes on plasmid stability in recombinant cell culture.

(OR)

(b) Discuss in detail on bioprocess design consideration for plant cell cultures.

14 (a) What are the distinct advantages of the fed batch systems in bioprocessing and derive the kinetics of a fed batch reactor system.

(OR)

(b) Write detailed notes on fluidized and packed bed bioreactors with neat sketch and explain their application

15 (a) Describe the various criteria for the scale-up of bioreactors.

(OR)

(b) What are the various criteria for the selection of bioreactors? and explain in detail.

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Time: 7

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