Code No: 09A52302 | R09 | SET-1

B. Tech III Year I Semester Examinations, May/June - 2012
BIOCHEMICAL REACTION ENGINEERING
(BIOTECHNOLOGY)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1. Write difference and similarities between chemical and bioreactors. [15]

2. Explain the basic principles of sterilization. [15]

3. Design equation for enzyme reactors, Batch growth of microorganisms. [15]

4. Describe Bubble-column reactors and Airlift reactors. [15]

5. At room temperature sucrose is hydrolyzed by the enzyme sucrase as follows:

   Sucrose $\xrightarrow{\text{sucrase}}$ products

   Starting with sucrose (C_{A0} = 1 mol/m^3) and sucrase (C_{EO} = 0.01 mol/m^3) the following data are obtained in a batch reactor.

C_A mol/m^3	0.68	0.16	0.006
t, hr	2	6	10 →

   Find a rate equation to represent the kinetics of this reaction. [15]

6. Describe the dispersion model. [15]

7. Explain Factors affecting cellular oxygen demand and Oxygen transfer in fermenters. [15]

8. Explain Measurement of dissolved oxygen concentrations. [15]

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Code No: 09A52302 | R09 | SET-2

B. Tech III Year I Semester Examinations, May/June - 2012
BIOCHEMICAL REACTION ENGINEERING
(BIOTECHNOLOGY)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1. Classify the bioreactors and Reactor configuration. [15]

2. Explain Kinetics of thermal death of cells & spores. [15]

3. Explain Chemostat growth, Exponential feeding strategy. [15]

4. Design equation of plug flow reactor, Design of CSTR with washout concept. [15]

5. Describe Fluidized-bed reactor and Packed-bed reactor. [15]

6. State experimental methods for finding E. [15]

7. What is the role of glucose in the breakdown of cellulose (find the type of inhibition, and rate equation). [15]

8. Explain Sulphite oxidation method. [15]

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Code No: 09A52302 | R09 | SET-3

B. Tech III Year I Semester Examinations, May/June - 2012
BIOCHEMICAL REACTION ENGINEERING
(BIOTECHNOLOGY)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1. Describe the conventional bioreactor with all aspects. [15]

2. Design of batch and continuous sterilization, sterilization of air and filter design. [15]

3. Explain fed batch growth, continuous growth and their growth kinetic quantification. [15]

4. Design Stirred tank reactor with recycle of biomass. [15]

5. Describe Liquid impelled loop reactor, Pumped tower loop reactor. [15]

6. Define RTD, earliness of mixing and the age distribution of fluid. [15]

7. Find a rate equation to represent the breakdown of cellulose by cellulose in the absence of inhibitor. [15]

8. A 20-1 stirred fermenter containing a Bacillus thuringiensis culture at 30^0C is used for production of microbial insecticide, k_La is a determined using the dynamic method. Air flow is shutoff for a few minutes and the dissolved-oxygen level drops; the air supply is then re-connected. When steady state is established, the dissolved-oxygen tension is 78% air saturation. The following results are obtained.

Time(S)	5	15
Oxidation tension(%air saturation)	50	66

a) Estimate k_La.
b) An error is made determining the steady-state oxygen level which, instead of 78%, is taken as 70%. What is the percentage error in k_La resulting from this 10% error in C_{AL}? [15]

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Code No: 09A52302 | R09 | SET-4

B. Tech III Year I Semester Examinations, May/June - 2012
BIOCHEMICAL REACTION ENGINEERING
(BIOTECHNOLOGY)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1. Describe the types of sterilization. [15]

2. Describe radiation and chemical sterilization. [15]

3.a) Explain Batch growth quantifying cell concentration.
b) Growth profile and kinetics in batch culture. [8+7]

4. Design Continuous tank fermenters in series without and with recycle of biomass. [15]

5. Describe Air lift reactors, multipurpose tower reactors. [15]

6. Reactant A (C_{A0} = 64 mol/m^3) flows through a plug flow reactor (τ = 50 s), and reacts away as follows: A $\longrightarrow$ R, $-r_A = 0.005\ C_A^{1.5}$,mol/m^3.s.
Determine the conversion of A if the stream is: **(a)** a micro fluid **(b)** a macro fluid. [15]

7. Write role of diffusion in bio-processing and Convective mass transfer. [15]

8. State Methodology of oxygen transfer from gas bubble to cell. [15]

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