Code No: 07A42304 **R07** **Set No. 2**

II B.Tech II Semester Examinations,December 2010
BIOPROCESS ENGINEERING
Bio-Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What do you mean by simple media & complex media?
   (b) Write the advantages of complex media over simple media. [8+8]
2. What are the applications of aerobic fermentation processes in biotechnological industries? [16]
3. Explain growth energetics using steady state continuous culture of *S.cereviseae*. [16]
4. How mass transfer plays an important role in the design of a fermenter? [16]
5. Describe solid-state fermentation. What is a Koji process and why is it used in major industrial production of enzymes? [16]
6. Derive the expression of specific growth rate for multiple substrate utilization. Specify what type of substrate inhibition it is? [16]
7. Write short notes on the following:
   (a) Precursors and inducers in medium formulation
   (b) Structured growth model of microorganisms
   (c) Oxygen and Carbon dioxide exhaust gas analyzer. [5+5+6]
8. Describe the process of manufacture of citric acid with a flow sheet indicating the material and energy flow at every point. [16]

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Code No: 07A42304 **R07** **Set No. 4**

II B.Tech II Semester Examinations,December 2010
BIOPROCESS ENGINEERING
Bio-Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Write a note on medium design and usage. [16]
2. Write the step -wise procedure to calculate the heat of reaction with oxygen not as a principal electron acceptor. [16]
3. What is solid-state fermentation process? Explain, how enzymes produced using this process? [16]
4. Estimate the theoretical growth and product yield coefficients for ethanol fermentation by S. cerevisiae as described by the following reaction $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$. [16]
5. Describe various requirements of a fermentation process with a flow sheet. [16]
6. Enumerate difference between growth and non-growth associated product kinetics. [16]
7. Write a brief note on biosensors, and describe how they are used for measuring process parameters. [16]
8. For many fermentation processes, fed - batch conditions are preferred over continuous feeding conditions - Discuss this with some specific examples. [16]

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Code No: 07A42304 **R07** **Set No. 1**

II B.Tech II Semester Examinations,December 2010
BIOPROCESS ENGINEERING
Bio-Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. How the oxygen requirements of an industrial fermentation medium are met? Describe with examples. [16]
2. Explain the growth energetics with relation to microbial growth giving relevant equation supporting it. [16]
3. Describe various physical process parameters that need to be controlled in a fermentation process. Explain them briefly. [16]
4. Describe the processes of precipitation of cellular extract and discussing its advantages and disadvantages. [16]
5. Explain the procedure involved in the determination of cell number density and cell mass concentration. [16]
6. Enumerate the range of fermentation process. Explain with examples. [16]
7. Derive the expression for determining the maintenance coefficient in continuous cultivation. [16]
8. What is meant by minimum fluidization velocity? What is its importance in design of fluidized bed bioreactors? [16]

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Code No: 07A42304 **R07** **Set No. 3**

II B.Tech II Semester Examinations,December 2010
BIOPROCESS ENGINEERING
Bio-Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain the following:
   (a) Elemental balances
   (b) Available electron balances
   (c) Maintenance coefficient. [6+5+5]
2. Write a note on aerobic fermentation processes with specific examples. [16]
3. Explain in detail about the general unsteady state energy balance equations. [16]
4. Write short notes on:
   (a) Filtration
   (b) Centrifugation
   (c) Coagulation and Flocculation [5+5+6]
5. (a) How the minerals requirements of an industrial fermentation medium are met? Describe with examples.
   (b) What are various nutrients required in the formulation of an industrial medium, and how they are met? [8+8]
6. (a) Explain the Monod model and state the assumptions and limitations of it.
   (b) In a chemostat, if a culture obeys the Monod equation the residual substrate is independent of the feed substrate concentration. But in an experiment it was observed that the residual substrate concentration increases as the feed substrate concentration is increased. Instead of monod equation apply contois equation and derive an expression for S in terms of So, D, Ksx, YMX/S and mm. State whether the residual substrate concentration increases with feed substrate concentration as observed in the experiment and calculate how much increase in residual substrate concentration is expected if the feed substrate concentration is increased two fold. [8+8]
7. Describe how a computer can be coupled to a fermenter for controlling various process parameters. [16]
8. What are various steps involved in converting the idea of a product into a commercial reality? [16]

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