

Code No: RR410805

RR

Set No. 2

IV B.Tech I Semester Examinations, November 2010

PROCESS MODELLING AND SIMULATION

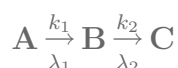
Chemical Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Explain the Mass Transfer phenomena in a Reactor with a case study. [16]
2. Draw an analog computer simulation circuit diagram for three CSTRs in series (isothermal, first order, irreversible, constant volume, and constant throughput). [16]
3. Discuss the general "Newton - Raphson" algorithm to determine the bubble point temperature for a binary system of components 1 and 2. Assume the system is ideal, Raoult's and Dalton's laws are applicable. [16]
4. A first order irreversible exothermic reaction $A \rightarrow B$ occurs in a series of three perfectly mixed CSTRs. Feed enters the first reactor and product leaves the third reactor. Derive the mass balance and component continuity equations considering isothermal and constant holdups. Assume constant density for the system, which is a binary mixture of A and B. [16]
5. Derive the Model equations to describe the Batch distillation of a multicomponent mixture. [16]
6. Write the energy equation for the CSTR (continuous stirred-tank reactor) in which consecutive first order reactions occur with exothermic heats of reaction λ_1 and λ_2 .



State the assumptions made and explain the nomenclature used. [16]

7. Explain the convergence procedure to find the bubble point temperature of a binary vapour-liquid mixture. [16]
8. Define the equations and notations for Dalton's law, Raoult's law and relative volatility of an ideal vapour-liquid equilibrium system. [16]

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Set No. 4

IV B.Tech I Semester Examinations, November 2010

PROCESS MODELLING AND SIMULATION

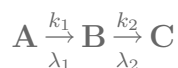
Chemical Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
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1. Explain the convergence procedure to find the bubble point temperature of a binary vapour-liquid mixture. [16]
2. Explain the Mass Transfer phenomena in a Reactor with a case study. [16]
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7. Discuss the general "Newton - Rapshon" algorithm to determine the bubble point temperature for a binary system of components 1 and 2. Assume the system is ideal, Raoult's and Dalton's laws are applicable. [16]
8. Write the energy equation for the CSTR (continuous stirred-tank reactor) in which consecutive first order reactions occur with exothermic heats of reaction λ_1 and λ_2 .



State the assumptions made and explain the nomenclature used. [16]

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Set No. 1

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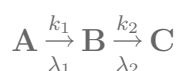
Chemical Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

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Set No. 3

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PROCESS MODELLING AND SIMULATION

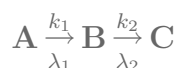
Chemical Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
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1. Explain the Mass Transfer phenomena in a Reactor with a case study. [16]
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