Total No. of Questions :10]

SEAT No. :

P3996

[Total No. of Pages :2

[4959]-1182
B.E. (Chemical)
PROCESS MODELING & SIMULATION
(2012 Course) (Semester - II) (End - Semester) (409349)

Time : 2½ Hours] ***[Max. Marks :70***

Instructions to the candidates:

1) ***Answer any 5 questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.***

Q1) Draw the flowchart of a systematic approach to process modeling, showing the interrelations between the flowchart stages. Alongside each major step, list in brief point form the key issues for each major modeling task. **[10]**

OR

Q2) Discuss the classification of models with proper examples. **[10]**

Q3) Develop a model for Triple effect evaporator. **[10]**

OR

Q4) Discuss the assumption for mixing process and develop a model for it. **[10]**

Q5) Develop a mathematical model for ideal binary distillation column. Use notations as usual. Write assumptions. Draw neat figure. **[16]**

OR

Q6) Develop a mathematical model for absorption column. Use notations as usual. Write assumptions. Draw neat figure. **[16]**

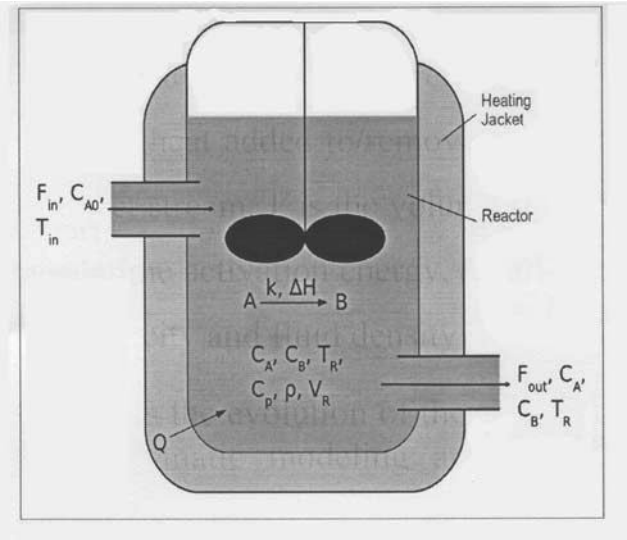
Q7) Develop a mathematical model for Bioreactor. **[18]**

OR

P.T.O.

Q8) Consider a CSTR where an irreversible first-order endothermic reaction of the form A $\xrightarrow{k}$ B takes place. Let C_A denote the concentration of the species A in the reactor, TR and Tin denote the temperatures of the reactor and of the inlet stream, respectively, Q, is the heat added to/removed from the reactor, C_{AO} is the concentration of A in the inlet stream, V is the volume of the reactor, k_O, E, ΔH are the pre-exponential constant, the activation energy, and the enthalpy of the reaction and Cp and ρ are the heat capacity and fluid density in the reactor. **[18]**

Develop a model that describes the evolution of the concentration and temperature in the reactor, using a systematic modeling approach that also outlines all assumptions made.



Q9) 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]**

OR

Q10) What is Process Simulation? What are the approaches of simulation? Explain it with proper example. **[16]**

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