

Roll No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (CE) (Sem.-7)

CHEMICAL PROCESS SIMULATION

Subject Code : BTCH-801

M.Code : 71881

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A**1. Write briefly :**

- a) Give the uses of mathematical model.
- b) What is lumped parameter model?
- c) What is simulation? Give its advantages.
- d) Why modelling assumptions are important in the building of a model?
- e) Give the significance of verification and validation of mathematical model.
- f) When does the chemical equilibrium between two phases occur?
- g) State the mass transportation law.
- h) Give the equation of states.
- i) What is a biochemical reactor?
- j) Differentiate between isothermal and non-isothermal system.

SECTION-B

2. Develop a mathematical model by involving energy equations for two heated tanks connected in series wherein the fluid entered into the first tank and exit from the second tank continuously and is heated inside both the tanks by providing heat through electrical heaters. State the notations and assumptions clearly.
3. Develop a mathematical model for an isothermal plug flow reactor. State the assumptions clearly.
4. Develop a mathematical model for non-interacting system. Also comment on the degree of freedom.
5. Develop a mathematical model for a reactor with mass transfer wherein an elementary reaction $A_{(g)} + B_{(l)} \rightarrow C_{(l)}$ is taking place. Comment on the degree of freedom of the model.
6. Develop a mathematical model for batch distillation column. State the assumptions clearly and comment on the degree of freedom of the model.

SECTION-C

7. Develop a mathematical model for an ideal binary distillation column. State the assumptions clearly and comment on the degree of freedom of the model.
8. Develop a mathematical model and describe the simulation strategy for isothermal batch reactor. State the assumptions clearly and comment on the degree of freedom of the model.
9. Develop a mathematical model for three CSTRs of variable volume are connected in series and in which exothermic elementary liquid phase reaction $A_{(l)} + B_{(l)} \rightarrow C_{(l)}$ is taking place.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.