(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 182602   Roll No. ☐☐☐☐☐☐☐☐☐☐☐

B.TECH.

Theory Examination (Semester-VI) 2015-16

INTRODUCTION TO MODELLING & SIMULATION

Time : 3 Hours   *Max. Marks : 100*

Note: Attempt questions from all three sections.

Section-A

1. **Attempt any all parts of the following:**   **(2×10=20)**

    (a) What is the difference between physical and mathematical modeling?

    (b) Explain degree of freedom with examples.

    (c) What is the difference between steady and unsteady state models?

    (d) Write five software programs available for chemical Engineering process.

(e) Explain terms lumped parameter and distributed parameter system.

(f) Write the principle of momentum balance and explain component balance.

(g) Write lumped parameter.

(h) Define simulation.

(i) Write the modal equation for single effect evaporator.

(j) What is mathematical consistency of model.

Section-B

2. Attempt any five parts of the following : **(10×5=50)**

(a) Give the classification of mathematical modeling.

(b) What are the various difficulties which occur in mathematical modeling? Explain in detail.

(c) Discuss the use of mathematical models in operation of chemical plants.

(d) Explain process simulation in detail. Give the scope of process simulation with examples.

(e) Compare the sequential modular and equation oriented approach of simulation.

(f) Discuss the partitioning and tearing in process plant simulation.

(g) An irreversible, first order, exothermic reaction A ⟶ B is carried out in a CSTR. Develop the equations to compute the conversion achieved and operating temperature at steady state

(h) What is modular based flow sheeting? Discuss its advantages and disadvantages.

Section-C

Note: Attempt any two parts of the following. (15×2=30)

3. Write the component continuity equation for a perfectly mixed reactor with first order isothermal reaction.

4. A fluid of constant density is pumped into a cone shaped tank of total volume V. The flow out of the tank is directly proportional to the square root of the height of the liquid in the tank. Derive the equation describing the system.

5. What is flow sheet simulation? Explain various approaches of flow sheet simulation.