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**M.E. / M.TECH. DEGREE EXAMINATIONS, MAY 2019**

First Semester

**CL18103 – PROCESS MODELING AND SIMULATION***(Chemical Engineering)***(Regulation 2018)****Time: Three Hours****Maximum : 100 Marks**Answer **ALL** questions**PART A - (10 X 2 = 20 Marks)**

1. Compare linear and nonlinear model.
2. How process model is developed? Give two examples.
3. Write component balance equation for isothermal CSTR.
4. What is meant by partitioning and tearing of process streams?
5. What do you mean by flow sheeting?
6. What is process simulation?
7. Elucidate the significance of degrees of freedom analysis in process modelling and simulation.
8. Write energy balance equation for stirred tank heater.
9. Differentiate between deterministic and stochastic models.
10. Justify the need for modelling of chemical processes.

**PART B - (5 X16 = 80 Marks)**

11. (a) Explain mathematical modeling and give detail classification of mathematical modelling. **(16)**

**(OR)**

- (b) (i) Describe briefly the fundamental laws used in mathematical models of chemical engineering systems. **(12)**

- (ii) Write the advantages of process simulation. **(4)**

12. (a) List the structural components and general purpose of sequential modular and equation oriented approach for steady state simulation. **(16)**

**(OR)**

- (b) (i) Derive a mathematical model for a batch reactor. **(8)**

- (ii) Discuss about the numerical methods used for solving ordinary differential equations. **(8)**

13. (a) Develop the steady state model and practical model for a flash drum. (16)

(OR)

(b) Develop the steady state, liquid phase dynamics, liquid and vapour phase dynamics and thermal equilibrium model for a LPG Vapourizer. (16)

14. (a) Develop a suitable model for analysis of non-isothermal plug flow reactor. (16)

(OR)

(b) Discuss the unsteady state distributed model for heat transfer in shell and tube heat exchanger. (16)

15. (a) (i) Explain about lumped parameter model with an example. (8)

(ii) Write short notes on empirical modeling with an example. (8)

(OR)

(b) Discuss with an example about stochastic modeling and Population balance approach. (16)