

Semester I, Paper-4
MODELLING AND SIMULATION

Teaching scheme

Lectures: 4 Hrs/week.
Practical: 2 Hrs/Week.

Examination scheme

Theory: 100 marks
Practical: 25 marks

Unit 1. (10 Hrs, 20 Marks)
Fundamentals of chemical process dynamics, Continuity equation, Equation of motion, Transport equation, Equation of state equilibrium, Solving mathematical models for series of isothermal constant hold up, variable holdup CSTRs, Modeling of Non isothermal CSTRs, Modeling of gravity flow tank

Unit 2. (10 Hrs, 20 Marks)
Solving mathematical models for single component vaporizer, Modeling of flash drum, Modeling of batch reactor, Modeling of binary distillation column, and Modeling of batch distillation.

Unit 3. (10 Hrs, 20 Marks)
Modeling process system via digital computer, writing systems of differential equations e.g. numerical method, Runge-Kutta method, Euler method, Newton Raphson method, Adam-Bashforth method.

Unit 4. (10 Hrs, 20 Marks)
Process identification: Purpose Time domain eyeball fitting of step test data, Direct sine wave, pulse and step signal testing and ATV identification.

Unit 5. (10 Hrs, 20 Marks)
Basic principles of simulation use of system simulation, tools for modeling & simulation, Simulation models types of system simulation. Analog & digital simulation techniques, process simulation, control system simulation, formulation of model for dynamic system & simulation on analog computer.

References:

1. Process control, "Thomas E. Marlin", Mc Graw Hill Publication.
2. Chemical process control, "Geoye stephanopolous", PHI private Limited
3. Process modeling, simulation and control for chemical Engineers, "William L. Luyben", MC-Graw Hill Private Ltd.
4. Computer based Industrial control, "Krishna Kant", PHI.

List of Experiments:

Term work shall consist of at least eight experiments based on Syllabus using MATLAB or similar software package.