
SYSTEM MODELLING & SIMULATION
(ELECTIVE – I)**Course Code:** 13EC2207**L P C**
4 0 3**Course Outcomes:**

At the end of the course the student will be able to

- CO1: Predict the modeling and simulation concepts for dynamic systems using variety of formalisms.
- CO2: Interpret various simulation packages with programming languages to increase model Validity and credibility.
- CO3: Demonstrate various timing models and event driven models to effectively simulate Queuing systems.
- CO4: Extrapolate different markov processes to illustrate the behavior of probabilistic Systems and state machines.
- CO5: Justify the importance of system optimization using modeling and simulation methods.

UNIT-I INTRODUCTION:

Basic Simulation Modeling, Systems, Models and Simulation, Discrete Event Simulation, Simulation of single server queuing system, Simulation of Inventory System, Alternative approach to modeling and simulation.

UNIT-II SIMULATION SOFTWARE AND MODELS:

Comparison of simulation packages with Programming languages, Classification of Software, Desirable Software features, General purpose simulation packages – Arena, Extend and others, Object Oriented Simulation, Examples of application oriented simulation packages. Guidelines for determining levels of model detail, Techniques for increasing model validity and credibility.

UNIT-III TIME AND EVENT DRIVEN MODELS:

Modeling input signals, delays, System integration, Linear Systems, Motion control models, Numerical Experimentation. Simulation diagrams, Queing theory, simulating queing systems, Types of Queues, Multiple servers.

UNIT-IV MARKOV PROCESS:

Disturbance signals, State Machines, Petri Nets & Analysis, System encapsulation.

Probabilistic systems, Discrete Time Markov processes, Random walks, Poisson processes, the exponential distribution, simulating a poison process, Continuous-Time Markov processes.

UNIT-V SYSTEM OPTIMIZATION:

System Identification, Searches, Alpha/beta trackers, Multidimensional Optimization, Modeling and Simulation methodology.

TEXT BOOKS:

- [1] Frank L. Severance, “*System Modeling & Simulation, an Introduction*”, John Wiley & Sons, 2001.
- [2] Averill M. Law, W. David Kelton, “*Simulation Modelling and Analysis*”, TMH, 3rd Edition, 2003.

REFERENCE BOOKS:

- [1] Geoffery Gordon, “*Systems Simulation*”, PHI, 1978.