SYSTEM MODELLING& SIMULATION
(ELECTIVE – I)

Course Code: 13EC2207 **L P C**
4 0 3

Course Objectives:

1. Explain the benefits of modelling and simulation in a range of important application areas.
2. Demonstrate the ability to apply the techniques of modelling and simulation to a range of problems.
3. Evaluate simulation and analyze results.

Course Outcomes:

At the end of the course student should be able to:

1. Understand the concepts of modelling and simulation of dynamic systems using variety of formalisms.
2. Understand the importance of simulation.
3. Verify and validate various simulation models.

UNIT-I
INTRODUCTION:

Basic Simulation Modeling, Systems, Models and Simulation, Discrete Event Simulation, Simulation of single server queing 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.