SYSTEM MODELLING&SIMULATION
(ELECTIVE – I)

Course Code: 15EC2207

L	**P**	**C**
3	**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   (10-Lectures)
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   (10-Lectures)
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   (10-Lectures)
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   (10-Lectures)
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   (10-Lectures)
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 Modeling and Analysis*", TMH, 3rd Edition, 2003.

REFERENCE BOOKS:
1. Geoffery Gordon, "*Systems Simulation*", PHI, 1978.