CS-606: MODELING & SIMULATION

Teaching and Examination Scheme:

Teaching Scheme			Credits	Marks			Duration of End Semester Examination
L	T	P/D	C	Sessional	End Semester Exams	Total	
3	0	0	3	40	60	100	3Hrs

COURSE OBJECTIVE:

The course should enable the students to provide a strong foundation on concepts of simulation and modeling, understand the techniques of random number generation, understand the techniques of testing randomness, practice on simulation tools and impart knowledge on building simulation systems.

COURSE CONTENT:

UNIT	CONTENT	No. of Hrs.
I	**Fundamentals** Definition and reasons for simulation, continuous (time-oriented) and discrete (event) systems, modeling/programming simple deterministic systems, rates and system dynamics.	9
II	**Concepts in Simulation** Stochastic variables; discrete vs continuous probability, Monte Carlo Simulations; Monte Carlo methods, normally distributed random numbers, Monte Carlo V/S Stochastic Simulations.	10
III	**Queuing Models** Single server queuing system, introduction to arrival and departure time, flowcharts for arrival and departure routine, event graphs of queuing model, determining the events and variables, event graphs for inventory model. Random Numbers: Introduction to Random Numbers, importance of random numbers in simulation, mid-square random number generator, residue method, arithmetic congruential generator, testing numbers for randomness, Chi-Square test.	10
IV	**Discrete Event System Simulation** Discrete events, representation of time, queues and servers, generation of arrival patterns, resource seizing, departures simulation of a telephone system and computer networks, simulating components of an operating system, delayed calls; modeling policies, priority queues, tasks, gathering statistics, counters and summary statistics, measuring utilization and occupancy, recording distributions and transit times. **Introduction to a Simulation Languages** Simulation in C++, GPSS/ MATLAB/Network Simulators.	10

Text Books:

1. Law and Kelton, ***"Simulation Modeling and Analysis"***, McGraw-Hill.

2. J. Banks, J. Carson and B. Nelson, ***"Discrete-Event System Simulation"***, Prentice-Hall.
3. Deo, Narsing, ***"System Simulation with Digital Computers"***, PHI.
4. D.S Hira, ***"System Simulation"*** S.Chand publication.

Reference Books:

1. K.A. Dunning ***"Getting Started in GPSS"***, Engineering Press, San Jose, CA.
2. P. Fishwick, ***"Simulation Model Design and Execution"***, Prentice-Hall.