Elective –I (CS 7102 Simulation & Modelling)

Unit-I

Introduction to Modeling and Simulation

Nature of Simulation. Systems , Models and Simulation, Continuous and Discrete Systems, system modeling, concept of simulation, Components of a simulation study, Principles used in modeling Static and Dynamic physical models, Static and Dynamic Mathematical models Introduction to Static and Dynamic System simulation , Advantages ,Disadvantages and pitfalls of Simulation.

Unit-II

System Simulation and Continuous System Simulation

Types of System Simulation, Monte Carlo Method, Comparision of analytical and Simulation methods, Numerical Computation techniques for Continuous and Discrete Models, Distributed Lag Models, Cobweb Model. Continuous System models, Analog and Hybrid computers, Digital-Analog Simulators, Continuous system simulation languages ,Hybrid simulation ,Real Time simulations.

Unit –III

System Dynamics & Probability concepts in Simulation

Exponential growth and decay models, logistic curves ,Generalization of growth models , System dynamics diagrams, Multi segment models , Representation of Time Delays. Discrete and Continuous probability functions, Continuous Uniformly Distributed Random Numbers, Generation of a Random numbers, Generating Discrete distributions, Non-Uniform Continuously Distributed Random Numbers, Rejection Method.

Unit-IV

Simulation of Queueing Systems and Discrete System Simulation

Poisson arrival patterns, Exponential distribution, Service times, Normal Distribution Queuing Disciplines, Simulation of single and two server queue. Application of queuing theory in computer system. Discrete Events ,Generation of arrival patterns, Simulation programming tasks, Gathering statistics, Measuring occupancy and Utilization, Recording Distributions and Transit times .

Unit-V

Introduction to Simulation languages and Analysis of Simulation output

GPSS: Action times, Succession of events, Choice of paths, Conditional transfers, program control statements . SIMSCRIPT: Organization of SIMSCRIPT Program, Names & Labels, SIMSCRIPT statements . Estimation methods , Relication of Runs, Batch Means , Regenerative techniques , Time Series Analysis , Spectral Analysis and Autoregressive Processes.

List of Experiments:-

1. Simulate CPU scheduling algorithm using queueing system a) FCFS b) SJF c) Priority Algo
2. Simulate multiplexer/concentrator using queuing system
3. Simulate congestion control algorithms.
4. Simulate disk scheduling algorithms.
5. Simulate a Manufacturing shop and write a program in GPSS.
6. Simulate Telephone system model and write a program in SIMSCRIPT.

References:

Gorden G., System simulation, Prentice Hall.

Seila, Simulation Modeling, Cengage Learning

Law .,Simulation Modeling And Analysis, McGraw Hill

Deo, System Simulation with Digital Computer, PHI

Harrington, Simulation Modeling methods, McGraw Hill

Severance, " System Modeling & Simulation, Willey Pub