

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)				
Subject Code & Name		Instructions Hours per Week			Credits			
EIR6E4		L	T	P	L	T	P	Total
Modelling and Simulation		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

Rationale: This course provides solution alternatives for the problem by modelling and simulation approach. System behavior is modelled and simulated for performance analysis.

Prerequisites: Familiarity with Linear Algebra, Probability and Statistics, Discrete structures, graph theory Object-oriented design and programming..

Course Contents

Unit-I

Advantages and disadvantages of Simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; Types of Models; Discrete-Event System Simulation; The Event-Scheduling / Time-Advance Algorithm, World Views, Manual simulation Using Event Scheduling; List processing.

Unit-II

Propagation and System Planning: Radio wave propagation in the mobile environment: Free-space propagation, propagation mechanisms, large scale and small scale fading, path loss models, statistical channel models: narrowband and wideband models, System Planning: mobile radio link design, and introduction to radio network planning.

Unit-III

Review of terminology and concepts; Useful statistical models; Discrete distributions; Continuous distributions; Poisson process; Empirical distributions. Characteristics of queuing systems; Queuing notation; Long-run measures of performance of queuing systems; Steady-state behavior of M/G/1 queue; Networks of queues; Rough-cut modeling: An illustration

Unit-IV

Properties of random numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random Numbers Random-Variate Generation: Inverse transform technique; Acceptance-Rejection technique; Special properties.

Unit-V

Data Collection; Identifying the distribution with data; Parameter estimation; Goodness of Fit Tests; Fitting a non-stationary Poisson process; Selecting input models without data; Multivariate and Time-Series input models. Model building, verification and validation; Verification of simulation models; Calibration and validation of models, Optimization via Simulation.

Learning Outcomes:

At the end of the module the student will be able to:

1. define, describe and apply basic concepts related to modelling, identification and simulation.
2. simplify a given model using static relations, substitution of variables using constants, neglecting small effects and aggregation of states.
3. Model and simulate mechanical (in one dimension) and electrical systems using the computer tools like Simulink

Books Recommended:

1. K S Trivedi, Theory of Modeling and Simulation - 3rd Edition, Elsevier.
2. Averill Law, Simulation Modeling and Analysis, McGraw Hill
3. Narsingh Deo, System Simulation with Digital Computer, 2007, PHI Learning.