

# AMIE19 SIMULATION MODELING AND ANALYSIS

## UNIT-1 INTRODUCTION TO SIMULATION

- 1.1 Simulation, advantages, Disadvantages, Areas of application, System environment, components of a system,
- 1.2 Model of a system, types of models, steps in a simulation study.
- 1.3 Random Numbers: Properties, Generations methods, Tests for Random numbers – Frequency test, Runs test, Autocorrelation test, Gap test, Poker test.

## UNIT-2 SIMULATION EXAMPLES

- 2.1 Simulation of Queuing systems, Simulation of Inventory System,
- 2.2 Monte Carlo simulation, General Principles,
- 2.3 Concepts in discrete – events simulation, event scheduling/Time advance algorithm.

## UNIT-3 INTRODUCTION TO PROBABILITY DISTRIBUTIONS:

- 3.1 Weibull, Triangular, Erlang and Gamma distributions and their applications (No analytical treatment)
- 3.2 Random Variate Generation: Inverse Transform Technique- Exponential, Uniform, Weibull, Triangular distributions, Direct transformation for Normal and lognormal Distributions
- 3.3 Convolution Method- Erlang distribution Acceptance and Rejection technique – Poisson and Gamma distributions

## UNIT-4 INPUT MODELING:

- 4.1 List of steps involved in input modeling – no analytical treatment Selecting input models without data, Multivariate and time series input models
- 4.2 Covariance and correlation, multivariate input models, time series input models.
- 4.3 Verification and Validation of Simulation Model: Model Building, Verification and validation, Verification of simulation models, Calibration and Validation of Models, Naylor and Finger's validation process.

## UNIT-5 OUTPUT ANALYSIS FOR A SINGLE MODEL

- 5.1 Types of simulations, stochastic nature of output data, Output analysis of terminating simulations, Output analysis of steady state simulations Optimization via simulation:
- 5.2 What does “optimization via simulation” mean? Why is optimization so difficult? Basic GA and TS.

## Reference Books:

1. Jerry Banks, John S Carson, II, Berry L Nelson, David M Nicol -Discrete Event system Simulation, III Edition, Pearson Education, Asia, ISBN – 81- 7808 – 505 – 4.
2. Narsingh Deo -Systems Simulation with Digital Computer; PHI Publication (EEE), ISBN 0- 87692-028-8
3. Averill M Law, W David Kelton -Simulation Modeling & Analysis, McGraw Hill International Editions – Industrial Engineering series, ISBN – 0-07-100803-9.