MCA/M12
System Simulation
Paper-MCA-203

Time allowed: 3 hours **M.M.: 80**

Note: Attempt Q. No. 1 and one question from each of Units-I, II, III and IV.

1. (a) What are the steps involved in the process of simulation?
   (b) What are state variables and how do they influence the complexity of the system?
   (c) Explain the role of Time-Scaling in Analog Simulation
   (d) What is the need of Monte Carlo computation? Give Example.
   (e) Discuss the affect of waiting time and idle time in a queuing system through example.
   (f) What do you understand by 'Forecasting through Simulation'?
   (g) Define central Limit theorem. Discuss its importance in the design of simulation experiments.
   (h) What do you understand by process oriented simulation language ?

UNIT-I

2. (a) Identify any two problems of your own experience that you think can be solved using computer simulation rather than analytically.
   (b) Explain the difference between Analog, Digital and Hybrid Simulation.
   (c) What are limitations of Simulation/
3. (a) differentiate static and dynamic models by choosing appropriate examples.
   (b) What are general characteristics of system ? How would you justify them ?
   (a) Describe the components of a "Super Bazar" and identify its entities, attributes and activities.

Unit-II

3. Develop algorithms simulators for the following systems:
   (i) Chemical Reactor
   (ii) Second Order Non-Linear Feedback Servo System.

5. (a) Describe inverse transformation method for generating a sample from a given non-uniform distributions. How it can be further extended to derive a sample from exponential probability distribution function?
   (b) Write a program to determine the approx. value of square root of 3 using 3000 random numbers.

UNIT-III

6. List out general characteristics of queuing system. For a single server queuing system:
   (j) Prove mathematically that arrival pattern follows poison distribution, and
   (k) Determine the expression for average number of customers in the system.
7. Write a computer program to simulate an inventory system with large number of polocies to determine the fillowing:
   i. Average number of dailly back orders,
   (ii) Average Daily Buffer stock and
   (iii) Average daily shortage cost.
   Choose appropriates system boundaries.

Unit-IV

8 Differentiate Static Vs. Dynamic Stochastic simulation experiments by choosing appropriate examples, and derive an expression to find run length of static simulation experiment.

9 (a) Discuss the following techniques for reducing the variance in simulation experiments without increasing the sample size:

(e) Correlated Sampling and

(f) Stratified sampling.

(b) Write short note on any two of the following simulation languages:

(i) DYNAMO

(ii) SIMSRIPT

(iii) SIMULA