MCA/M08
System Simulation
MCA -203

Time : 3 Hours MM:50
Note:- Attempt Five questions in all, selecting One question from each unit.

UNIT-I

1(a) What is need of Modeling and Simulation? Draw a flowchart to illustrate the process of problem solving using modeling and simulation. 2+3
(b) Write short note on "Different views of systems". 2.5
(c) Distinguish between State variables and System variables. 2.5

2(a) Explain the difference between:
(i) Analog Simulation Vs. Digital Simulation
(ii) Fixed Time Step Vs. Next Event Simulation 2+2
(b) Explain the significance of scaling in analog simulation.
(c) Develop an algorithm to simulate a "Water Reservoir System"

3(a) Develop an algorithm to generate a series of pseudo random values which follows a given normal distribution function. 5
(b) Explain the Poker test for testing the independence of given set of random numbers. 5

UNIT-II

4 Consider a single server queuing system with Poisson arrival and service times for which long term averages are "a and "b", respectively and FIFO

(i) $\frac{dPn(t)}{dt} = \frac{Pn+1(t)}{} - \frac{1}{a} + \frac{1}{b} Pa(t) + \frac{1}{a} Pa-1(t)$

(ii) Average queue length= $\frac{P2}{1-P}$, Where P is the utilization factor of the service facility and

(iii) Probability of more than n-customers in the system P^{a+1} 10

5(a) Draw a flow chart for simulating a 2-server queuing system with FIFO queue discipline and specified arrival and service patterns. 7
(b) Write a short note on "Forecasting through Simulation" 3

6 Write a Computer Program to simulate an inventory system for a large number of re-order combinations to determine (i) Average Daily Sale (ii) Average Stock (iii)

Average Buffer Stock (iv) Carrying Cost (v) Shortage Cost and (Vi) Re-Order Cost. The system is characterized by the following parameters.

(i) Number of units demanded follows Poisson Distribution
(ii) Procurement lead time follows Erlong distribution.
(iii) Simulation period is 500 days corresponding to single re order combination of Re-order cost per order, carrying cost per day per unit and a backorder cost per day per unit, for carrying backorders. 10

UNIT-III

7(a) Derive a mathematical expression to find the Run-length of a Static Stochastic Simulation experiments. 6

(b) Explain how auto correlated data effect the run length of the simulation experiment. 4

8(a) Using suitable example, explain how Dynamic Stochastic Simulation experiment differs from the Static Simulation experiment? Also discuss various techniques of elimination the transient behaviour in Dynamic Stochastic experiments. 6

(b) Write short note on validation. 4

9(a) What is Stochastic Convergence? Explain the following variance Reduction Techniques.
(i) Antithetic Sampling (ii) Control Variates 6

(b) Discuss salient features of following Simulation Languages.
(i) SIMSSCRIPT (II) SIMULA 4

10(a) Enumerate the factors involved in selection of a Discrete System Simulation language. 3

(b) Write a Simulator in any high language to describe the functioning of a hypothetical Computer. 7