Roll No. ....

MCA/MX   5253

System Simulation
Paper: MCA-203

Time: Three Hours]   [Maximum Marks: 80

Note:- Attempt FIVE questions in all. Question No.1 is compulsory.

Attempt remaining FOUR questions by selecting only ONE question from each Unit.

1. (a) What do you understand by system? Explain the system and its components with the help of a suitable example.   3

(b) Explain the difference between Physical and Mathematical models.   3

(c) Explain the need of Simulation in Business.   3

(d) Differentiate System and State variables through examples.   3

(e) List out the disadvantages of Analog Simulation.   3

(f) Explain the use of queuing systems in Call-Centres.   3

(g) What do you understand by Stochastic Convergence?   3

(h) How would you eliminate the effect of transients in Dynamic Stochastic Simulation experiments?   3

UNIT-I

2. (a) (i) Define the term 'Model' and describe various types of Models.
    (ii) Give disadvantages of Analog Simulation.   7

·· (b) Define Simulation. List out the steps involved in solving the problem by Computer Modeling and Simulation process.   7

3. (a) Differentiate:

(i) Fixed Time Step Simulation vs. Event-to-Event Simulation

(ii) Magnitude scaling and Time scaling in Analog Simulation. 7

(b) Write short notes on:

(i) 'Different Views of the system'.

(ii) Entities, Attributes and Activities of a 'Computer System'. 7

UNIT-II

4. (a) Discuss:

(i) Uniformity, and (ii) Independence Test, for testing a sequence of pseudo-random numbers.   7

(b) Write an algorithm to generate a sequence of N pseudo-random numbers which follows Normal Distribution.   7

5. .Simulate any **two** of the following systems:

   (i) Water Reservoir System

   (ii) Telephone System

   (iii) Simulation of a Pure-Pursuit Problem.   7x2

UNIT-III

6. Write a program in any high level language to simulate a Two-Server queuing system with common queue characterized by **FIFO** discipline. Choose appropriate arrival and service patterns. Also explain how this simulator can be further extended for M-Server queuing system?   14

7. (a) Simulate an Inventory System mathematically to derive an expression for EOQ of a system in which we run out of Stock for a certain fraction of time, by choosing appropriate system boundaries.   7

   (b) How would you generate the Poisson variates for any specified value of A ?   4

   (c) Write a short note on 'Forecasting through simulation'.   3

UNIT-IV

8. Define Central Limit theorem. Derive an expression to find the Run-Length of Dynamic Stochastic Simulation experiments for 95% confidence level.   14

9. (a) Describe the following variance reduction tools:

   (i) Antithetic Sampling

   (ii) Importance Sampling.   7

   (b) Discuss good and bad features of any Discrete System Simulation Language.   7