

**MCA/ M11**  
**System Simulation**  
**Paper : MCA 203**

**Time: Three Hours**  
**80**

**Maximum Marks:**

Note: (i) Attempt FIVE Questions in all  
(ii) Question No. 1 is compulsory  
(iii) Attempt remaining Four questions by selecting only ONE question from each Unit

1. (a) Define Simulation. Distinguish between Analog and Digital Simulation.  
(b) Explain the use of simulation in Science and Engineering Research.  
(c) What is Model ? Differentiate Static and Dynamic Models.  
(d) Explain the difference between random numbers and pseudorandom numbers.  
(e) What do you understand by Monte Carlo computations?  
(f) Discuss the use of queuing simulation in Device-Scheduling.  
(g) what is the difference between validation and verification?  
(h) List out factors in selection of Discrete system simulation languages.

**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) Why study modeling? How it differs from simulation? Discuss various types of models and their general characteristics.
3. (a) Differentiate :  
(i) System Boundaries and System Environment  
(ii) Analog, Digital and Hybrid Simulation.  
(a) What do you understand by 'Non-unique representation of the system' ?

**UNIT-II**

4. (a) Write an algorithm to generate a sequence of N pseudo-random numbers which follows Negative Exponential Distribution.  
(b) Discuss how would you apply the Poker's test for verifying the independent behavior of the given sequence of random numbers ?

5. Simulation any two of the followings systems:

- (b) pure-pursuit problem
- (ii) Traffic Control System
- (iii) Construction of Dam Across a river.

### **UNIT-III**

6. List out general characteristics of a queuing system. For a single server queuing system:

- (c) prove mathematically that arrival pattern follows Poisson distribution, and
- (ii) Determine the expression for average number of customers in system.

7. Write a computer program to simulate an inventory System with large numbers of policies to determine.

- (i) Average number of daily back orders.
- (ii) Average Daily Buffer Stock, and
- (iii) Average daily Shortage cost. Choose appropriate system boundaries.

### **Unit-IV**

8. Derive an expression to find the run-length of Static Stochastic Simulation experiments 99% percentage of confidence level

9. (a) what is Stochastic Convergence ? Describe the following variance reduction methods:

- (i) Correlated Sampling
- (ii) Stratified Sampling
- (b) Write short notes on the following :
  - (i) Expression based continuous simulation languages.
  - (ii) GPSS