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Dec.-22-0281

CS-606 (Modeling and Simulation)

B.Tech. 6th (CBCS)

Time : 3 Hours

Max. Marks : 60

*The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.*

**Note :** Attempt five questions in all, selecting one question from each section A, B, C and D. Question no. 9 is compulsory.

#### SECTION - A

1. What are the advantages and disadvantages of Simulation? (10)
2. How simple deterministic systems can be modeled or programmed? (10)

#### SECTION - B

3. Explain Monte Carlo Simulations with suitable examples. (10)
4. Discuss Stochastic variables. Differentiate between Monte Carlo and Stochastic Simulations. (10)

#### SECTION - C

5. Define Queuing Systems. Explain different queuing disciplines. (10)
6. Illustrate in detail the next-event time-advance approach for the single-server queuing system. (10)

#### SECTION - D

7. Describe Discrete Event System Simulation in detail. (10)

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8. What are modeling policies? How One can gather statistics in Discrete Event System Simulation? (10)
9. (i) Discuss the various steps in a simulation study.  
(ii) What are the Windows in Simulator GUI?  
(iii) Compare and contrast the modeling process with the scientific method: Make observations; formulate a hypothesis; develop a testing method for the hypothesis; collect data for the test; using the data, test the hypothesis; accept or reject the hypothesis.  
(iv) How to Build and Apply Computer Simulations? Explain.  
(v) If  $\lambda$ ,  $\mu$  are the rates of arrival and departure respectively in a M/M/1 queue, write the formulas for the average waiting time of a customer in the queue and the average number of customers in the queue in the steady state.  
(vi) Assuming an exponentially distributed service time, which queuing discipline is likely to have the shortest average waiting time: FIFO, LIFO, Priority, or SPT?  
(vii) Discuss Chi-Square test.  
(viii) Describe the use of simulation in medical field.  
(ix) Why random numbers used in simulation? What are the techniques to generate them?  
(x) Explain Priority queues. (10×2=20)



MAY-24-0533

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### SECTION-A

1. What is simulation? Mention two situations where simulation is appropriate and two situations where it is inappropriate.

(10)

2. Differentiate between simulation and modelling. What are the areas of applications of simulation? Give the steps involved in the simulation study.

(10)

### SECTION-B

3. Explain how the Monte Carlo technique is used in the static simulation. Give applications of the Monte Carlo simulation technique.

(10)

4. What do you mean by discrete-event simulation? What are its basic building blocks? Explain.

(10)

### SECTION-C

5. What is queuing model? List some of the performance measures of queueing systems.

(10)

6. List the properties of random numbers. Explain the process of generating random numbers. What are the problems faced while generating random numbers?

(10)

### SECTION-D

7. Explain the steps in the development of a useful model of input data for discrete event simulation.

(10)

8. Write a note on:

i) GPSS

ii) MATLAB

(5+5=10)

### SECTION-E

9. All questions are compulsory.

i Differentiate between activity and delay.

ii What is a model? What is the purpose of a model?

iii What is a pseudo-random number generator?

iv What are discrete probability functions?

v Define event.

vi Write an expression for Poisson distribution.

vii How simulation helps in the time-to-market industry?

viii List some of the popular continuous distributions.

ix Comment on verification and validation of the model.

x What is the system? List the different types of the system.

(10×2=20)



### SECTION E (Compulsory)

9. Explain following terms. (10×2=20)
1. List out the various java features.
  2. Why do we need 'finally' block?
  3. List out the four layout managers.
  4. What is the usage of garbage collection in Java?
  5. Mention different types of JDBC.
  6. Write the benefits of RMI. State any four features of java.
  7. Describe arithmetic operators with examples.
  8. Describe different java access specifiers.
  9. How to create a package? Explain with examples.
  10. What is difference between vector and array? Give suitable example.



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### SECTION-A

1. What is simulation? Explain the steps of the simulation study with a flowchart. (10)
2. Define simulation and modelling. Mention any three important factors in the selection of simulation software. Differentiate between discrete and continuous systems using examples. (10)

### SECTION-B

3. Describe Monte Carlo Simulation methods in detail. Mention some of the application areas of the Monte Carlo Method. (10)
4. What is the inverse transformation technique? Explain how is it used for producing random variants from an exponential distribution. (10)

### SECTION- C

5. Describe queuing system with respect to arrival and service mechanisms, system capacity, queue discipline, and flow diagrams of arrival and departure events. (10)
6. What are the properties of random numbers? Explain the techniques of generation of random number with an appropriate example. (10)

7. How can you use simulation run statistics in an analysis of simulation output? (10)
8. What is a GPSS? List some of the common block diagram symbols used in GPSS. Explain the simulation of the telephone system. (10)

### SECTION-E (Compulsory)

9. All questions are compulsory.
  - i What is the difference between analytical method and simulation?
  - ii What is a model? What is the purpose of a model?
  - iii Define computer simulation
  - iv What is a random variable?
  - v What are discrete probability functions?
  - vi "Monte Carlo simulation is a special case of stochastic simulation". Comment.
  - vii What are measures of effectiveness?
  - viii How simulation helps in the time-to-market industry?
  - ix Explain the advantages and disadvantages of simulation.
  - x Define the Chi-square test. (10×2=20)