(vi) Average waiting time

UNIT-IV

7. (a) What is a random number? What is the difference between a pseudo-random number and a truly random number? 5

(b) Explain different steps in the development of a useful model of input data. 4

(c) Use the linear congruential method of to generate a sequence of 5 four-digit random integers. 5

8. (a) Explain the following continuous distributions: 7

(i) Uniform distribution

(ii) Exponential distribution

(b) Discuss the following : 7

(i) Linear Congruential method

(ii) Chi-square goodness of fit test

UNIT-V

9. (a) Explain the types of simulation with respect to output analysis. Give examples. 8

(b) Write short note on absolute measures of performance and their estimation. 6

10. (a) Explain output analysis for steady-state simulation. 5

(b) What is the difference between validation and verification in the simulation? Explain. 9

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UG/PG ODD SEMESTER EXAMINATION, 2022

COMPUTER SCIENCE

5th Semester

Course No. : MCSC-502

(Modeling and Simulation)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

(Answer any five questions, taking one from each unit)

UNIT-I

1. (a) Define simulation. Write the advantages and disadvantages of simulation. 1+4=5

(b) Distinguish between the following : 3x2=6

(i) Systems and Systems environment

(ii) Discrete and continuous system

(c) It is important to have a model for doing simulation. Justify your answer. 3

2. (a) What are the various types of model available for simulation. Discuss each of them briefly. 6

(b) Write the steps involved in a simulation study. Also draw the flow chart to guide the model builder for simulation study. 8

(Turn Over)

UNIT-II

3. (a) Write and explain the steps involved in time-advance algorithm for calculating simulation time. 6

(b) Consider the function

$$f(x) = \begin{cases} k - \frac{x}{4}, & 1 < x \leq 3 \\ 0, & \text{otherwise} \end{cases}$$

which is being used as a probability density function for a continuous random variable 'X'.

(i) Find the value of k

(ii) Find $\rho\ (x \leq 2.5)$ 8

4. (a) Describe how spread sheet is helpful for modeling and simulation of a real world problem. 5

(b) Write the properties of cummulative distribution function for a random variable X. 3

(c) (i) Define descrete random variable with suitable example.

(ii) The life of a device used to inspect cracks in aircraft wings is given by X. The cdf for the device is given by

$$F(x) = \int_{0}^{x} \frac{1}{2} e^{-t/2}\, dt = 1 - e^{-x/2}$$

Calculate the probability less than 2 years and probability between 2 and 3 years. 6

UNIT-III

5. (a) What do you understand by queueing model? Describe the components of a quering systems. 7

(b) Explain the queueing notations used for modeling and simulation a queue problem. 7

6. A grocery store has only one checkout counter, customer arrives at this checkout counter at random times that are from 1 to 8 minute apart each possible value of inter arrival time (IAT) has the same probability of occurance, the service time vary from 1 to 6 minutes with the probability as below :

The problem is to analyz the system by simulating the arrival of service of 10 customers. 14

Random digit for IAT = 64, 112, 678, 289, 871, 583, 139, 423, 39

Random digit for service time = 84, 18, 87, 81, 6, 91, 79, 9, 64, 38

ST	1	2	3	4	5	6
Probability	·10	·20	·30	·25	·10	·05

Calculate

(i) Total IAT

(ii) Total service time

(iii) Total waiting time in the queue

(iv) Total idle time

(v) Total time customer spend in the system