CBCS SCHEME

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17CS834

Eighth Semester B.E. Degree Examination, Dec.2023/Jan.2024
System Modeling and Simulation

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. List any 5 circumstances, when the simulation is the appropriate tool and when it is not. **(10 Marks)**

b. A small grocery store has only one checkout counter. The Customer arrives at this checkout counter at random from 1 to 8 min apart. Each possible value of service time has same probability of occurence. The service time varies from 1 to 6 min apart. Each possible value of service time has same probability of occurence. Develop simulation distribution table for 10 customers.

Random digit for arrival time : 913 727 015 948 309 922 753 235 302

Random digit for service time : 84 10 74 53 17 79 91 67 89 38. **(10 Marks)**

OR

2 a. Define the following terms used in simulation :

i) Discrete system ii) Continuous system iii) Stochastic system

iv) Deterministic system v) Static Vs Dynamic system. **(10 Marks)**

b. Develop a simulation table for single server queue with one checkout counter using time advance algorithm. Find busy time of server, Max. queue length, Total no. of customer who spent 3 min or more is system , Total number of departure.

IAT :	1	6	8	8	3	8	4	2	8
ST :	4	1	4	4	2	3	5	6	4

(10 Marks)

Module-2

3 a. Explain Discrete and Continuous random variables. **(08 Marks)**

b. Explain the following continuous distributions :

i) Uniform distribution ii) Normal distribution. **(08 Marks)**

c. What is Splitting and Pooling? **(04 Marks)**

OR

4 a. Explain the characteristics of queuing system. **(10 Marks)**

b. Write short notes on :

i) Steady state parameters of M/G/I ii) Networks of Queue. **(10 Marks)**

Module-3

5 a. What is the role of Maximum density and Maximum period in generation of random numbers? With given Seed 27 , Constant multiplier 43 , Increment 17 and Modulus 100 , generate a sequence of 4 random numbers. **(10 Marks)**

b. The sequence of numbers 0.44 , 0.81 , 0.14 , 0.05 , 0.93 has been generated. Apply the Kolmogorov – Smirnov test with $\alpha = 0.05$ to determine if the hypothesis that the numbers are uniformly distributed on the interval [0, 1] can be rejected. Compare F(x) and $S_N(x)$ on a graph. Assume $D_\alpha = 0.565$. **(10 Marks)**

OR

6 a. Explain Inverse transform technique for Exponential and Weibull distribution. (10 Marks)

b. What is Acceptance rejection technique? Generate 3 Poisson variates with mean $\alpha = 0.2$ and given random numbers 0.4357 , 0.4146 , 0.8353 , 0.9952 , 0.8004. (10 Marks)

Module-4

7 a. Explain different steps in the development of a useful model of input data. (10 Marks)

b. Apply goodness of fit test, check whether random numbers are uniformly distributed over interval [0 , 1] with given size of data 100. Assume $\alpha = 0.01$ and $\hat{\alpha} = 5.86$. Simulation table to check critical values using Poisson assumption is given below :

Interval :	1	2	3	4	5	6	7	8	9	10
Frequency :	8	6	10	11	12	8	10	12	12	11

(10 Marks)

OR

8 a. Explain the types of simulations with respect to output analysis. (10 Marks)

b. Discuss the following measures of performance :
i) Point Estimator ii) Confidence – Interval Estimation. (10 Marks)

Module-5

9 a. Explain the output analysis for steady state simulation in detail. (10 Marks)

b. Explain the output analysis for terminating simulation. (10 Marks)

OR

10 a. What do you mean by Verification and Validation of simulation models? With a neat diagram, explain the iterative process of calibrating model. (10 Marks)

b. Describe the 3 steps approach to validation by Naylor and Finger. (10 Marks)

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