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

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1 a. What is Simulation? Explain with flowchart the steps involved in simulation study.

(10 Marks)

b. A supermarket has only one checkout counter. Customer arrives at this checkout counter at random from 1 to 5 minutes apart with equal probability. The service time varies from 1 to 6 minutes with probability 0.30, 0.25, 0.05, .10, 0.10 and 0.20. Develop a simulation table for 10 customers and find the following :
   i) Average service time
   ii) Average time between arrivals
   Use the following sets of random numbers for arrivals 84, 10, 74, 53, 17, 79, 03, 87, 27. Random digit for service time 23, 35, 65, 81, 54, 03, 87, 27, 73, 70. **(06 Marks)**

OR

2 a. Explain the various concepts used in discrete event simulation with an example. **(08 Marks)**

b. Explain event – scheduling algorithm by illustrating old system snapshot and new system snapshot. **(08 Marks)**

Module-2

3 a. Explain the following discrete distribution.
   i) Binomial distribution
   ii) Poisson distribution. **(08 Marks)**

b. Explain the following continuous distribution.
   i) Uniform distribution
   ii) Exponential distribution. **(08 Marks)**

OR

4 a. What are the characteristics of queuing systems? Explain with a neat diagram. **(08 Marks)**

b. Explain steady state parameters of M/G/1 queue. **(08 Marks)**

Module-3

5 a. What is a Random number? What are the different properties of a Random number? When a Random number is called pseudo – random number? Explain. **(08 Marks)**

b. The sequence of numbers 0.54, 0.73, 0.98, 0.11, 0.08 has been generated. Use 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. $D_{0.05} = 0.565$. **(08 Marks)**