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18IM61

Sixth Semester B.E. Degree Examination, July/August 2022 Simulation Modeling and Analysis

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define Simulation. Explain the advantages and disadvantages of simulation. (10 Marks)
- b. Explain the steps in a simulation study with a flow chart. (10 Marks)

OR

- 2 a. Briefly explain simulation in inventory systems. (10 Marks)
- b. A grocery store has one checkout counter. Customers arrive at this checkout counter at random from 1 to 8mins apart and each inter-arrival time has the same probability of occurrence. The service times vary from 1 to 6 minutes with probability are given below :

Service Time(mins)	1	2	3	4	5	6
Probability	0.10	0.20	0.30	0.25	0.10	0.05

Simulate the arrival of 5 customer and calculate :

- i) Average waiting time for a customer
 - ii) Probability that a customer has a wait
 - iii) Probability of a server being idle
 - iv) Average service time
 - v) Average time between arrivals
- use the following sequence of random numbers

Random digits for arrival : 913, 727, 015, 948, 309, 922

Random digits for service time : 84, 10, 74, 53, 17, 79

Assume the first arrival of customer of time '0'

Depict the simulation in a tabular form.

(10 Marks)

Module-2

- 3 a. Explain the concepts in discrete-event simulations. (10 Marks)
- b. Explain the steps in event-scheduling/Time advance algorithm. (10 Marks)

OR

- 4 a. Use the Kolmogorov – Smirnov test for uniformity test for the five numbers generated. 0.44, 0.81, 0.14, 0.05, 0.93. (10 Marks)
- b. A sequence of 1000 three – digit numbers has been generated and an analogue indicates that 680 have three different digits, 289 contain exactly one Pair of like digits, and 31 contain three like digits. Use Poker test to check the numbers are independent. Consider $\alpha = 0.05$. (10 Marks)

Module-3

- 5 a. Explain the inverse transform technique for generation of a random variate, sampling from exponential distribution. (10 Marks)
- b. Develop a generation scheme for the triangular distribution with pdf.

$$f(x) = \begin{cases} x, & 0 \leq x \leq 1 \\ 2-x, & 1 < x \leq 2 \\ 0, & \text{otherwise} \end{cases} \quad (10 \text{ Marks})$$

OR

- 6 a. Explain convolution method to generate Erlang variates. (10 Marks)
- b. Generate three Poisson variates with mean $\alpha = 0.2$ compute $e^{-\alpha}$. Consider the following random number: 0.4357, 0.4146, 0.8353, 0.9952, 0.8004. (10 Marks)

Module-4

- 7 a. How do you select input models without data? Explain. (10 Marks)
- b. Explain in detail the steps involved in the development of a useful model of input data. (10 Marks)

OR

- 8 a. Explain Model building, verification and validation of simulation model. (10 Marks)
- b. Explain measure of performance and their estimation in output analysis of simulation model. (10 Marks)

Module-5

- 9 a. Explain the meaning of optimization via simulation. (10 Marks)
- b. Explain simulation of different levels of abstraction in computer systems. (10 Marks)

OR

- 10 a. Explain the factors to be considered for selection of simulation software. (10 Marks)
- b. List simulation packages. Explain the trends in simulation software. (10 Marks)

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