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17CS834

Eighth Semester B.E. Degree Examination, July/August 2022
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 five circumstances, when the simulation is the appropriate and when it is not. (05 Marks)
- b. Write the advantages and disadvantages of simulation. (05 Marks)
- c. Explain with a flow chart the steps involved in simulation study. (10 Marks)

OR

- 2 a. Explain event-scheduling / Time advance algorithm with example. (10 Marks)
- b. Develop a manual simulation table for single server queuing system of a grocery shop for 6 customers and find, (i) Average waiting time of customer (ii) Idle time of server (iii) Average time customer spends in system. (iv) Probability wait customers arrive at shop randomly from 1 to 8 minutes and have equal probability. Service time varies from 1 to 6 minutes. The random digits for IAT and ST are 913, 727, 015, 948, 309 and 84, 10, 74, 53, 17, 79 respectively.

ST	1	2	3	4	5	6
P	0.10	0.20	0.30	0.25	0.10	0.05

(10 Marks)

Module-2

- 3 a. Explain discrete distribution and continuous distribution with examples. (10 Marks)
- b. What is Poisson process? Mention the properties of Poisson process. (10 Marks)

OR

- 4 a. Explain the characteristics of a queuing system. (10 Marks)
- b. State and explain Kendal's notation for queuing system. (10 Marks)

Module-3

- 5 a. Explain combined linear congruential method for random number generation. (10 Marks)
- b. The sequence of numbers 0.44, 0.81, 0.14, 0.05, 0.93 has been generated. Use 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 (where $D_\alpha = 0.565$) (10 Marks)

OR

- 6 a. Write a step by step procedure to generate random variate using inverse transform technique for exponential distribution. (10 Marks)
- b. Explain acceptance rejection technique. Generate 3 Poisson variate with mean = 0.2. Consider the random numbers 0.4357, 0.4146, 0.8353, 0.9952, 0.8004 (10 Marks)

Module-4

- 7 a. List the steps involved in the development of a useful model of Input data and also write the important suggestions to be noted while collecting the data. (10 Marks)
- b. Explain the different methods used to identifying the distribution with data. (10 Marks)

OR

- 8 a. Using goodness of fit test, test whether random numbers are uniformly distributed based on Poisson assumption with level of significance $\alpha = 0.05$, $\hat{\alpha} = 3.64$. Sample data are

Interval	0	1	2	3	4	5	6	7	8	9	10	11
Observed frequency	12	10	19	17	10	8	7	5	5	3	3	1

[where $\chi_{0.05}^2 11.1$]

(10 Marks)

- b. Explain the types of simulation with respect to the output analysis. (10 Marks)

Module-5

- 9 a. Explain with neat diagram, model building, verification and validation. (10 Marks)
- b. Describe the three steps approach to validation by Naylor and Finger. (10 Marks)

OR

- 10 a. Explain output analysis for terminating and steady state simulation. (10 Marks)
- b. Explain optimization vice simulation. (10 Marks)
