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10MT62

Sixth Semester B.E. Degree Examination, July/August 2021
Modelling and Simulation

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions.
2. Use of statistical table is permitted.

- 1 a. Define system. Explain the components of a system with example. (06 Marks)
- b. Define model. Classify models. (04 Marks)
- c. Explain the steps in simulation with a flow chart. (10 Marks)
- 2 a. Explain event scheduling/time advance algorithm with any example. (08 Marks)
- b. 6 Dump trucks are used to transport coal from the entrance of a mine to a railroad. Each truck is loaded by one of the two loaders. After loading, a truck immediately moves to the scale, to be weighed as soon as possible. Both the loader and the scale have first come first served waiting lines for trucks. Travel time from a loader to scale is considered negligible. After being weighed, a truck begins travel time and then afterwards return to loader queue. The activities of loading, weighing and travel times are given in the table

Loading time:	10	5	5	10	15	10	10
Weighing time:	12	12	12	16	12	16	
Travel time :	60	100	40	40	80		

End of simulation is 36 min. Depict the simulation table and estimate the loader and scale utilization. Assume that five of the trucks are at the loaders and one at the scale at time 0.

(12 Marks)

- 3 a. Use Linear Congruential Method (LCM) to generate a sequence of 5 random number with, $X_0 = 27, a = 17, C = 43$ and $m = 100$ (10 Marks)
- b. Consider the following sequence of 5 numbers 0.45, 0.81, 0.14, 0.04, 0.90 are generated. Use Kolmogorov-Smirnov test for uniformity with the level of significance $\alpha = 0.05$. (10 Marks)
- 4 a. Explain briefly Weibull distribution and Triangular distribution. (12 Marks)
- b. Elaborate the need for generating random variates. Given probability mass function pmf of random variates and a set of uniform random numbers over the range (0, 1), describe the method to generate random variates. (08 Marks)
- 5 a. Explain briefly : i) Uniform distribution ii) Geometric distribution. (10 Marks)
- b. Explain acceptance rejection technique for gamma distribution. (10 Marks)
- 6 a. Explain variance reduction techniques. (10 Marks)
- b. Explain with figure validation of simulation models. (10 Marks)
- 7 a. Using the Chi-square goodness of fit test. Test whether the following data follows Poisson distribution take $\alpha = 0.05$. (10 Marks)

Arrivals	0	1	2	3	4	5	6	7	8	9	10	11
Frequency	12	10	19	17	10	8	7	5	5	3	3	1

- b. Write a brief note on parameter estimation. (10 Marks)
- 8 a. List simulation languages. Explain any ONE simulation languages. (10 Marks)
- b. Explain the features of ARENA and its application for queuing system. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.