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10MT62

**Sixth Semester B.E. Degree Examination, Aug./Sept. 2020**  
**Modeling and Simulation**

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer any FIVE full questions, selecting at least TWO questions from each part.  
2. Use of statistical tables allowed.

**PART – A**

- 1 a. With the help of an example, explain the components of a system. (05 Marks)  
b. Explain briefly the inventory system in simulation. (05 Marks)  
c. With a neat flow chart, briefly explain the different steps involved in simulation study. (10 Marks)

- 2 a. Briefly explain manual simulation using event scheduling for single channel queue. (08 Marks)  
b. Six trucks are used to haul coal from the entrance of a small mine to the railroad. Each truck is loaded by one of two loaders. After loading a truck immediately moves to the scale to be weighted. Both the loaders and the scale have first come first serve waiting line for trucks. After being weighed, a truck begins a travel time and then after ward returns to the loader queue. It is assumed that 5 of the trucks are at the loaders and 1 is at the scale at time  $\theta$ . The activity times are given in the following table:

Loading time (min) :	10	5	15	5	10
Weighing time (min):	12	16	12	12	12
Travel time (min):	40	60	80	60	40

Simulate the system for 25 minutes, estimate the loader and scale utilization. (12 Marks)

- 3 a. What are pseudo random numbers? List the errors which occur during the generation. (05 Marks)  
b. Use linear congruential method to generate a sequence of three random numbers for  $X_0 = 27$ ,  $a = 8$ ,  $c = 47$  and  $m = 100$ . (05 Marks)  
c. A sequence of 1000 four digit numbers has been generated and an analysis indicates the following combinations and frequencies. Four different digits = 565, one pair = 392, two pairs = 17, three like digits = 24 and remaining are four like digits. Based on the poker test, test whether these numbers are independent,  $X_{0.05,3}^2 = 7.81$ . (10 Marks)

- 4 a. Explain inverse transform technique for exponential distribution and geometric distribution. (10 Marks)  
b. Given the uniform distribution on  $\{1, 2, \dots, k\}$  with pmf  $p(x) = 1/k$ ,  $x = 1, 2, \dots, k$  generate the random variates for the 5 random numbers (0.81, 0.12, 0.34, 0.56 and 0.93). Derive the formula used, use  $k = 10$  for generating random variates. (10 Marks)

- 5 a. What is acceptance – rejection technique? Generate 3 Poisson variates with mean  $\alpha = 0.2$  use the following random numbers 0.4357, 0.4146, 0.8353, 0.9952, 0.8004. (10 Marks)  
b. Explain briefly acceptance rejection technique for Poisson distribution and Gama distribution. (10 Marks)

- 6 a. Explain briefly variance reduction technique. (10 Marks)  
b. Explain variables – verification and validation of simulation models. (10 Marks)
- 7 a. Explain the steps in the development of useful model of input data. (10 Marks)  
b. Briefly explain Goodness of Tests in input modeling. (10 Marks)
- 8 Write short notes [Any Four] (20 Marks)
- a. GPSS
  - b. ARENA
  - c. GAP Test
  - d. Variance reduction technique
  - e. Antithetic variables.

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