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10CS82

Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018
System Modeling and Simulation

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. What is simulation? Explain with flowchart the steps involved in simulation study. **(10 Marks)**

b. Discuss three circumstances under which simulation is the appropriate tool and two circumstances under which simulation is not the appropriate tool. **(05 Marks)**

c. Discuss the types of models of a system. **(05 Marks)**

2 a. Explain the major concepts in discrete event simulation? Write flowcharts for arrival and departure events. **(10 Marks)**

b. Six dump trucks are used to have coal from the entrance of a mine to a rail road. 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 loaders and scale have first come first serve weighting line for trucks. Travel time from loaders to scale is considered negligible. After being weighed, a truck begins travel time (during which time truck unloads) and then afterwards returns to loader queue. The activities of loading weighing and travel time 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 completion of two weighings from the scale. Depict simulation table and estimate the ladder and scale utilizations. Assume that five of the trucks are at the loaders and one is at scale at the time 0. **(10 Marks)**

3 a. Explain any two discrete distributions and give equation for probability mass function. Also calculate mean and variance of same. **(08 Marks)**

b. With example explain the properties of Poission process. **(06 Marks)**

c. What is Poisson process? list out the assumptions which are needed to fulfill the counting process, $\{N(t), t \geq 0\}$ is said to be poission process with mean rate X. **(06 Marks)**

4 a. Explain the characteristics of queuing system. List different queuing notations. **(12 Marks)**

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

PART – B

5 a. Explain linear congruential method. Write three ways of achieving maximal period. **(05 Marks)**

b. The sequence of random number 0.54, 0.73, 0.98, 0.11 and 0.68 has been generated. Use Kolmogorov – Smiron test with $\alpha = 0.05$ to determine if the hypothesis that the numbers are uniformly distributed on the interval [0, 1] can be rejected. Take $D_\alpha = 0.565$. **(05 Marks)**

c. What is acceptance rejection technique? Generate three Poission variates with mean $\alpha = 0.2$. The random numbers are 0.4357, 0.4146, 0.8353, 0.9952, 0.8004, 0.7945, 0.1530. **(10 Marks)**

6 a. Explain different steps in the development of a useful model of input data. **(10 Marks)**

b. Records pertaining to the monthly number of Job related injuries at an underground coal mine were being studied by federal agency. The values of past 100 months are as follows :

Injuries/month	0	1	2	3	4	5	6
Frequency of occurrence	35	40	13	6	4	1	1

Apply the chi-square test to these data to test the hypothesis that the distribution is poisson with mean 1.0 and $\alpha = 0.05$ and $\chi^2_{0.05,3} = 7.81$. **(10 Marks)**

7 a. Differentiate between terminating and steady state simulation with respect to output analysis with an example. **(10 Marks)**

b. Briefly explain measure of performance of simulation system. **(10 Marks)**

8 a. Explain the components of verification and validation process. Explain with neat diagram, model building, verification and validation process. **(12 Marks)**

b. With neat diagram, explain the iterative process of calibrating a model. **(08 Marks)**

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