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10CS82

Eighth Semester B.E. Degree Examination, June/July 2015
System Modeling and Simulation

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. List any five circumstances, when the simulation is the appropriate tool and when it is not. **(10 Marks)**

b. Explain the steps in a simulation study, with the flow chart. **(10 Marks)**

2 a. Explain the following:
i) System ii) Event list iii) Entity iv) Event. **(04 Marks)**

b. Write the flow chart with respect to single channel queue:
i) Execution of the arrival event
ii) Execution of the departure event. **(06 Marks)**

c. One company uses 6 trucks of haul manganese ore from kolar to its industry. There are two loaders, to load each truck. After loading, a truck moves to the weighing scale to be weighed. The queue discipline is FIFO. When it is weighed, a truck travels to the industry and returns to the loader queue. The distribution of loading time, weighing time and travel time are as follows:

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

Depict the simulation table and estimate the loader and scale utilization. Assume 5 trucks are at the loaders and one is at the scale, at time '0'. Stopping time T_E = 76 min. **(10 Marks)**

3 a. Explain discrete random variable and continuous random variable with example. **(08 Marks)**

b. Explain the following discrete distribution:
i) Binomial distribution ii) Poisson distribution. **(06 Marks)**

c. Explain the following continuous distribution:
i) Uniform distribution ii) Exponential distribution. **(06 Marks)**

4 a. Explain queue behavior and queue discipline and list queuing notation for parallel server systems. **(12 Marks)**

b. What is network of queue? Mention the general assumption for a stable system with infinite calling population. **(08 Marks)**

PART – B

5 a. Explain combined linear congruential generator. **(06 Marks)**

b. Explain inverse-transform technique of producing random variates for
i) Exponential distribution ii) Weibull distribution. **(08 Marks)**

c. Generate three Poisson variates with mean $\alpha = 0.2$.
[Random number : 0.4357, 0.4146, 0.8353, 0.9952, 0.8004]. **(06 Marks)**

6 a. The sequence of numbers 0.44, 0.81, 0.14, 0.05, 0.93 has been generated. Use the Kolmogonov-Smirnov test with $\alpha = 0.05$ to determine if the hypothesis that the numbers are uniformly distributed in the interval [0, 1] can be rejected. Compare F(x) and $S_N(x)$ on a graph. [N = 5, $D_{0.05} = 0.565$]. **(10 Marks)**

b. Explain chi-square goodness of fit test. Apply it to Poisson assumption with $\alpha = 3.64$. Data size = 100 and observed frequency O_i = 12, 10, 19, 17, 10, 8, 7, 5, 5, 3, 3, 1] $\left[\chi^2_{0.05,5} = 11.1\right]$. **(10 Marks)**

7 a. What are pseudo random numbers? What are the problems that occur while generating pseudo random number? **(06 Marks)**

b. Enlist the steps involved in development of a useful model of input data and number of ways to select input models without data. **(08 Marks)**

c. List any 6 suggested estimators for distributions often used in simulation. **(06 Marks)**

8 a. Explain with a neat diagram, model building, verification and validation. **(10 Marks)**

b. Explain the iterative process of calibrating a model. **(10 Marks)**

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