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06CS82

Eighth Semester B.E. Degree Examination, December 2011

System 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. Statistical tables A.6 and A.8 from the text book can be provided.

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.

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. One company uses 6 trucks to 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		

Calculate the total busy time of both the loaders, the scale average loader and scale utilization. Assume 5 trucks are at the loaders and one is at the scale, at time "0". Stopping time $T_E = 64$ min. **(10 Marks)**

b. Explain simulation in GPSS, with a block diagram, for the single server queue simulation. **(06 Marks)**

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

3 a. Explain discrete random variables and continuous random variables, with examples. **(10 Marks)**

b. Explain any two discrete distributions. **(05 Marks)**

c. Explain the following continuous distribution :
i) Uniform distribution
ii) Exponential distribution. **(05 Marks)**

4 a. Explain the characteristics of a queuing system. List different queuing notations. **(10 Marks)**

b. Explain any two long-run measures of performance of queuing systems. **(10 Marks)**

PART – B

5 a. Explain the two different techniques used for generating random numbers, with examples. **(10 Marks)**

b. 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 on the interval [0, 1] can be rejected. Compare $F(X)$ and $S_N(X)$ on a graph. **(10 Marks)**

6 a. Explain inverse-transform technique of producing random variates for exponential distribution. **(05 Marks)**

b. Generate three Poison variates with mean $\alpha = 0.2$. **(05 Marks)**

c. Explain the types of simulation with respect to output analysis. Give at least two examples. **(10 Marks)**

7 a. 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. **(10 Marks)**

b. List the steps involved in the development of a useful model of input data. **(05 Marks)**

c. Explain Chi-square goodness-of-fit test for exponential distribution, with an example. **(05 Marks)**

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

b. Explain any two output analysis for steady-state simulations. **(10 Marks)**

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