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10CS82

Eighth Semester B.E. Degree Examination, Dec.2015/Jan.2016
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. Define simulation. Explain when simulation is an appropriate tool and not an appropriate tool. **(12 Marks)**
    b. Name the entities, attributes, activities, events and state variables for the system shown below:
    i) Library   ii) Bank   iii) Airport   iv) Grocery store. **(08 Marks)**

2   a. Explain event scheduling/ time advance algorithm. **(10 Marks)**
    b. Six dump trucks are used to haul coal from entrance of a small mine to the rail road. Each truck is loaded by one of the two loaders. After loading truck immediately moves to the scale to be weighed as soon as possible. Both loaders and scale have FCFS for trucks. Travel time from loader to scale is negligible. After being weighed, a truck begins a travel time and then returns to loader queue. Simulate for clock = 20. Find average loader utilization and average scale utilization. The activity times are given in the following table:

Loading Time	10	5	5	10	15	10	10
Weighing Time	12	12	12	16	12	16	
Traveling time	60	100	40	40	80		

(10 Marks)

3   a. Find mean and variance of the die tossing experiment. Assume the die is loaded so that the probability that given face land up in proportional to the number of spots showing. **(10 Marks)**
    b. The time to failure of a light bulb is Weibull distributed with $V = 1.8 \times 10^3$ hours. $\beta = 1/2$ and $\alpha = 1/3 \times 10^3$ hours.
    (i)   What fraction of bulbs are expected to last longer than mean lifetime?
    (ii) What is the median lifetime of a light bulb? **(10 Marks)**

4   a. Explain the characteristics of queueing system. **(10 Marks)**
    b. List the steady state parameters of M | M | 1 queue. **(05 Marks)**
    c. Explain terms used in queueing notation of the form A | B | C | N | K. **(05 Marks)**

PART – B

5   a. Explain generation of pseudo random numbers with examples. Mention the important considerations in selecting a method for generating random numbers. **(10 Marks)**

b. Use Chi square test with $\alpha = 0.05$ to test whether data shown below is uniformly distributed or not. Assume critical value $\chi^2_{0.05,9} = 16.9$

0.34	0.90	0.25	0.89	0.87	0.44	0.12	0.21	0.46	0.67
0.83	0.76	0.79	0.64	0.70	0.81	0.94	0.74	0.22	0.74
0.96	0.99	0.77	0.67	0.56	0.41	0.52	0.73	0.99	0.02
0.47	0.30	0.17	0.82	0.56	0.05	0.45	0.31	0.78	0.05
0.79	0.71	0.23	0.19	0.82	0.93	0.65	0.37	0.39	0.42
0.99	0.17	0.99	0.46	0.05	0.66	0.10	0.42	0.18	0.49
0.37	0.51	0.54	0.01	0.81	0.28	0.69	0.34	0.75	0.49
0.72	0.43	0.56	0.97	0.30	0.94	0.96	0.58	0.73	0.05
0.06	0.39	0.84	0.24	0.40	0.64	0.40	0.19	0.79	0.62
0.18	0.26	0.97	0.88	0.64	0.47	0.60	0.11	0.29	0.78

(10 Marks)

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

b. Explain the different ways of selecting input models when data is not available. **(10 Marks)**

7 a. Explain the calibration and validation of models. **(10 Marks)**

b. Explain the suggestions given for use in verification process. **(10 Marks)**

8 Write short notes on :

a. World views

b. Network of Queues

c. Optimization via Simulation

d. List Processing **(20 Marks)**

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