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13MCA52

Fifth Semester MCA Degree Examination, Dec.2018/Jan.2019
System Simulation and Modeling

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. What is simulation? State when simulation is appropriate and when it is not appropriate. **(10 Marks)**

b. With a neat flow diagram, explain steps involved in a simulation study. **(10 Marks)**

2 a. What is system and system environment? Explain the components of Grocery shop system. **(06 Marks)**

b. Explain discrete and continuous system with examples. **(04 Marks)**

c. Explain the following statistical model:
(i) Uniform distribution (ii) Gamma distribution
(iii) Weibull distribution (iv) Normal distribution **(10 Marks)**

3 a. Briefly explain the properties of random numbers. **(04 Marks)**

b. Given $x_0 = 117$, $a = 43$, $m = 1000$, $c = 0$. Generate 5 random numbers using multiplicative congruential method. **(10 Marks)**

c. List the errors in pseudo random number generation. **(06 Marks)**

4 a. Apply the KS test for the following random numbers for uniformity at 5% level of significance. The random numbers are,
0.23, 0.64, 0.18, 0.02, 0.71, 0.36, 0.47, 0.86, 0.91, 0.43 **(10 Marks)**

b. Explain in detail the characteristics of Queuing system. What does the format M/M/1/∞/∞ represent? **(10 Marks)**

5 a. Prepare a simulation table for a single channel Queue using event scheduling / time advance algorithm until clock reaches 20 mins. The IAT & ST is given below.

IAT	1	1	6	3	7	5	2	4
S.T	4	2	5	4	1	5	4	1

(10 Marks)

b. Using the acceptance-rejection technique generate three Poisson variates with mean $\alpha = 0.3$ and random numbers are 0.4357, 0.4146, 0.8353, 0.9952, 0.8004, 0.7945, 0.1530. **(10 Marks)**

6 a. List the steps in Histogram construction. **(05 Marks)**

b. List the suggestions for collecting the input data. **(05 Marks)**

c. Consider the failure time of electronic component which is shown below.

79.919	3.081	0.062	1.961	5.845	3.027	6.505	0.021	0.013	0.123
0.796	59.899	1.192	34.760	5.009	18.387	0.141	43.565	24.42	0.433
144.695	2.663	17.967	0.091	9.003	0.941	0.878	3.371	2.157	7.579
0.624	5.380	3.148	7.078	23.960	0.590	1.928	0.300	0.002	0.543
7.004	31.764	1.005	1.147	0.219	3.217	14.382	1.008	2.336	4.562

Use the χ^2 test to test the above data are exponentially distributed or not. Use $\alpha = 0.05$. **(10 Marks)**

7 a. Clearly distinguish between verification and validation of simulation model. **(04 Marks)**
b. With a neat diagram explain model building verification and validation. **(10 Marks)**
c. Explain the types of simulation with respect to output analysis. **(06 Marks)**

8 Write a short note on the following :
a. World views
b. Q-Q plot
c. Point estimation and Interval estimation
d. Simulation in JAVA **(20 Marks)**

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