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06CS82

Eighth Semester B.E. Degree Examination, Dec. 2013/Jan. 2014
System Modeling and Simulation

Time: 3 hrs. Max. Marks:100

Note: *1. Answer FIVE full questions, selecting atleast TWO questions from each part.*
2. Normal distribution table is permitted.

PART – A

1 a. Briefly explain the advantages and disadvantages of simulation. **(10 Marks)**

b. What is simulation? Explain with flow-chart, the steps involved in simulation study. **(10 Marks)**

2 a. A grocery store has one checkout counter. Customer arrive at this checkout counter at random from 1 to 8 minutes apart and each interval time has the same probability of occurrences. The service time vary from 1 to 6 minutes with probabilities as given below :

Service time	1	2	3	4	5	6
Probability	0.10	0.20	0.30	0.25	0.10	0.05

Simulate the arrival of 10 customer and calculate :
i) Average waiting time for a customer
ii) Probability that a customer has to wait
iii) Probability of a server being idle
iv) Average service time
v) Average time between arrivals.

RD's for	913	727	015	948	309	922	753	235	302	
RD's for service time :	84	10	74	53	17	79	91	67	89	38

Assume that first customer arrives at time 0. Depict the simulation in tabular form. **(14 Marks)**

b. Explain event scheduling algorithm by generating system snapshots at clock = t and clock = t_1. **(06 Marks)**

3 a. What is list processing? Explain the basic operations of list processing. **(08 Marks)**

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

c. With example explain the properties of Poisson process. **(06 Marks)**

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

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

PART – B

5 a. Use linear congruential method to generate a sequence of 5 random members, with $x_0 = 27$, c = 43, a = 17, m = 100. **(04 Marks)**

b. Use the K – S table with $\alpha = 0.05$ for the following set of random members. Determine if the hypothesis that the number are uniformly distributed in the interval (0, 1). Random members are : 0.54, .73, 0.98, 0.11, 0.68. **(08 Marks)**

c. Test whether the 2^{nd}, 9^{th}, 16^{th}, - - - - etc /so on numbers in the following sequence are auto correlated by taking $\alpha = 0.05$.

0.38	0.48	0.36	0.01	0.54	0.34	0.96	0.06	0.61	0.85
0.48	0.86	0.14	0.86	0.89	0.37	0.49	0.60	0.04	0.83
0.42	0.83	0.37	0.21	0.90	0.89	0.91	0.79	0.77	0.99
0.95	0.27	0.41	0.81	0.96	0.31	0.09	0.06	0.23	0.77
0.73	0.47	0.13	0.55	0.11	0.75	0.36	0.25	0.23	0.72
0.60	0.84	0.70	0.30	0.26	0.38	0.05	0.19	0.73	0.44

(08 Marks)

6 a. Explain acceptance – rejection technique for Poisson distribution. Generate 5 Poisson variates with mean $\alpha = 0.25$. Random numbers are : 0.073, 0.693, 0.945, 0.739, 0.014, 0.342. **(10 Marks)**

b. Test whether the following data follows Poisson distribution using the chi-square test of goodness of fit. With mean $\alpha = 0.05$

Arrivals/ period	0	1	2	3	4	5	6	7	8	9	10	11
Frequency	12	10	19	17	10	8	7	5	5	3	3	1

(10 Marks)

7 a. The following data are available on the processing time at a m/c (in minutes). Develop an input model for the processing time : 0.64, 0.59, 1.1, 3.3, 0.54, 0.04, 0.45, 0.25, 4.4, 2.7, 2.4, 1.1, 3.6, 0.61, 0.20, 1.0, 0.27, 1.7, 0.04, 0.34. **(08 Marks)**

b. Explain types of simulations with respect to output anlaysis. Briefly explain the confidence – interval estimation method. **(12 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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