13MCA52

Fifth Semester MCA Degree Examination, June/July 2019
System Simulation and Modeling

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1   a.   Define simulation, draw a neat flow chart and explain the various steps in simulation study.
         (12 Marks)
    b.   Explain the advantages and disadvantages of simulation.   **(08 Marks)**

2   Consider a grocerry store with one checkout counter prepare the simulation table for 8 customers and find out the average time of customer in Q, and avg service time. The Inter Arrival Time (IAT) and Service Time (ST) are given in minutes.

IAT	3	2	6	4	4	5	8	
ST	3	5	5	8	4	6	2	3

There are 2 servers able and baker. A simplifying role is that able gets the customer of both servers are idle. The able has seniority. Determine the IAT distribution, service distribution of able and baker. Simulate system for 10 customers and determine utilization of both servers.

IAT	1	2	3	4
P	0.25	0.40	0.30	0.15

RDA	26	98	90	26	42	74	80	68	22	
ST	95	21	51	92	89	38	13	61	50	49

Able server				
ST	2	3	4	5
P	0.30	0.28	0.25	0.17

Baker				
ST	3	4	5	6
P	0.35	0.25	0.20	0.20

(20 Marks)

3   a.   With the help of flow chart explain execution of arrival and departure event.   **(10 Marks)**
    b.   One company uses 6 trucks to have iron from mine to industry. There are 2 loaders to load each truck. After loading, a truck moves to the weighing scale to be weighed. After weighing the truck travels to industry and returns back to the loader queue.

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

Prepare a simulation table using event scheduling approach until clock reaches 20 mins.
(10 Marks)

4   a.   Explain the characteristics of queuing system.   **(10 Marks)**
    b.   Generate a sequence of 5 random numbers with help linear congruential method with seed value $X_0 = 27$ the multiplier $a = 17$ and $c = 43$ and modulus $m = 100$.   **(10 Marks)**

5 a. Explain Kolmogrov – Smirnov test for uniformity of random numbers. Test for uniformity of the following random numbers. 0.44, 0.81, 0.14, 0.05 and 0.93 using level of significance of 0.05 given $D_\alpha = 0.565$. **(10 Marks)**

b. Test whether the following sequence of numbers are auto correlated, test at 5% ($\alpha = 0.05$) level of significance whether 3rd, 8th, 13th and so on. Give : $Z_{0.025} = 1.96$.

0.12	0.01	0.23	0.28	0.89	0.31	0.64	0.28
0.83	0.93	0.99	0.15	0.33	0.35	0.91	0.41
0.60	0.27	0.75	0.88	0.68	0.49	0.05	0.43
0.95	0.58	0.19	0.36	0.69	0.87		

(10 Marks)

6 a. Explain 4 steps in the development of useful model of input data. **(10 Marks)**

b. Explain the process of identifying the distribution of data using histograms. **(10 Marks)**

7 a. What is verification? How is verification of simulation model done? **(10 Marks)**

b. Explain 3 step approach of Naylor and Finger for the validation process of a simulation model. **(10 Marks)**

8 Write short notes on :
a. Simulation software
b. Differentiate between discrete and continuous system
c. Network of queues
d. System and system environment. **(20 Marks)**

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