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Fifth Semester MCA Degree Examination, Dec.2017/Jan.2018
System Simulation and Modelling

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 flow chart, explain the steps in simulation study. **(10 Marks)**

2 a. What is a Queuing system? Explain the characteristics of a Queuing system. **(08 Marks)**

  b. A small shop has one check out counter. Customer arrive at this counter at Random from 1 to 10 minutes apart. Each possible value of Inter arrival time has the same probability of occurrence equal to 0.10. The service time vary from 1 to 6 minutes with probability shown below :

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

  Develop simulation table for 10 customers. Find i) Average waiting time   ii) Average waiting time of customer.
  Use the following random digits for arrivals and service time respectively as
  913 , 727 , 15 , 948 , 309 , 922 , 753 , 235 , 302 (Arrivals)
  84, 10, 74, 53, 17, 79, 91, 67, 89, 38 (Service time). **(12 Marks)**

3 a. What are the major concepts in discrete event simulation? **(10 Marks)**

  b. Explain the problems in generation of Pseudo Random numbers. **(05 Marks)**

  c. Generate 5 random numbers. Given that Intial value = 27 , Multiplier = 17 Increment = 43 and Modulus 100. **(05 Marks)**

4 a. Explain KS test steps for uniformity of random numbers. Hence test for uniformity of 0.44, 0.81 , 0.14 , 0.05 , 0.93. Given the critical value $D_\alpha = 0.410$. **(10 Marks)**

  b. Test whether the following sequence of numbers are auto correlated at 5%. Level of significance of 3rd, 8th, 13th so on (Table value = 1.96).

0.69	0.87	0.23	0.28	0.98	0.31	0.65	0.28	0.83	0.93
0.99	0.15	0.33	0.35	0.91	0.41	0.60	0.27	0.57	0.88
0.86	0.49	0.05	0.43	0.95	0.58	0.19	0.36	0.12	0.01

  (10 Marks)

5 a. Explain the Inverse transformation technique for the Exponential and Uniform distribution. **(10 Marks)**

  b. Explain Acceptance – Rejection technique for Poisson distribution. **(05 Marks)**

  c. Generate 3 Poisson variates with mean $\alpha = 0.2$ (use the Random numbers 0.4357, 0.4146 , 0.8353 , 0.9952 , 0.8004). **(05 Marks)**

6 a. Describe three steps approach to validation by Naylor and Finger. **(10 Marks)**

  b. With flow diagram, explain the transitional relationship between model building , verification and validation. **(10 Marks)**

7 a. Explain the types of simulation with respect to output analysis. **(10 Marks)**

  b. Discuss the calibration and validation of models. **(10 Marks)**

8 Write short notes on :
  a. World views
  b. Simulation tools.
  c. Quantile – Quantile plot
  d. Event – Scheduling Algorithm. **(20 Marks)**

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