



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Fifth Semester, Master of Computer Applications (MCA)

Make-up Examination; Jan / Feb - 2017

System Simulation and Modeling

Time: 3 hrs

Max. Marks: 100

Note: Answer **FIVE** full questions, selecting **ONE** full question from each unit.

UNIT - I

- 1 a. What is simulation? Explain when simulation is the appropriate tool? 10
- b. Explain the advantages and disadvantages of simulation. 10
- 2 a. Define a model. Explain types of models. 8
- b. With recent flow chart, explain the steps in a simulation study. 12

UNIT - II

- 3 a. What is random numbers? Explain the characteristic of good random number generator. 10
- b. Explain linear congruential method for generation of random numbers. Hence, using mixed congruential method generate a sequence of them two-digit random numbers with $X_0 = 37$, $a = 7$, $C = 29$ and $m = 100$. 10
- 4 a. The sequence of numbers 0.54, 0.73, 0.98, 0.11 and 0.68 has been generated, use Kolmogorov-Smirson test with $\alpha = 0.05$ to learn whether the hypothesis that the numbers are uniformly distributed on the interval $[0, 1]$ can be rejected. 10
- b. Test for whether 3rd, 8th, 13th and so on number in the following sequence of random numbers are auto corrected at $\alpha = 0.05$ (when $Z_{0.025} = 1.96$)

0.01	0.12	0.23	0.28	0.89	0.31	0.64	0.28	0.83	0.93	10
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	

UNIT - III

- 5 a. Explain the characteristics of queuing system. 10
- b. Explain the simulation of queuing system. 10
- 6. A small grocery store has only one checkout counter. Customers arrive at this checkout counter at random times that are from 1 to 8 minutes apart. Each possible value of inter arrival time has the same probability of occurrence as shown in Table 1.
The service times vary from 1 to 6 minutes, with the productivities shown in Table 2. The problem is to analyze the system by simulating the arrival and service of 20 customers. 20

Time between Arrivals (Minutes)	Probability	Service Time (Minutes)	Probability
1	0.125	1	0.10
2	0.125	2	0.20
3	0.125	3	0.30
4	0.125	4	0.25
5	0.125	5	0.10
6	0.125	6	0.05
7	0.125		
8	0.125		

Table 1 : Inter arrival time

Table 2: Service time

Use the following random numbers to determine inter arrival time and service time.

For Inter arrival time :

913, 727, 015, 948, 309, 922, 753, 235, 302, 109, 093, 607, 738, 359, 888, 106, 212, 493, 535

For service Time :

84, 10, 74, 53, 17, 79, 91, 67, 89, 38, 32, 94, 79, 05, 79, 84, 52, 55, 30, 50

Find the following :

- i) Average waiting time
- ii) Probability of wait
- iii) Probability of idle service
- iv) Average service time
- v) Average time between arrivals.

UNIT - IV

- 7 a. List and explain the concepts in Discrete-Event-Simulation. 10
- b. Explain Event scheduling / Time advance algorithm. 10
- 8 a. Illustrate the steps in the development of a useful model of input data. 10
- b. What is histogram? Explain the steps to construct histograms. 10

UNIT - V

- 9 a. With neat diagram, explain the model building, verification and validation process in Simulation. 10
- b. Explain iterative process of calibrating a model. 10
- 10 a. Explain measures of performance and their estimations. 10
- b. Explain the output analysis for terminating simulation. 10

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