MCA – 54 C

V Semester M.C.A. Degree Examination, Feb./March 2010
SYSTEM SIMULATION AND MODELING

Time: 3 Hours Max. Marks : 100

Instructions : *1) Answer **all** questions in Part **A, 5** out of **8** questions in Part **B** and **4** out of **6** questions in Part **C**.*
*2) Part **A** : Questions from **1** to **8** carry **1** mark **each** and **9** to **14** carry **2** marks **each**.*
*3) Part **B** : **Each** question carries **8** marks.*
*4) Part **C** : **Each** question carries **10** marks.*

PART – A

1. What is an event in a system ?
2. What is endogenous and exogenous system ?
3. What is a lead time ?
4. Give an example for scheduled arrival process.
5. What is the mean E(X) of continuous random variable ?
6. What is a random number ?
7. Name a test conducted for testing the independence of random numbers.
8. What is verification ?
9. What is simulation ?
10. Bring out the difference between discrete and continuous systems.
11. What are the different queue disciplines ?
12. What is pmf of a random variable ?
13. Mention the tests for random numbers.
14. What are subjective and objective tests?

P.T.O.

PART – B

1. What are the advantages of simulation ?

2. Use linear congruential method to generate 5 random numbers. Given that initial value = 27, multiplier = 17, increment = 43 and modulus = 100.

3. Explain Poisson process.

4. A production process manufactures computer chips on the average at 2% non-conforming. Every day a random sample of size 50 is taken from the process. If the sample contains more than two non-conforming chips, the process will be stopped. Determine the probability that the process is stopped by the sampling scheme.

5. Construct a random variate generator for geometric distribution with pmf $p(x) = p\,(1 - p)^x$, $x = 0, 1, 2, \ldots$ where $0 < p < 1$.

6. A sequence of 1000 three-digit numbers has been generated and an analysis indicates that 680 have three different digits, 289 contain exactly one pair of like digits, and 31 contain three like digits. Based on the poker test, are these numbers independent?

7. Explain data collection.

8. With a diagram explain model building, verification and validation process.

PART – C

1. With a flowchart explain the steps involved in simulation study.

2. Explain the characteristics of a queuing system.

3. Simulate an (M, N) inventory system over 3 cycles for the following specification: M = 11 units, N = 5 days. Start with 3 units in the inventory and 8 units ordered with a lead time of one day. Assume the lead time to be 1, 3, 1 days for 3 cycles respectively. The demand probability and random digits to be used are given below

Demand	Probability
0	0.10
1	0.25
2	0.35
3	0.21
4	0.09

Cycle	Random digits
1	24, 35, 65, 81, 54
2	03, 87, 27, 73, 70
3	47, 45, 48, 17, 09

4. Given the sequence of numbers, can the hypothesis that the numbers are independent be rejected on the basis of length of runs up and down at $\alpha = 0.05$?

0.30	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	0.57	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

5. Explain the inverse technique for exponential and uniform distributions.

6. Explain time-series input models.

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