R 8252

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Fifth Semester

Mechatronics Engineering

EC 340 — MODELING AND SIMULATION

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define a system and a system environment.

2. Define a system model.

3. State two statistical properties that a random number must posses.

4. What is the purpose of Gap test?

5. Define exponential distribution.

6. Define Weibull distribution. Give an application for it.

7. State two situations when simulation of a system is not appropriate.

8. What is a continuous system? Give an example.

9. Define the probability of a server being idle.

10. Name two simulation packages and give their features.

PART B — (5 × 16 = 80 marks)

11. (a)   Explain the various types of system models.

Or

(b)   (i)   Explain the components of a system with a suitable example.

        (ii)   Explain the principles used in modeling.

12. (a) Explain random number generation using mid product method, constant multiplier method and additive congruential method with an example for each.

Or

(b) (i) Explain briefly about Chi-Square Test.

(ii) Find whether there is an excessive number of runs above or below the mean for the sequence of numbers.

0.41	0.68	0.89	0.94	0.74	0.91	0.55	0.62	0.36	0.27
0.19	0.72	0.75	0.08	0.54	0.02	0.01	0.36	0.16	0.28
0.18	0.01	0.95	0.69	0.18	0.47	0.23	0.32	0.82	0.53
0.31	0.42	0.73	0.04	0.83	0.45	0.13	0.57	0.63	0.29

13. (a) Explain the generation of random numbers with uniform distribution, exponential distribution and Weibull distribution using inverse transform technique.

Or

(b) (i) Explain the acceptance-rejection technique to generate uniform distribution, Poisson distribution and Normal distributions. (10)

(ii) Generate a Poisson variate with mean $\alpha = 0.2$. Assume an initial random number as 0.8353. (6)

14. (a) Explain the concepts in Discrete-Event simulation with an example.

Or

(b) Explain the simulation of component failures using appropriate distribution models. Discuss the reason for choosing the models.

15. (a) Explain with an example, the simulation of (M, N) inventory system where M represents the maximum inventory level and N represents the length of the cycle.

Or

(b) (i) Write notes on any two simulation packages. (8)

(ii) Simulate a single server queue atmosphere using any one simulation language. (8)