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Question Paper Code : 75557

5 Year M.Sc. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Seventh Semester

Software Engineering

XCS 472/10677 SW 702 — MODELLING AND SIMULATION

(Common to 5 Year M.Sc. Computer Technology/M.Sc. Information Technology)

(Regulation 2003/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Name the entity, attributes, activities, events in a fast-food restaurant system.

2. Execute a departure event through block diagram.

3. Find the binomial distribution whose mean is 3 and variance is 2.

4. Define a empirical distribution.

5. Generate first five random numbers by multiplicative congruential generator given $a = 11$, $m = 16$, $x_0 = 7$.

6. Write about acceptance Rejection technique.

7. Write the criteria used to select a simulation language.

8. Write the advantages of language 'Arena'.

9. Write the types of simulation with respect to output analysis.

10. Write about Data collection in Simulation.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Find out what ways and at what steps might a personal computer be used to support the simulation process. (8)

(ii) Given the arrival distribution of cars

Time between Arrivals :	0	1	2	3	4
Probability :	0.10	0.20	0.35	0.20	0.15

Develop the simulation and subsequent analysis for a period of 1 hour. What is the effect of changing the arrival distribution? (8)

Or

(b) (i) Write the advantages and disadvantages of simulation. (8)

(ii) A parent volunteers to remind other parents to come to a school meeting next week. The volunteer is given a list with 100 names. It takes 5 ± 2 seconds to find the next number to call, 7 ± 2 seconds to place the call and 30 ± 5 seconds to give the message for each parent on the list, the chance of reaching that parent is 35%. How many parents were reached out of the 100 names? (8)

12. (a) (i) The sampling process as $n = 50$ Bernoulli trials, each with $p = 0.02$, the nonconforming chips in the sample X, will have binomial distribution. Determine the probability that more than two nonconforming chips are found. (8)

(ii) Determine the variance $V(X)$ of the triangular distribution. (8)

Or

(b) (i) Write about Queue behavior and queue discipline. (8)

(ii) Explain the steady-state behavior of finite-population models. (8)

13. (a) (i) Based on runs up and runs down, determine whether the following sequence of 40 numbers is such that the hypothesis of independence can be rejected with $\alpha = 0.05$. (8)

0.41	0.37	0.02	0.45	0.67	0.21	0.94	0.88	0.11	0.90
0.19	0.72	0.75	0.08	0.54	0.13	0.36	0.16	0.28	0.75
0.18	0.01	0.95	0.69	0.18	0.92	0.32	0.82	0.53	0.95
0.31	0.42	0.73	0.04	0.85	0.16	0.57	0.63	0.63	0.73

(ii) Develop a poker test for five digit numbers. (8)

Or

(b) (i) Compute the random variate X_i for Exponential distribution. (8)

(ii) Develop a generation scheme for the triangular distribution with pdf

$$f(x)=\begin{cases}\frac{1}{2}(x-2) & 2\le x\le 3\\ \frac{1}{2}\left(2-\frac{x}{3}\right) & 3<x\le 6\\ 0 & \text{otherwise}\end{cases}. \quad (8)$$

14. (a) Generate a single-server queue simulation in C++. (16)

Or

(b) Using a spreadsheet software, generate 1000 exponentially distributed random values with a mean of 10. What is the maximum of the simulated values? What fraction of the generated values is less than the mean of 10? (16)

15. (a) (i) Explain the verification of simulation model. (8)

(ii) Determine the maximum-likelihood estimators $\hat{\beta}$ and $\hat{\theta}$ from the following data which are randomly generated from a Gamma distribution. (8)

1.691	1.437	8.221	5.976
1.116	4.435	2.345	1.782
3.810	4.589	5.313	10.90
2.647	2.432	1.581	2.432
1.843	2.466	2.833	2.361

Or

(b) (i) Describe the output analysis for steady-state simulation. (8)

(ii) Describe about the stochastic nature of output data. (8)

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