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206EC005

Ph.D./M.S.(Engg.) by Research Degree Examination, April/May 2024
Simulation, Modeling and Analysis

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain with a neat diagram, the different ways to study a system. **(10 Marks)**

b. Explain with a neat diagram about next-event time advance approach. **(10 Marks)**

OR

2 a. Explain simulation of Inventory system with necessary block diagrams. **(12 Marks)**

b. Describe in detail the steps in sound simulation study. **(08 Marks)**

Module-2

3 a. Consider the size of demand for a product is a discrete random variable 'X' that takes the values 1, 2, 3, 4 with probabilities $\frac{1}{6}, \frac{1}{3}, \frac{1}{3}$ and $\frac{1}{6}$ respectively. Find pmf, pdf of the variable x. Also find $P(2 \le x \le 3)$ and compute the mean μ. **(10 Marks)**

b. Calculate the estimated coverages for Normal distribution and exponential distribution when n = 5, 10, 20 and 40 along with skewness by considering 500 experiments. **(10 Marks)**

OR

4 a. Explain the timing and relationships of validation, verification and establishing credibility. **(10 Marks)**

b. Describe the techniques for increasing model validity and credibility. **(10 Marks)**

Module-3

5 Write short notes on :

(i) Weibull distribution
(ii) Uniform distribution
(iii) P – P plot
(iv) Q – Q plot . **(20 Marks)**

OR

6 a. Explain with an example the non stationary Poisson processes. **(10 Marks)**

b. Describe in detail ARMA, Gamma and ARTA processes. **(10 Marks)**

Module-4

7 a. Calculate the first 17 random numbers using LCG technique by considering m = 16, a = 5, c = 3 and $z_0 = 7$. **(10 Marks)**

b. By considering Tauswor the generator random numbers as r = 3, q = 5, $b_1 = b_2 = b_3 = b_4 = b_5 = 1$; calculate the first 40 random bits. **(10 Marks)**

OR

8 a. Generate the first 4 random variates using discrete inverse transform method by considering x is a discrete random variable which takes on values 1, 2, 3, 4 with probabilities $\frac{1}{6}$, $\frac{1}{3}$, $\frac{1}{3}$ and $\frac{1}{6}$ respectively . **(10 Marks)**

b. Explain Bionomial and Geometric distribution methods of generating random variates. **(10 Marks)**

Module-5

9 a. Explain in detail about the problem of Initial Transient. **(10 Marks)**

b. Explain in detail about replication / deletion approach of obtaining a point estimate and confidence interval. **(10 Marks)**

OR

10 a. Explain in detail about statistical analysis of steady-state cycle parameters. **(10 Marks)**

b. Explain in detail about statistical analysis for terminating solutions. **(10 Marks)**

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