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Sub Code: MTME- 101
Roll No.

M. TECH.
(SEM I) THEORY EXAMINATION 2022-23
SIMULATION, MODELLING & ANALYSIS

Time: 3 Hours *Total Marks: 70*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

(a) Describetheareasof applicationofsimulation.
(b) Discussthetermsystemandsystemenvironment
(c) Differentiate between discrete and continuous systems.
(d) Define server utilization.
(e) Define jockeying and balking.
(f) Describetheareasof applicationofrandom numbers.
(g) Write properties of a good random number generator

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

(a) Define Simulation and modelling. What are the advantage and disadvantage of simulation and modeling?
(b) What is a model? What are the types of system model and what is the difference between static and dynamic model.Give example.
(c) Explainthediscreteprobabilityfunction,continuousprobabilityfunctionandcumulativedistribution function.
(d) Describe characteristics of queuing system in detail.
(e) Describe Random Variate Generation. Explain Inverse transformation method.

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Describe the steps involved in simulation with the help of flow-chart.
(b) Explain the components of system with examples. Name several entities, attributes, activities for the following systems.
  (i) A barber shop
  (ii) A cafeteria
  (iii) A traffic

4. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Write short notes on:
  (i) Weibull Distribution
  (ii) Gamma Distribution

(b) Calculate the probability of there being n arrival (n = 0, 1, 2, 3,.....10) in an interval of 10 sec. when the arrivals have a Poisson's distribution with a mean value of 0.4

Attempt any *one* part of the following: **7 x 1 = 7**

(a) Customers arrive at Mary's Shoes every 12 minutes on the average, according to a Poisson process. Service time is exponentially distributed with an average of 8 minutes per customer. Management is interested in determining the performance measures for this service system.

(b) A computer repair person is "beeped "each time, there is a call for service. The number of beeps per hour is known to occur in accordance with a Poisson distribution with a mean of 2 per hour. Find out the probability of three beeps in the next hour. Poisson probability mass function is given by equation $p(x) = \begin{cases} \frac{e^{-a}a^{x}}{x!} & x = 0,1,2..... \\ 0 & \text{otherwise} \end{cases}$

Attempt any *one* part of the following: **7 x 1 = 7**

(a) What are the techniques of generating random numbers? Explain them.

(b) Use the Linear Congruential method to generate a sequence of random numbers with $X_0 = 27, a = 17, c = 43$ and m=100.

Attempt any *one* part of the following: **7 x 1 = 7**

(a) Define lognormal distribution. The rate of return on a volatile investment is modeled as having a lognormal distribution with mean 20% and S.D. 5%. Compute the parameters for lognormal distribution

(b) Explain

(i) Goodness of fit test

(ii) Input models without data with example