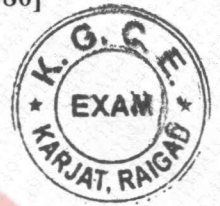


(3 Hours)

[Total Marks: 80]



- N.B.:** (1) Question No.1 is **Compulsory**.
 (2) Attempt **any three** questions from **remaining** questions.
 (3) Assume **suitable** data wherever required but **justify** the same.
 (4) **Figures** to the **right** indicate **full marks**.
 (5) Answer to each new question to be started on a **fresh page**.

1. (a) Elaborate the steps involved in simulation study. Why is it necessary to have program and process documentation? (10)
 (b) The sequence of numbers 0.63, 0.49, 0.24, 0.89, and 0.71 has been generated. Use the Kolmogorov-Smirnov test with $\alpha = 0.05$ to determine if the hypothesis that the numbers are uniformly distributed on the interval $[0, 1]$ can be rejected. Use $D_{0.05, 5} = 0.565$. (10)

2. (a) A firm sells bulk rolls of newsprint. The daily demand is given by the following probability distribution: (10)

Daily Demand (Rolls)	3	4	5	6
Probability	0.20	0.35	0.30	0.15

Lead time is a random variable given by the following distribution:

Lead Time (Days)	1	2	3
Probability	0.36	0.42	0.22

Determine the lead-time demand for 5 cycles of simulation. Random digits for lead time and demand are as follows:

R.D. for Lead Time	46	75	86	27	63				
R.D. for Demand	4	5	4	5	6	3	4	4	6

- (b) Draw the flowchart for arrival and departure event. Compare event-scheduling, process interaction and activity scanning algorithms. (10)
3. (a) Ace Heating and Air Conditioning service finds that the amount of time a repairman needs to fix a furnace is uniformly distributed between 1.5 and 4 hours. (10)
 (i) Find the probability that a randomly selected furnace repair requires more than 2 hours.
 (ii) Find the probability that a randomly selected furnace repair requires less than 3 hours.
 (iii) Find the mean and standard deviation.
- (b) The number of customers arriving at Costa Coffee is Poisson distributed with mean 4. Generate Poisson variate. Use random numbers 0.5389, 0.0532, 0.3492 in sequence. (10)
4. (a) Given the following data for utilization and time spent in system for the Able – Baker carhop problem. Calculate the overall point estimators, standard error and 95% confidence interval for the same. (10)
 Given $t_{0.025, 3} = 3.18$

Run r	1	2	3	4
Able's Utilization ρ_r	0.808	0.875	0.708	0.842
Average system time w_r (mins)	3.74	4.53	3.84	3.98

- (b) What do you understand by calibration and validation of models? How can one increase the face validity of a model and validate the model assumptions. (10)

[TURN OVER



- 5. (a) Customers arrive at random to the passport center at a rate of 40 customers per hour. (10)
Currently, there are 20 clerks, each serving 4 customers per hour on the average. Estimate the average utilization of a server and the average number of busy servers. Can we decrease the number of servers?
- (b) Describe briefly Queueing, Inventory and Reliability systems. (10)

- 6. Write short notes on (any two): (20)
 - (a) Multivariate and Time Series Input Models
 - (b) Areas of applications of simulation
 - (c) Initialization bias in steady state simulation
 - (d) Simulation of Manufacturing & Material Handling System

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