CBCS SCHEME

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18CS645

Sixth Semester B.E. Degree Examination, Dec.2024/Jan.2025
System Modelling and Simulation

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. List any five circumstances, when the simulation is the appropriate tool and when it is not. **(10 Marks)**

b. With a neat diagram, explain the steps in the simulation study. **(10 Marks)**

OR

2 a. Cars arrive to the shop for service in the manner shown below

Time between arrival	1	2	3	4
Probability	0.25	0.40	0.20	0.15

There are two car hops, Able and Baker. Able works a bit faster than Baker. Perform the simulation for six callers and construct the simulation table for the same.

Distribution of their service time is shown in the below :

For Able :

Service time	2	3	4	5
Probability	0.30	0.28	0.25	0.17

For Baker :

Service time	3	4	5	6
Probability	0.35	0.25	0.20	0.20

Random digits for arrival are 26, 98, 90, 26, 42

Random digits for service time 95, 21, 51, 92, 89, 38 **(10 Marks)**

b. List and explain major concepts in Discrete – event simulation. **(10 Marks)**

Module-2

3 a. List the conditions which satisfies for Discrete random variables and continuous random variables. **(10 Marks)**

b. List the assumptions for fulfilling Poisson process for counting process $[N(t), t \geq 0]$ with mean rate λ. **(10 Marks)**

OR

4 a. Explain the characteristics of queuing system. **(10 Marks)**

b. List A/B/C/N/K letters for queuing notations by Kendal and Queuing notation for parallel server systems for these notation λ_e, μ, ρ, s_n and ω_n^Q. **(10 Marks)**

Module-3

5 a. What are pseudo random numbers? What are the problem that occur while generating pseudo random numbers. **(10 Marks)**

b. What is linear congruential method? Use the linear congruential method to generate a sequence of random numbers $x_0 = 63$, $a = 19$, $c = 0$, $m = 100$. **(10 Marks)**

OR

6 a. The sequence of random numbers 0.44, 0.81, 0.14, 0.05, 0.93 are generated using Kolmogorov Smirnov test with $\alpha = 0.05$ to determine if the hypothesis that the numbers are on the interval [0, 1] can be rejected. [Where $D_\alpha = 0.565$]. **(10 Marks)**

b. What is acceptance rejection technique? Generate 3 Poisson variates with mean $\alpha = 0.2$. The random numbers are 0.4357, 0.4146, 0.8353, 0.9952, 0.8004. **(10 Marks)**

Module-4

7 a. Explain the different steps in development of a useful model of input data. **(10 Marks)**

b. List the suggestion that enhances the data collection. **(10 Marks)**

OR

8 a. Briefly explain confidence interval estimation. **(10 Marks)**

b. Prescribe quantities in output analysis for terminating simulations. **(10 Marks)**

Module-5

9 a. Define verification of simulation model and suggest techniques for verifying a simulation model. **(10 Marks)**

b. Explain model building verification and validation with respect to simulation model. **(10 Marks)**

OR

10 a. Illustrate the calibration technique for simulation model. **(10 Marks)**

b. Explain Naylor and Finger 3 step approach to aid in the validation process. **(10 Marks)**

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