CBCS SCHEME

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15CS834

Eighth Semester B.E. Degree Examination, June/July 2019
System Modelling and Simulation

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. What is simulation? Explain with flowchart the steps involved in simulation study. **(08 Marks)**

b. A computer technical support centre in staffed by two people. Able and Baker, who take calls and try to answer questions and solve computer problems. The time between calls ranges from 1 to 4 minutes with the distribution as shown in table 1.1. Able is more experienced and can provide service faster than Baker, which mean that, when both are idle, Able takes the call. The distribution of their service times are show in table 1.2 and Table 1.3: Inter arrival time (IAT) distribution

Table 1.1 : Inter Arrival Time (IAT) distribution

IAT (mins)	1	2	3	4
Probability	0.25	0.40	0.20	0.15

Table 1.2 : Service Time (ST) Distribution of Able

Service time (mins)	2	3	4	5
Probability	0.30	0.28	0.25	0.17

Table 13 : Service time distribution of Baker

Service time (mins)	3	4	5	6
Probability	0.35	0.25	0.20	0.20

Random digits for inter arrival times are :
26, 98, 90, 26, 42, 74, 80, 68, 22, 48, 34, 45, 24, 34
Random digits for service time are :
95, 21, 51, 92, 89, 38, 13, 61, 50, 49, 39, 53, 88, 01, 81
Simulate this system for 10 customers by
Finding (i) Average inter arrival time (ii) Average service time of Able
(iii) Average service time of Baker. **(08 Marks)**

OR

2 a. List the various concept used in discrete event simulation and explain any four of these with examples. **(08 Marks)**

b. Consider a single server queuing system with inter arrival and service time details as shown below :

IAT	1	1	6	3	7	5	2	4	1
ST	4	2	5	4	1	5	4	1	4

Stop simulation when simulation clock reaches 23. **(08 Marks)**

Module-2

3 a. Explain binomial and Poisson distribution and give probability mass function, mean and variance. **(06 Marks)**

b. Explain the following continuous distributions :
i) Uniform distribution ii) Exponential distribution iii) Triangular distribution
iv) Normal distribution. **(10 Marks)**

OR

4 a. Explain the characteristics of a queuing system. **(08 Marks)**

b. Explain the various steady state parameters of M/G/1 queue. **(08 Marks)**

Module-3

5 a. Use the linear congruential method to generate a sequence of random numbers with $X_0 = 27$, $a = 17$, $C = 43$ and $m = 100$. Write 3 ways of achieving maximal period. **(08 Marks)**

b. The sequence of random members 0.44, 0.81, 0.14, 0.05, 0.93 has been generated. Use Kolmogorav 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. Take $D_\alpha = 0.565$. **(08 Marks)**

OR

6 a. Suggest a step by step procedure to generate random variates using inverse transform technique for exponential distribution. **(08 Marks)**

b. What is acceptance rejection technique? Generate three Poisson variates with mean $\alpha = 0.2$. The random numbers are 0.4357, 0.4146, 0.8353, 0.9952, 0.8004, 0.7945, and 0.1530. **(08 Marks)**

Module-4

7 a. Explain the steps involved in the development of a useful model of input data. **(08 Marks)**

b. Apply chi – square goodness of fit test for Poisson distribution with $\alpha = 3.64$, data size = 100 and observed frequency $O_i = 12, 10, 19, 17, 10, 8, 7, 5, 5, 3, 3, 1$ [$\eta_{0.05,5} = 11.1$]. **(08 Marks)**

OR

8 a. Explain the different ways of selecting input models when data is not available. **(08 Marks)**

b. Explain the types of simulation with respect to output analysis. Give examples. **(08 Marks)**

Module-5

9 a. Discuss output analysis for steady state simulation in detail. **(08 Marks)**

b. Discuss output analysis for terminating simulation in detail. **(08 Marks)**

OR

10 a. Explain with neat diagram, a model building verification and validation. **(08 Marks)**

b. Describe the 3 steps approach formulated by Naylor and Finger in the validation process. **(08 Marks)**

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