Total No. of Questions : 12]

SEAT No. :

P782

[Total No. of Pages : 4

[4659] - 139

B.E. (Production)

SIMULATION AND MODELING

(2008 Pattern) (Elective - II (c)) (Semester - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer any three questions from each section.***
2) ***Answer to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Define simulation and state what kind of problems of manufacturing industries can be solved by simulation. **[8]**

b) What statistical techniques should be used to analyze the output of simulation study? Explain any one. **[8]**

OR

Q2) a) Explain the concepts in Discrete-Event Simulation. **[8]**

b) State the events and activities associated with the operation of material handling department. **[8]**

Q3) a) Explain in brief the steps in a Simulation study. **[8]**

b) A small grocery store has only one checkout counter. Customers arrive at this checkout counter at random from 1 to 8 minutes apart. Each possible value of interarrival time has the same probability of occurrence. The service times vary from 1 to 6 minutes with the probabilities shown in table 1. Find Average Waiting Time, Probability (wait), Probability of idle server, Average service time (minutes), Average time between arrivals (minutes) for 20 customers. **[10]**

P.T.O.

Table 1 **Service Time Distribution**

Service Time (Min)	Probability	Cumulative Frequency	Random Digit Assignment
1	0.10	0.10	01-10
2	0.20	0.30	11-12
3	0.30	0.60	31-60
4	0.25	0.85	61-85
5	0.10	0.95	86-95
6	0.05	1.00	96-00

OR

Q4) a) Consider a drive-in restaurant where carhops take orders and bring food to the car. Cars arrive in the manner shown in table 1. There are two carhops-Able and Baker. Able is better able to do the job and works a bit faster than Baker. The distribution of their service times are shown in tables 2 and 3. Find able and Baker busy time, Average Waiting Time, Probability (wait), Probability of idle server, Average service time (minutes), Average time between arrivals (minutes) for 26 customers.

[10]

Table 1: Interarrival distribution of Cars

Time Between arrivals (Min)	Probability	Cumulative Probability	Random Digit Assignment
1	0.25	0.25	01-25
2	0.40	0.65	26-65
3	0.20	0.85	66-85
4	0.15	1.00	86-00

Table 2: Service Distribution of Able

Service Time	Probability	Cumulative Probability	Random-Digit Assignment
2	0.30	0.30	01-30
3	0.28	0.58	31-58
4	0.25	0.83	59-83
5	0.17	1.00	84-00

Table 3: Service Distribution of Baker

Service Time	Probability	Cumulative Probability	Random-Digit Assignment
3	0.35	0.35	01-35
4	0.25	0.60	36-60
5	0.20	0.80	61-80
6	1.00	1.00	81-00

b) State the properties of Random Numbers. **[8]**

Q5) a) Explain briefly the steps involved in the development of a useful model of input data. **[8]**

b) Explain the technique for Generating Random Numbers with example. **[8]**

OR

Q6) a) Explain in brief the tests to check desirable properties of random numbers. **[8]**

b) Discuss the methods for selecting families of input distributions when input data are available. **[8]**

SECTION - II

Q7) a) Discuss the inverse transformation technique to sample from the exponential distribution. **[8]**

b) The sequence of number 0.54, 0.73, 0.98, 0.11 and 0.66 has been generated. Use Kolmogorov - Smirnov test with $\alpha = 0.05$ to determine if the hypothesis that the number are uniformly distributed on the interval [0,1] can be rejected. **[8]**

OR

Q8) a) Write short notes on: **[8]**

i) Monte-Carlo methods.

ii) Chi-square goodness of fit test.

b) Briefly explain the measure of performance of a simulation system. **[8]**

Q9) a) State the need of simulation in manufacturing and material handling systems. **[8]**

b) Discuss about a simulation of a flexible manufacturing shop. **[8]**

OR

Q10) a) State the input parameters to be consider in manufacturing system for building simulation model. **[8]**

b) Discuss about a simulation of a sheet metal part manufacturing systems. **[8]**

Q11) a) Performance Measures for Queuing Systems of single server system. **[8]**

b) Enlist various simulation software used in simulation of discrete system manufacturing with its important characteristics. **[10]**

OR

Q12) Write a short note: **[18]**

a) Advantages and Disadvantages of simulation.

b) Pseudo random number.

c) Terminating and non terminating simulation.