

MAY 2016

P/ID 17527/PCE09

Time : Three hours

Maximum : 100 marks

PART A — ($6 \times 5 = 30$ marks)

Answer any SIX questions.

1. Define model. Narrate various types of models with examples.
2. Draw flowcharts for the execution of the arrival and departure events of a single channel queue.
3. What are the characteristics of queuing systems?
4. Illustrate the various types of tests for checking the randomness of random numbers.
5. Obtain the random variable for exponential distribution.
6. What are the four steps in the development of a useful model of input data?
7. With a neat sketch, explain the iterative process of calibrating a model briefly.
8. What are the various types of simulations with respect to output analysis?

PART B — (7 × 10 = 70 marks)

Answer any SEVEN questions.

9. A newspaper boy buys the papers for 33 cents each and sells them for 50 cents each. Newspapers not sold at the end of the day are sold as scrap for 5 cents each. Newspapers can be purchased in bundles of 10. Thus, the newspaper boy can buy 50, 60 and so on. There are three types of newsdays, “good”, “fair” and “poor” with probabilities of 0.35, 0.45 and 0.20 respectively. The distribution of papers demanded on each of these days is given in Table 1. Determine the average profit per day the newspaper boy should earn, if he purchases 70 newspapers. Simulate it for 10 days.

Table 1 : Distribution of newspapers demanded

Demand	Demand probability distribution		
	Good	Fair	Poor
40	0.03	0.10	0.44
50	0.05	0.18	0.22
60	0.15	0.40	0.16
70	0.20	0.20	0.12
80	0.35	0.08	0.06
90	0.15	0.04	-
100	0.07	-	-

For type of newsdays, use the following random numbers :

94, 77, 49, 45, 43, 32, 49, 00, 16, 24

For demand, use the following random numbers :

80, 20, 15, 88, 98, 65, 86, 73, 24, 60.

10. Explain any two techniques for list processing.
11. The system, a grocery checkout counter, is modeled as a single server queue. Assume that the inter arrival times of customers are exponentially distributed with a mean of 4.5 minutes, and that the service times are normally distributed with a mean of 3.2 minutes and a standard deviation of 0.6 minutes. Write a program in GPSS with block diagram to collect all the statistics of the above system for 1,000 customers.
12. The interarrival times as well as the service times at a single-chair barbershop have been shown to be exponentially distributed. The arrival and service rates of customers are 2 per hour and 3 per hour respectively. Calculate the server utilization and the probabilities for zero, one, two, three and four or more customers in the shop.
13. Use the Kolmogrov-Smirnov test, with $\alpha = 0.05$ check whether the five numbers 0.44, 0.81, 0.14, 0.05, 0.93 are uniformly distributed or not. The critical value at $\alpha = 0.05$ given in the Kolmogrov-Smirnov table is 0.565.

14. Derive the random variate for Poisson distribution.
 15. What is time-series model? Explain any one time-series model.
 16. Write a detailed note on input-output validation using historical input data.
 17. How is point and interval estimator useful in measuring the performance of a simulated system?
 18. Discuss on the roles of batch means for interval estimation in steady-state simulations.
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