



USN

21AY24CS027

10CS82

Eighth Semester B.E. Degree Examination, Jan./Feb. 2021

**System Modeling and Simulation**

Time: 3 hrs.

Max. Marks:100

*Note: Answer any FIVE full questions, selecting at least TWO questions from each part.***PART – A**

1.
  - a. List any five circumstances, when simulation is appropriate tool and when it is not an appropriate tool. (10 Marks)
  - b. Briefly explain areas of application of simulation. (05 Marks)
  - c. Mention different types of simulation models with examples. (05 Marks)
2.
  - a. Describe queueing system with respect to arrival and service mechanism, system capacity and queue discipline. (06 Marks)
  - b. Write the flow diagram for service just completed and unit entering system flow diagram. (06 Marks)
  - c. The newsstand 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 newsstand can buy 50, 60 and so on. There are three types of news days: "good", "fair" and "poor, they have the probabilities 0.35, 0.45 and 0.20 respectively. The distribution of newspapers demanded on each of these days is given in Table.1. Simulate this system for 6 days and recording profit from sales each day for purchase of 70 news papers.

Demand Probability Distribution			
Demand	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	0.00
100	0.07	0.00	0.00

Table.1 : Distribution of News papers demanded per day

Random digits for type of news day: 58, 17, 21, 45, 43, 36

Random digits for demand: 93, 63, 31, 19, 91, 75

(08 Marks)

3.
  - a. Explain event Scheduling Algorithm. (08 Marks)
  - b. Consider a single server queueing system with arrival and service details as:  
Inter arrival time 1 1 6 3 7 5 2 4 1 ...  
Service times 4 2 5 4 1 5 4 1 4 ...  
Prepare a table using event scheduling algorithm. Stop simulation when clock reaches 6 mins. Find total busy time and maximum queue length. (12 Marks)
4.
  - a. Explain the following continuous distribution:
    - (i) Uniform distribution
    - (ii) Exponential distribution(10 Marks)
  - b. Explain the characteristics of queueing system. (10 Marks)

**PART – B**

- 5 a. Write the properties of random numbers and the number of important consideration for generating random numbers. (10 Marks)  
b. Explain linear congruential method and combined linear congruential method for generating random number. (10 Marks)
- 6 a. Explain the steps in the development of useful input model. (10 Marks)  
b. Explain chi-square goodness of fit test. Apply it to Poisson assumption with  $\alpha = 3.64$ . Data size = 100 and observed frequency  $O_i = 12, 10, 19, 17, 10, 8, 7, 5, 5, 3, 3, 1, [ \chi^2_{0.05,5} = 11.1 ]$ . (10 Marks)
- 7 a. Explain output analysis for terminating simulation. (10 Marks)  
b. Write short notes on:  
(i) Point estimation  
(ii) Confidence-Interval Estimation (10 Marks)
- 8 a. With a neat diagram, explain model building, verification and validation. (10 Marks)  
b. Explain the iterative process of calibrating a model. (10 Marks)

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