No. of Printed Pages : **2**

Sl. No.

B3.E2-R5 : SYSTEM MODELLING AND COMPUTER SIMULATION

NOTE :

1. Answer question 1 and any FOUR questions from 2 to 7.

Total Time : 3 Hours **Total Marks : 100**

1. (a) Explain the term modelling.

(b) Compare verification and validation.

(c) What is a random variable ? Differentiate between continuous and discrete variables with example.

(d) Define simulation.

(e) What is continuous simulation and in what areas it is used ?

(f) Define Markov Process.

(g) Why do we build models ? **(7x4)**

2. (a) Explain the steps to develop a simulation model.

(b) Define the following terms : discrete system, continuous system, stochastic system, deterministic system, entity, attribute, list, system and event. **(9+9)**

3. (a) List the advantages of using modelling and simulation.

(b) Consider the grocery store with one check out counter. Prepare the simulation table for eight customers and find out average waiting time of customer in queue, idle time of server and average service time. The inter arrival time (IAT) and service time (ST) are given in minutes.

IAT : 3, 2, 6, 4, 4, 5, 8

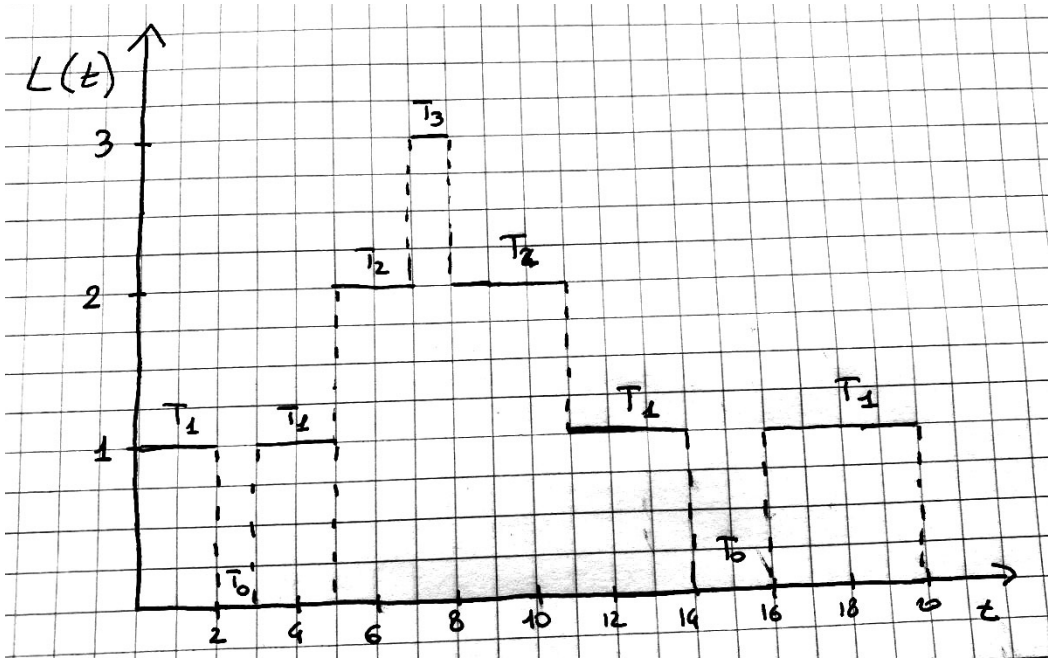
ST (min) : 3, 5, 5, 8, 4, 6, 2, 3

Assume first customer arrives at time $t = 0$

(c) Explain the terms used in queuing notations of the form A/B/C/N/K. **(7+7+4)**

4. (a) Explain the steps performed for simulation analysis.

(b) What are the various measures used to assess the quality of a queuing system ? In a simulation of a queue in an interval time of 20 time units (as shown in the figure below). Where T_i is the total time in [0, T] in which the system contained exactly i customers. Calculate the Average Number of Customers in the System and the Average Time Spent in System per Customer.



(9+9)

5. (a) Briefly define any four concepts used in discrete event simulation.

(b) Explain inverse transform method to simulate observations from generic random variables.

(c) Enlist the steps involved in development of a useful model of input data. **(6+7+5)**

6. (a) What is Monte Carlo Simulation ? Discuss the steps involved in Monte Carlo method with the help of a flowchart.

(b) List any three situations when simulation tool is appropriate and three situations where it is not an appropriate tool. **(9+9)**

7. (a) What do you understand by time series input model ? Briefly explain autoregressive order - 1 model.

(b) Explain the two different techniques for generating random numbers with examples.

(c) Generate three Poisson variates with mean $\alpha = 0.2$ **(7+6+5)**

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