

(Answer any four from the following questions)

1. a) Discuss the terms with example: entity, attribute, activity and state of the system. 2
 - b) Define endogenous and exogenous activities. What are open and closed system? 2
 - c) Design a small part of an 'on-line computer system' in case of system design studies. 1.5
 - d) Describe the elements of a supermarket model. Classify model that used in system studies. 2
 2. a) Define system engineering according to system analysis and system design studies. 2
 - b) Explain the interactions that occur in a system by looking at a 'Corporate Model'. 2
 - c) Construct the flowchart of the progress of a simulation study. Discuss the factor that distinguishes analytical methods from numerical methods. 3.5
 3. a) Why a queue is formed? What is inter-arrival time? 2
 - b) What are the measures of performance of a single server queuing system? 1.5
 - c) Consider in case of a single server queuing system, arrival occurs at times 0.4, 1.6, 2.1, 3.8, 4.0, 5.6, 5.8, 7.2 and departure occurs at times 2.4, 3.1, 3.3, 4.9, 8.6, If the simulation ends at time $T(6) = 8.6$, then find out the three measures of performance. 4
 4. a) Define 'Clock time' and 'Simulation time' in case of discrete system simulation. 2
 - b) Mention two activities of causing events. 'Each call is a separate entity having four attributes'- Mention the attributes. 3
 - c) Mention the basic steps required for simulation modeling. 2.5
 5. a) Describe discrete random variable and continuous random variable. 3
 - b) The life of a disk is given by X , a continuous random variable assuming all values in the range $x \geq 0$. The pdf of the lifetime (in years) is: 4.5
- $$f(x) = \begin{cases} \frac{1}{2} e^{-x/2}, & x \geq 0 \\ 0 & \text{otherwise} \end{cases}$$
- Find the probability of that disk between 2 and 5 years.
6. a) Explain the numerical computation technique for continuous and discrete models with appropriate example. 3
 - b) Discuss the use of random numbers in the perspective of Monte Carlo method. 2.5
 - c) Describe Cobweb Models in case of fluctuations of market price. 2