Duration: 3 Hrs **Max. Marks: 80**

Instructions:

(1) Questions 1 is Compulsory
(2) Draw neat diagrams
(3) Out of Remaining 5 Question attempt any Three
(4) Figures to the right indicate full marks.

Q 1	(a)	What are the characteristics of Queuing System?	**05**
	(b)	Discuss advantages and disadvantages of Simulation	**05**
	(c)	Explain with diagram Different types of models in Simulation.	**05**
	(d)	Explain different random number generation techniques	**05**
Q 2 (a)		Define the following: Clock, Event notice, Delay, Bootstrapping, List, Event, System, Model, Entity, Attribute	**10**
Q2 (b)		Define Simulation and Explain Steps in simulation with flowchart.	**10**
Q3 (a)		Explain Direct Transformation method for random variate generation using Normal and Lognormal distribution	**10**
Q3 (b)		Local train arrives at railway station at every 15 minutes beginning at 5:00 am. A passenger arrives at the station which is uniformly distributed between 10:00 am and 10:30 am. Find probability that passenger has to wait a) less than 6 min b) more than 10 min	**10**
Q4 (a)		Explain Naylor and finger validation approach	**10**
Q4 (b)		Explain the steps in runs up and down test for independence. Test the following set of random numbers for independence by runs up and down test. Take $\alpha = 0.05$ and critical value $Z\alpha = 1.96$ 0.12 0.01 0.23 0.28 0.89 0.31 0.64 0.28 0.33 0.93	**10**

Q5 (a) Calculate the Statistics for Single channel queue for 10 customers where interarrival time (IAT) and service time (ST) is given by following table. Assume first customer arrives at time t=0 **10**

IAT	--	08	06	01	08	03	08	07	02	03
ST	04	01	04	03	02	04	05	04	05	03

Q5 (b) A certain passenger has to go to international airport from hotel. There are two routes from hotel to airport. By route A, the travel time in minutes from hotel to airport is normally distributed with μ=27 and σ= 5. By route B it is normally distributed with μ=30 and σ= 2. which route is better choice for passenger if (i) one has 30 min (ii) 34 minutes **10**

Q6 Write Short Notes on following (any 2) **20**

(a) KS Test

(b) Inverse Transform technique

(c) Issue in Manufacturing System

(d) Time Advance Algorithm

(e) Goodness of fit test.

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