

Time :(3 Hours)

[Total Marks: 80]

**N.B.:** (1) Question No.1 is Compulsory.

- (2) Attempt any three questions from remaining questions.
- (3) Assume suitable data wherever required but justify the same.
- (4) Figures to the right indicate full marks.
- (5) Answer to each new question to be started on a fresh page.

1. (a) Mention some of the areas where simulation can be applied. Also explain when system cannot be simulated. (10)
- (b) What do you understand by calibration and validation of models? How can one increase the face validity of a model and validate the model assumptions? (10)

2. (a) Perform the simulation of the inventory system. Daily demand is represented by the random number 4,3,8,2,5 and the demand probability is given by (10)

Demand	0	1	2
Probability	0.2	0.5	0.3

If the initial inventory is 4 units, determine on which day the shortage condition occurs.

- (b) Define the following: Clock, Event notice, Delay, Bootstrapping, List, Event, System, Model, Entity, Attribute. (10)

3. (a) Show that the geometric distribution is memoryless. (10)

- (b) The time to attend a breakdown call is found to follow exponential distribution with a mean of 0.5. Generate two exponential random variates representing the time to attend. Use  $R_1=0.54$  and  $R_2=0.72$ . (10)

4. (a) Describe the algorithm for runs above and below the mean random number testing method. Test the following set of random numbers for independence by runs up and down test. Take  $\alpha =0.05$  and critical value  $Z\alpha =1.96$  (10)

0.12 0.01 0.23 0.28 0.89 0.31 0.64 0.28 0.33 0.93

- (b) Categorize the types of random numbers according to the properties of random numbers. Explain any one with example. (10)

5. (a) 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)

- (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  $\mu=27$  and  $\sigma= 5$ . By route B it is normally distributed with  $\mu=30$  and  $\sigma= 2$ . which route is better choice for passenger if (i) one has 30 min (ii) 34 minutes (10)

6. Write short notes on (any two): (20)

- a)KS Test
- b)Verification and Validation Process
- c)Manufacturing and Material Handling System
- d)Goodness of fit test