

MR (7/6/13)

Seat
No.

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मान - 006

System Dynamics & Simulation

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Answer any five questions.
5. Neat diagram must be drawn wherever necessary.
6. Figures to right indicate full marks.
7. Use of electronic pocket calculator is allowed.
8. Assume suitable data, if necessary.

1. 20
 - a) Describe the behavior of dynamic systems with the help of suitable example.
 - b) Classify the following systems in static and dynamic systems stating the reasons.
 - * An underwater tank
 - * A submarine
 - * Flight of an aircraft
 - * A college
 - * Population of a country.
2. 20
 - a) What is the difference between static and dynamic models?
 - b) Discuss, the discrete probability function. How it is different from continuous probability function ?
3. 20
 - a) What is simulation? Describe its advantages in solving the problems. Give its main limitations with suitable examples.
 - b) Why the random numbers generated by computer are called pseudo random numbers?
Discuss the congruence method of generating the random numbers.
4. 20
 - a) What is discrete simulation? Explain with the help of suitable example.
 - b) Explain Erlang distribution and its role in simulation.

5. 20

- a) Describe with a suitable example a continuous simulation.
 b) Write a short note on M/Ek/1 models and their applications.

6. 20

- a) Consider an assembly line with five stations. Demonstrate that it is a queueing system by describing its components.
 b) Discuss the arrival and service processes of queueing models. Write the standard method of expressing the queueing problem.

7. 20

- a) Give a general structure of the queueing system and explain it. Prove that if the number of arrivals follows Poisson process, then the inter-arrival times follow the exponential distribution.
 b) An insurance company has three claim adjusters in its branch office. People with claims against the company are found to arrive in a Poisson fashion at an average rate of 20 per 8 hour day. The amount of time that an adjuster spends with a claimant is found to have an exponential distribution with mean service time 40 minutes. Claimants are processed in the order of their appearance.
 i) How many hours per week can an adjuster expect to spend with the claimants?
 ii) How much time, on the average, does a claimant spend in the branch office?

8. 20

- a) i) The price change of shares of a company has been observed over the past 50 trades. The frequency distribution is as follows :

Price Change	-3/8	-1/4	-1/8	0	1/8	1/4	3/8	1/2
No. of Trades	4	2	8	20	10	3	2	1

If the current price per share of the company is 23, use random numbers to simulate the price per share over the next 10 trades. Use the following stream of random numbers : 21, 84, 07, 30, 94, 57, 57, 19, 84, 84.

- ii) Explain the use of computers for Simulation.
 b) Formulate the problem given in Q.7 (b) so as to solve the same by using any of the simulation software.
 Discuss the parameters and their values that are required to be set in the software.
 Explain the steps to be followed so as it can be solved by using the software.