Roll No .....

AU/ME-801 (D) / IP/IEM-801(B)

B.E. VIII Semester

Examination, June 2015

Simulation & Process Modeling

(Elective-III)

Time : Three Hours

Maximum Marks : 70

Note: Attempt any one Question from each unit. Each unit carry equal marks.

Unit I

1. a) What do you mean by system modeling? Explain.

   b) Write difference between continuous and discrete event simulation.

OR

2. a) What are the basic features of simulation games and what is a structure of typical procedure of simulation gaming?

   b) What activities are performed in simulation gaming runs?

Unit II

3. Suppose that X and Y are jointly continuous random variables with

$$f(x, y) = \begin{cases} y - x & \text{for } 0 < x < 1 \text{ and} \\ & 1 < y < 3 \\ 0 & \text{otherwise} \end{cases}$$

   a) Compute and plot $f_X(x)$ and $f_Y(y)$

b) Are X and Y independent

c) Compute $F_X(x)$ and $F_Y(y)$

OR

4. For any random variables x_1, x_2 and any numbers a_1, a_2 show that Var $(a_1 x_1 + a_2 x_2) = a_1^2$ Var $(x_1) +, 2a_1a_2$ Con y $(x_1 x_2)$ $+ a_2^2$ Var (x_2)

Unit III

5. A bank has only one typist. Since the typing work varies in length the typing rate is randomly distributed approximating a Poisson distribution with mean service rate of 8 letters per hour. The letters arrive at a rate of 5 per hour during the entire 8 hours work duty. If the typewriter is valued at Rs. 1.50 per hour determine :

   a) Equipment utilization

   b) The percentage time that an arriving letter has to wait

   c) Average system time

   d) Average cost due to waiting on the part of the typewriter

OR

6. A milk plant at a city distribute its products by trucks, loaded at the loading dock. It has its own fleet of trucks plus trucks of a private transport company. This transport company has complained that sometimes its trucks have to wait in line and thus the company loses money paid for a truck and driver that are only waiting. The company has asked the milk plant management either to go in for a second loading dock or discount prices equivalent to the waiting time. Average arrival rate (all trucks) = 3/hour and average service rate = 4/hour. The transport company has provided 40% of the total number of trucks.

Assuming that these rates are random according to Poisson distribution determine :

a) The probability that a truck has to wait

b) The waiting time of a truck that waits

c) The expected waiting time of company trucks per day

Unit IV

7. a) What are the assumptions of System Dynamics (SD) method of modelling?

   b) What are the basic structural elements of SD models?

OR

8. a) Explain the feedback loop and relation between its polarity and behaviour.

   b) Explain the procedure for preparation of causal loop diagrams?

Unit V

9. a) What methods of verification and validation of simulation models do you know?

   b) Discuss the conditions under which behaviour sensitivity test should be carried out?

OR

10. a) Explain the importance of extreme condition test in SD models?

    b) Compare and contrast validation schemes used for experimental model and system dynamic models.

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