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CS 131606

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Roll No. of candidate

Azara, Hatkhowapara,									
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2019

B.Tech. 6th Semester End-Term Examination

Computer Science and Engineering

MODELLING AND SIMULATION

Full Marks – 100

Time – Three hours

The numerals on the right margin indicate the full marks allotted to the question.

Answer question No.1 and any *Six* from the rest.

1. Answer the following questions by marking whether a statement is true (T) or false (F):- (10 × 1 = 10)
 - (i) A model is a collection of information about a system:(T/F)
 - (ii) The model of the suspension system of a car is a first order differential equation: (T/F)
 - (iii) From your text an aircraft flying under autopilot control is an example of a discontinuous system: (T/F)
 - (iv) In a deterministic model the output can be determined from the knowledge about the inputs: (T/F)
 - (v) In a Stochastic model the output can be determined from the knowledge about the inputs: (T/F)

[Turn over

- (vi) In a traffic system cars are entities: (T/F)
 - (vii) In a discrete system changes brought about by entities are predominantly smooth: (T/F)
 - (viii) An overhead tank supplying water through a pipe can be modeled by a simple "Ohm's law" electrical circuit: (T/F)
 - (ix) Models can be broadly divided into three parts: (T/F)
 - (x) A system in equilibrium can be represented by a "static mathematical" model: (T/F)
2. (a) Explain the terms: *System Analysis, System Design and System Postulation*. (8)
- (b) What are the principles used in modelling a system? (7)

3. A lagged model of a market is represented by the equations shown below:

(Q = quantity (demand) and S = supply and P is the price, a,b,c and d are constants). The market is assumed to be cleared - that is the supply and the demand are equal.

$$Q = a - bp$$

$$S = c + dP - 1$$

$$Q = S$$

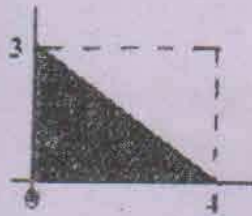
Given that:

$$P_0 = 0.50, a = 6.00, b = 1.00, c = 1.50 \text{ and } d = 0.75$$

Draw the cob-web graphs: Price vs Time and Price vs Quantity and Supply. Is the market under these conditions stable? (15)

4. Use the Monte-Carlo method to find the area of the following figure.

Also give the algorithm you shall be using and write a programme (in your favourite language) to implement the algorithm. (15)



5. Look at the following GPSS programme. Explain what the programme does and what each of the "block" does. (15)

Single server queuing system

SIMULATE

GENERATE 20.5

SEIZE TURN

ADVANCE 15.3

RELEASE MACH

TERMINATE 1

START 300

END

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Here TURN is a lathe machine which has to process jobs one after another.

6. (a) For the differential equation shown below set up an analogue computer simulation circuit (use standard blocks as in your text book) (8)

$$F(t) = M \cdot \frac{d^2x}{dt^2} + K_1 \cdot \frac{dx}{dt} + K_2x + C.$$

- (b) What are the advantages and disadvantages of analogue computer simulations? (7)

7. What are System Dynamic Diagrams? Give an example of a system dynamic diagram representing population growth that includes birth, death and immigration. (15)
8. What are the tasks involved in preparing a computer programme for the simulation, of a system? Draw a flow-chart to explain this. (15)
9. In a test the marks obtained by 60 students were as follows:

Marks Groups	Number of Students
1(0-10)	1
2(11-20)	2
3(21-30)	3
4(31-40)	6
5(41-50)	11
6(51-60)	13
7(61-70)	14
8(71-80)	7
9(81-90)	2
10(91-100)	1

(Explanation Students obtaining marks between 0 and 10 belongs to Group 1, between 11 and 20 belongs to Group 2, between 21 and 30 is Group 3 and so on)

Find a graph the probability distribution and cumulative distribution. Determine the mean, mode, median and the standard deviation. (15)