Roll No: | | | | | | | | | | | | | |

MCA
(SEM III) THEORY EXAMINATION 2021-22
SIMULATION & MODELING

Time: 3 Hours   *Total Marks: 100*

Note: **1.** Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. **Attempt *all* questions in brief.**   **2 x 10 = 20**
   a. Define hybrid simulation.
   b. What is the application of system simulation?
   c. What is the need of simulation and when it should be done?
   d. What is rejection method?
   e. Define single server queue system.
   f. What is system dynamics diagram?
   g. Define object oriented simulation language.
   h. What is System Simulation?
   i. Describe Distributed Lag models.
   j. Describe an inventory problem.

SECTION B

2. **Attempt any *three* of the following:**   **10 x 3 = 30**
   a. Discuss Full Corporate Model with appropriate diagram.
   b. What is difference between Cobweb model and distributed lag model? Explain with the help of example.
   c. Discuss fixed time-step Vs event-to-event with flow chart in discrete system simulation.
   d. Discuss Exponential growth model, modified exponential growth model and logistic model with suitable example.
   e. Differentiate between CSMP and DYNAMO Simulation languages.

SECTION C

3. **Attempt any *one* part of the following:**   **10 x 1 = 10**
   (a) What do you mean by system simulation? Why system is simulated? Discuss the basic nature of simulation and its applications.
   (b) Differentiate any three of the following:
      i. Static Vs Dynamic Models
      ii. Physical Vs Mathematical Models
      iii. Discrete Vs Continuous Systems
      iv. Simulation Vs Analytical Methods

4. **Attempt any *one* part of the following:**   **10 x 1 = 10**
   (a) What is cobweb model? Draw a cobweb model for the following market:
      $$D= 12.4 - 1.2P$$
      $$S=8.0 - 0.6 P\_1$$
      $$P0 =1.0$$
   (b) Simulate 3-dimensional pure-pursuit problem. Draw flow chart with required equations

5. **Attempt any *one* part of the following:**   **10 x 1 = 10**
   (a) What do you mean by randomness? Write a technique to generate random number. Let m=100, a=8, c=47 and R(0)=27. Generate a sequence of random integers i.e. R (i) using linear congruential method.

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(b)   Simulate Water Reservoir System Problem.

6.   **Attempt any *one* part of the following:**   **10 x 1 = 10**

(a)   Discuss Exponential growth model, modified exponential growth model and logistic model with suitable example.

(b)   What do you mean by system dynamics diagram? Why is it required? Define Multi-segment model and draw system dynamics diagram for an inventory control system.

7.   **Attempt any *one* part of the following:**   **10 x 1 = 10**

| (a) | Activity Network Graph of a project is given as follows with a table showing time durations. |

TASK	A	B	C	D	E	F	G	H	I
OPTIMISTIC TIME	5	18	26	16	15	6	7	7	3
PESSIMISTIC TIME	10	22	40	20	25	12	12	9	5
MOST LIKELY TIME	8	20	33	18	20	9	10	8	4

Now find following –
   (i)   EST and EFT for each activity.
   (ii) Critical Path .
   (iii) Expected project completion time.
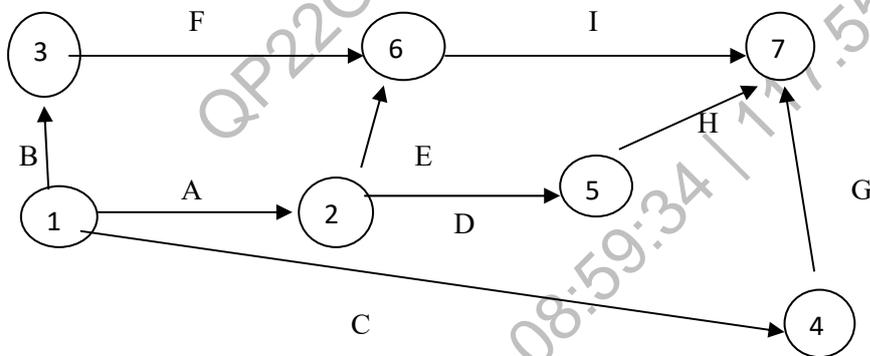
| (b) | Discuss any two -
    (i)   CSMP-III and MODSIM-III
    (ii)   SIMULA and GPSS Simulation languages.
    (iii)   continuous and discrete simulation languages. |