12. State the general form of an integer programming problem. Distinguish between pure and mixed integer programming problems. Why integer programming is needed ?

Or

Explain in detail the different software used in linear programming. **12**

13. Describe the fundamental components of a queuing process with suitable examples.

Or

The following table gives the activities in a construction project and other relevant information :

Activity (i-j)	Preceding activity	Normal time (days)	Crash time (days)	Normal cost (Rs.)	Crash cost (Rs.)
(1-2)	-	20	17	600	720
(1-3)	-	25	25	200	200
(2-3)	(1-2)	10	8	300	440

Roll No. ..... **Exam Code : J-19**

Subject Code—0124

M. Sc. (CS)/M.C.A. EXAMINATION

(Main & Re-appear)

(Batch 2009 Onwards)

(Fourth Semester)

(MCA-3 Years)

COMPUTER BASED OPTIMIZATION METHODS

MS-19

Time : 3 *Hours* *Maximum Marks :* 70

Section A

Note : Attempt any *Seven* questions. **7×5=35**

1. What are the main characteristics of Operation Research ?

2. Write down the various assumptions in linear programming problem that limit its applicability.

3. Differentiate between the discrete and continuous Markov Chains.

4. Write down the disadvantages of Network Techniques.

5. Define Critical event, Critical activity and Critical path. Also, mention the main features of critical path.

6. Explain the concept of degeneracy in simplex method.

7. Explain the Kendall's Notation for representing Queuing Models.

8. Explain the terms :

(i) Stochastic Process

(ii) Markov Process

(iii) Transition Problem

(iv) Ergodic Process

(v) Equilibrium of steady state.

9. Why Integer Programming is needed ?

10. What do you mean by primal and dual problems ? Is the number of constraints in the primal and dual the same ?

Section B

Note : Attempt all the questions.

11. Explain the role of Operation Research in Decision-making. Also, write down the various steps involved in logical and systematic approach for decision-making.

Or

Solve the LP problem using Simplex method :

Max. $z = 3x_1 + 2x_2$,

Subject to the constraints :

$$2x_1 + x_2 \leq 40$$

$$x_1 + x_2 \leq 24$$

$$2x_1 + 3x_2 \leq 60$$

and all $x_1, x_2 \geq 0$ **12**

(2-4)	(1-2)	12	6	400	700
(3-4)	(1,3), (2-3)	5	2	300	420
(4-5)	(2-4), (3-4)	10	5	300	600

(a) Draw the activity network of the project.

(b) Find the total float and free float for each activity.

(c) Using the above information "crash" or shorten the activity step-by-step until the shortest duration is reached. **11**

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