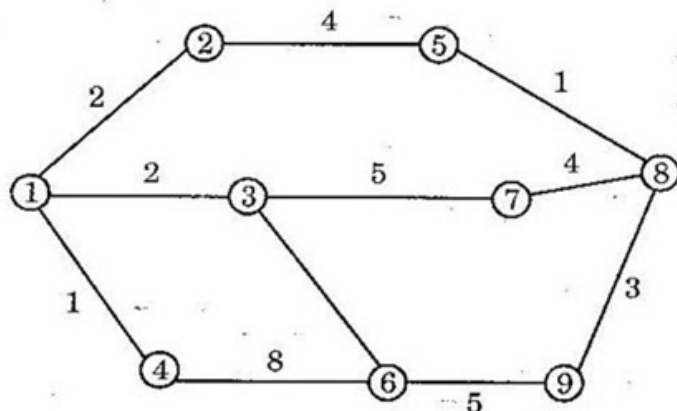


9. (a) Define Slack time and Critical activity. 7  
 (b) A project is represented by the following network shown below:



Calculate the critical path and duration of the project. 7

Roll No. ....

Total Pages : 4

MCA/M-13

10204

**COMPUTER SCIENCE**

(Computer Oriented Optimization Techniques)

Paper-MCA-204

Time Allowed : 3 Hours]

[Maximum Marks : 80

**Note :** Attempt five questions in all, selecting at least **one** question from each Unit. Question No. 1 is compulsory.

**(Compulsory Question)**

1. (a) Define a Model.  
 (b) Discuss surplus variable with suitable examples.  
 (c) Define Duality and its benefits.  
 (d) Explain all integer programming with suitable examples.  
 (e) Define a balanced assignment problem with suitable examples.  
 (f) Explain busy period and busy cycle.  
 (g) Define PERT and CPM.  
 (h) Explain Basic Feasible solution. 3×8=24

**UNIT-I**

2. Define U.R. and also discuss its management applications and development in India. 14
3. (a) Discuss the general methods for solving models. 7  
 (b) State the rule of U.R. in decision making. 7

10204/K/961/1,350

P. T. O.

## UNIT-II

4. Solve the following LPP by using simplex method and also chain its flow chart:

$$\text{MIN } Z = x_1 - 3x_2 + 2x_3$$

subject to

$$3x_1 - x_2 + 3x_3 \leq 7$$

$$-2x_1 + 4x_2 \leq 12$$

$$-4x_1 + 3x_2 + 8x_3 \leq 10$$

$$\text{and } x_1, x_2, x_3 \geq 0.$$

14

5. Define Degeneracy and also solve the following LPP by using dual simplex method

$$\text{MAX } Z = -2x_1 - x_3$$

subject to

$$x_1 - x_2 - x_3 \geq 5$$

$$x_1 - 2x_2 + 4x_3 \geq 8$$

$$\text{and } x_1, x_2, x_3 \geq 0.$$

14

## UNIT-III

6. Discuss the necessities of integer programming and solve the following LPP:

$$\text{MAX } Z = x_1 + x_2$$

subject to

$$2x_2 \leq 7$$

$$x_1 + x_2 \leq 7$$

$$2x_1 \leq 11$$

$$x_1, x_2 \geq 0 \text{ and are integers.}$$

14

7. (a) Define an unbalanced assignment problem with suitable example. 7

- (b) A car hire company has one car at each of five depots a, b, c, d and e. A customer requires a car in each town, namely A, B, C, D and E. Distance (m/cm) between depots (origin) and town (destination) one given in the following distance matrix:

	a	b	c	d	e
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	50	80	80	110
E	55	35	70	80	105

How cars should be assigned to customers so as to minimize the distances travelled? 7

## UNIT-IV

8. (a) State the characteristics of a queueing system. 7

- (b) If for a period of 2 hours in a day (8-10 A.M.) trains arrive at the Y and every 20 minutes but the service time continuous to remain 36 minutes thus calculate for the period. 7

Or

- (a) The probability that the y and is empty. 7
- (b) Average queue lengths. On the assumption that the line capacity of the y and is limited to 4 trains only. 7