2016

MCA

MCA 2.3

COMPUTER BASED OPTIMIZATION TECHNIQUE

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Answer any five questions :

   a) Write two definitions of Operation Research. Explain the characteristic of OR. 2 + 5 = 7

   b) Solve the following LPP by Graphical method 8

$$\text{Maximize } Z = x_1 - 2x_2$$

$$\text{Subject to } -x_1 + x_2 \leq 1$$

$$6x_1 + 4x_2 \geq 24$$

$$0 \leq x_1 \leq 5,\ 2 \leq x_2 \leq 4$$

2. (a) What are the slack, surplus and artificial variable? Explain with example. 2 × 3 = 6

   (b) Use Simplex method to solve the following problem 9

$$\text{Maximize } Z = 2x_1 + 5x_2$$

$$\text{Subject to } x_1 + 4x_2 \leq 24$$

$$3x_1 + x_2 \leq 21$$

$$x_1 + x_2 \leq 9$$

$$x_1 + x_2 \geq 0$$

3. (a) Define non-degenerate basic feasible solution for transportation problem. 3

(b) Find the optimum solution to the following transportation problem in which the cells contain the transportation cost in rupees. 12

	W_1	W_2	W_3	W_4	W_5	Available
F_1	7	6	4	5	9	40
F_2	8	5	6	7	8	30
F_3	6	8	9	6	5	20
F_4	5	7	7	8	6	10
Required	30	30	15	20	5	100 (total)

4. (a) Write the definition of Assignment problem. 2

(b) Solve the following assignment problem 13

	I	II	III	IV	V
1	11	17	8	16	20
2	9	7	12	6	15
3	13	16	15	12	16
4	21	24	17	28	26
5	14	10	12	11	13

5. (a) Construct the dual of the problem 5

Maximize $Z = 3x_1 + 10x_2 + 2x_3$

Subject to $2x_1 + 3x_2 + 2x_3 \le 7$

$3x_1 - 2x_2 + 4x_3 = 3$

$x_1, x_2, x_3 \ge 0$

(b) Solve by dual simplex method of the following problem 10

Maximize $Z = 2x_1 + 2x_2 + 4x_3$

Subject to $2x_1 + 3x_2 + 5x_3 \ge 2$

$3x_1 + x_2 + 7x_3 \le 3$

$x_1 + 4x_2 + 6x_3 \le 5$

$x_1, x_2 x_3 \ge 0$

6. Use Branch and Bound technique to solve the following problem 15

Maximize $Z = 7x_1 + 9x_2$

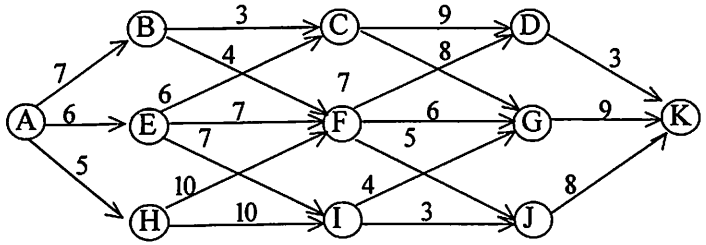
Subject to $-x_1 + 3x_2 \le 6$

$7x_1 + x_2 \le 35$

$0 \le x_1, \ x_2 \le 7$

x_1, x_2 are integus

7. Find the shortest path from vertex A to B along ares joining various vertices lying between A and B. Length of the path is given 15



8. A self-service store employs one cashier at its counter. Nine customers arrive on an average every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assuming poission distribution for arrival rate and

inponential distribution for service time, find

$3 \times 5 = 15$

1. Average number of customers in the system
2. Average number of customers in the queue
3. Average time a customers spends in the system.

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