

b) Use Big-M method, to solve the L.P.P:

Min. $z = -3x_1 + x_2$

Subject to $2x_1 + x_2 \geq 2$

$x_1 + 3x_2 \leq 2$

$x_2 \leq 4$

and $x_1, x_2 \geq 0$

7. a) Explain the concept of integer programming by a suitable example. Give any approach to solve an integer programming problem.

b) Find the optimum integer solution to the all integer programming problem:

Max. $z = x_1 + 2x_2$

Subject to $x_1 + x_2 \leq 7$

$2x_1 \leq 11$

$2x_2 \leq 7$

and $x_1, x_2 \geq 0$ are integers.

8. a) Define dual of a L.P.P. Find the dual of the following L.P.P.:

Min. $z = 2x_1 + 5x_3$

Subject to $x_1 + x_2 \geq 2$

$2x_1 + x_2 + 6x_3 \leq 6$

$x_1 - x_2 + 3x_3 = 4$

and $x_1, x_2, x_3 \geq 0$

b) Use Branch-and-Bound technique to solve the following integer programming problem:

Max. $z = 7x_1 + 9x_2$

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

$7x_1 + x_2 \leq 35$

$0 \leq x_1, x_2 \leq 7$

and x_1, x_2 are integers.

******

Roll No ....

MEIC - 104

M.E./M.Tech., I Semester

Examination, June 2016

Operation Research And Optimization

Time : Three Hours

Maximum Marks : 70

Note : i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) Solve the following L.P.P. by simplex method.

Max. $Z = 5x_1 + 3x_2$

Subject to $3x_1 + 5x_2 \leq 15$

$5x_1 + 2x_2 \leq 10$

$x_1, x_2 \geq 0$

b) Solve the following assignment problem.

Persons \ Jobs	J_1	J_2	J_3	J_4	J_5
A	10	5	15	25	8
B	7	10	21	32	5
C	9	18	7	16	25
D	3	5	6	8	10
E	30	40	6	3	2

2. a) State Bellman's principle of optimality and use it to solve the problem:

Max. $Z = x_1\, x_2\, x_3 \ldots x_n$

Subject to $x_1 + x_2 + \ldots\ldots + x_n = C$

and $x_1, x_2 \ldots\ldots x_n \geq 0$

b) A man is engaged in buying and selling identical items. He operates from a warehouse that can hold 500 items. Each month he can sell any quantity that he chooses upto the stock at the beginning of the month. Each month, he can buy as much as he wishes for delivery at the end of the month so long as his stock does not exceed 500 items. For the next four months, he has the following error-free forecasts of cost sales prices:

Month (i) :	1	2	3	4
Cost (C_i) :	27	24	26	28
Sale price (P_i) :	28	25	25	27

If he currently has a stock of 200 units, what quantities should he sell and buy in next four months? Find the solution using dynamic programming.

3. a) Solve the following linear programming problem by dynamic programming approach:

Max. $z = 2x_1 + 5x_2$

Subject to $2x_1 + x_2 \le 43$

$2x_2 \le 46$

and $x_1, x_2 \ge 0$

b) Solve the following transportation problem and find the optimal solution:

Destinations

Origin		D_1	D_2	D_3	D_4 Availability
O_1	5	2	4	3	22
O_2	4	8	1	6	15
O_3	4	6	7	5	8
Requirement	7	12	17	9	

4. a) Solve the following non-linear problem as a separate convex programming problem:

Minimize $z = (x_1 - 2)^2 + 4(x_2 - 6)^2$

Subject to $6x_1 + 3(x_2 + 1)^2 \le 12$

$x_1, x_2 \ge 0$

b) Solve graphically the problem:

Max. $z = 2x_1 + 3x_2$

Subject to $x_1^2 + x_2^2 \le 20$

$x_1 \cdot x_2 \le 8$

and $x_1, x_2 \ge 0$

Verify the Kuhn-Tucker conditions hold for the maxima you obtain.

5. a) Describe a quadratic programming problem and outline a method of solving it.

b) Apply wolfe's method for solving the quadratic programming problem:

Max. $z = 4x_1 + 6x_2 - 2x_1^2 - 2x_1x_2 - 2x_2^2$

Subject to $x_1 + 2x_2 \le 2$

and $x_1, x_2 \ge 0$

6. a) Solve the following quadratic programming problem by Beale's method:

Max. $z = 10x_1 + 25x_2 - 10x_1^2 - x_2^2 - 4x_1x_2$

Subject to $x_1 + 2x_2 + x_3 = 10$

$x_1 + x_2 + x_4 = 9$

and $x_1, x_2, x_3, x_4 \ge 0$