Program : M.A./M.Sc. (Mathematics)
M.A./M.Sc. (Final) Question Bank-2015
Paper Code:MT-10
Section-A (Very Short Answer type Questions)

1   If the line segment joining any two points of set S lies wholly in the set S . Then the set S is called.

Ans.   Convex Set

2   When does tow –Phase revised simple so method applicable?

Ans. When some artificial variables are involved in the given L.P.P.

3   In dynamic programming original problem is broken into --------------------

Ans.   Sub problems (stages)

4   What is convex separable programming problem?

Ans.   Conves programming problem in which all the functions are separable is called a convex separable programming problem.

5   Write down the quadrate form whose associated matrix is

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$

Ans. $x_1^2 + 2x_2^2 + 3x_3^2$

6   The following LPP is called

Max or Min $Z = CX$

$S.t. \quad Ax \le, = \ge b$

$\qquad l_j \le x_j \le u_j, \nabla j = 1,2,3 - n$

$and \quad x \le 0$

7   let the function F(x, λ) define as

$$F(x, \lambda) = \quad f(x) + \sum_{i=1}^{m} \lambda_j g_i(x)$$

$$= \quad f(x) + \lambda^T G(x)$$

Then the function F(x, λ) is called.

Ans.   Lagrangian function

8   The dual of the dual of the quadratic programming problem is the quadratie program it self – True or False?

Ans.   False

Section-B (Short Answer type Questions)

1. The optimal hyper plane in a L.P.P a supporting hyperplane to the convex set feasible solution.

Ans.   [Page no. 7 Theo. 1.5)

2. Solve the following I.P.P using revised simplex method.

$Max \quad z = 3x_1 + 2x_2 + 5x_3$

$S.t \quad x_1 + 2x_2 + x_3 \leq 430$

$\qquad 3x_1 - 2x_2 \leq -460$

$\qquad x_1 + 4x_2 \leq 420$

$\qquad x_1, x_2 x_3 \leq 0$

Ans. (Page no 48, Ques. 2)

3. Solve the following I.P.P.

$Max \quad z = 2x_1 + x_2$

$S.t \quad -3x_1 + 7x_2 \leq 14$

$\qquad 7x_1 - 3x_2 \leq 14$

$\qquad x_1, x_2 x_3 \geq 0$

Ans. (Page no. 93, Que. 1)

4 Use Branch and Bound method to solve the following integer liner programming problems.

$Max \quad z = 2x_1 + 3x_2$

$S.t \quad 5x_1 + 7x_2 \leq 35$

$\qquad 4x_1 - 9x_2 \leq 36$

$\qquad x_1, x_2 x_3 \geq 0 \, and \, are \, inligers$

5 A positive quantity b is be divided into n parts in such a way that the product of the n parts in to be maximum use Lagrange multipler technique to obtain the optimal subdivision.

Ans. (page no 130, Example-14)

6 Use lagrangian multiplier method to solve the following nonlinear programming problem

$Maximize\ f(x) = 2x_1^2 + 2x_2^2 + 2x_3^2 - 24x_1 - 8x_2 - 12x_3 + 10$

$S.t \qquad x_1 + x_2 + x_3 = 11$

$\qquad\qquad x_1, x_2 x_3 \geq 0$

Ans. (page no. 153, Exam 6)

7 Solve the following L.P.P. Using dynamic programming.

$Max. \qquad z = 2x_1 + 3x_2$

$S.t \qquad x_1 - x_2 \leq 1$

$\qquad\qquad x_1 + x_2 \geq 0$

Ans. (page no. 264, Ques.2)

8 To prove every local maximum of the general convex programming problem is its global maximum.

Ans. (page no. 237, Theo.1)

Section-C(Long Answer type Questions)

1 (a) Solve the following quadratic programming problem using Wolfe's method

$Max. f(x_1, x_2) = 2x_1^2 - x_1 x_2 + 2x_2^2 - x_1 - x_2$

$S.t \qquad 2x_1 + x_2 \leq 1$

$\qquad\qquad x_1, x_2 \geq 0$

Ans. (page no. 196, Example -3)

(b) Solve the following programming problem graphically and verify the kishn-Ticker conditions for the same.

$Max. f(x_1, x_2) = 2x_1 - 3x_2$

$S.t \qquad x_1^2 + x_2^2 \leq 20$

$\qquad\qquad x_1 x_2 = 8$

$\qquad\qquad x_1, x_2 \geq 0$

2(a) Solve the following nonlinear programming problem graphically:

$Max. f(x_1, x_2) = 8x_1 - 8x_2 - x_1^2 - x_2^2$

$S.t \qquad x_1 + x_2 \leq 12$

$\qquad\qquad x_1 - x_2 \geq 4$

$\qquad\qquad x_1, x_2 \geq 0$

2 (a) A manufacturing concern produces a product consisting of two raw materials ray A_1, and A_2. The production function is estimated as

$$z = f(x_1, x_2) = 3.6x_1 - 0.4x_1^2 + 6x_2 - 0.2x_2^2$$

Where z represents the quantity (in tons) of the product produced and x_1 and x_2 designate the input amounts of raw materials A_1, and A_2. The company has Rs. 50,000 to spend on there two raw materials. The unit price of A, is Rs. 10000 and A_2. is Rs. 5000. Determine how decided so as to maximize the A_1, and A_2. be decided so as to maximize the production output.

Ans. (page no. 131. Ex. 15)

3 Determine the properties of sign definiteness for the following quadratic form

$$z = x_2^1 - 4x_1x_2 + 6x_1x_3 + 5x_2^2 + 10x_2x_3 + 8x_2^3$$

Ans. (page no. 118 Example 8)

4 (a) Branch and Bound Method to solve the following integer linear programming problems.

$$\begin{aligned}
&\textit{Minimize} && Z = 10x_1 + 9x_2 \\
&\textit{S.t.} && x_1 \le 8, x_2 \le 10 \\
& && 5x_1 + 3x_2 \ge 45 \\
& && x_1, x_2 \ge 0 \text{ and } x_1 \text{ is integer}
\end{aligned}$$

Ans. (page No 112 Q.7)

(b) A manufactures of baby-doll maker two types of dolls, doll x and doll y processing of these two dolls is done on two machines, A and B, Doll x requires tow hours on machine A and B house on machine B. Doll y requires 5 hours on machine A and also five hours on machine B. There are sixteen hours of time per day available on machine A and thirty hours on machine B. The profit gained on both the dolls is same, i.e. one rupee per doll. What should be the daily production of the two dolls for maximum profit?

(a) Set up and solve the I.P.P/

(b) If the optimum solution is not integer valued, use the gomory's technique to derive the optimal solution.

Ans. (page no. Exam. 4)