

DEPT. OF MATHEMATICS
JHARGRAM RAJ COLLEGE
B.Sc(H) Sem – V , INTERNAL ASSESSMENT-1st , 2019-20
Sub: MATHEMATICS, Course – DSE1

Full Marks: 10

Time: 30 m.

Answer any five questions:

(2 × 5 = 10)

1. A manufacturer makes red and blue pens. A red pen takes twice as much time as to make a blue pen. If the manufacturer makes only blue pens, 500 can be made in a day. A red pen sells for Rs 8/- and at most 150 can be sold in a day. A blue pen sells for Rs 5/- and at most 250 can be sold in a day. The manufacturer desires to maximize his profit. Formulate the problem as linear programming problem.
2. Define convex set with an example.
3. Prove that a hyper plane is a convex set.
4. Prove that intersection of any number of convex sets is also a convex set.
5. Find the extreme points of the convex set determined by the following system of equations
$$2x + 3y \leq 6 ; x + y \geq 1 , x, y \geq 0.$$
6. Show that the set $X = \{(x, y): x \leq 5, y \geq 3\}$ is a convex set.
7. Find the extreme points of the feasible space of the following LPP by graphical method.
Maximize $Z = x_1 + 2x_2$
Subject to $x_1 + x_2 \leq 2 ; x_1 - x_2 \geq 1 , x_1, x_2 \geq 0.$
8. Find the maximum value of the objective function of the LPP by graphical method
Maximize $Z = 10x_1 + 15x_2$
Subject to $x_1 + x_2 \geq 2 ; 3x_1 + 2x_2 \leq 6 , x_1, x_2 \geq 0.$

DEPT. OF MATHEMATICS
JHARGRAM RAJ COLLEGE
B.Sc(H) Sem – V , INTERNAL ASSESSMENT-2nd , 2019-20
Sub: MATHEMATICS, Course – DSE1

Full Marks: 10

Time: 30 m.

Answer any five questions:

(2 × 5 = 10)

1. What are the characteristics of the standard form of a linear programming problem?
2. Define slack variable with an example.
3. Define surplus variable with an example.
4. Solve graphically the following LPP
Maximize: $Z = x - 3y$
Subject to: $5x + y = 30$; $4x + 3y \geq 12$; $y \leq 5, x, y \geq 0$.
5. Solve the following LPP graphically
Maximize: $Z = 2x_1 + x_2$
Subject to: $4x_1 + 3x_2 \leq 12$; $4x_1 + x_2 \leq 8, x_1, x_2 \geq 0$.
6. What is redundant constraint? Give an example.
7. Show that $\{X = (x, y): |x| \leq 2\}$ is a convex set.
8. Show that $x_1 = 5$; $x_2 = 0$; $x_3 = -1$ is a basic solution of the system of equations
 $x_1 + 2x_2 + x_3 = 4$ & $2x_1 + x_2 + 5x_3 = 5$.