CHAPTER 12

LINEAR PROGRAMMING PROBLEMS

SAY 2018

1. The manufacturer produces nuts and bolts. The time required to produce one packet of nuts and one packet of bolts on machines A and B is given in the following table:

	Machine A	Machine B
Nuts (1 packet)	2 Hours	3 Hours
Bolts (1 packet)	3 Hours	1 Hour

He earns a profit of Rs.25 per packet of nuts and Rs 12 per packet of bolts. He operates his machines for almost 15 hours a day. Formulate a linear programming problem to maximize his profit. (3)

2. Solve the L.P.P given below graphically: (4)
Maximise $Z = 3x + 5y$ subject to the constraints
$x + 3y \le 3$
$x + y \le 2$
$x, y \ge 0$

MARCH 2018

3. A manufacture produces nuts and bolts. It takes 1 hour of work on machine A and 3 hours on Machine B to produce a package of nuts. It take 3 hours on machine A and 1 hour on machine B to produce a package of bolts. He earns a profit of Rs. 17.50 per package on nuts and Rs.7 per package on bolts. Formulate the above L.P.P, if the machines operates for at most 12 hours a day. (3)

4. Solve the linear programming problem graphically. Minimise $Z = -3x + 4y$.
Subject to the constraints
$x + 2y \le 8$
$3x + 2y \le 12$ (4)
$x \ge 0,\ y \ge 0$

SAY 2017

5. Consider the linear programming problem.
Maximize $z = x + y$ subject to the constraints
$x - y \le -1;\ -2x + y \ge 0\ ;x, y \ge 0$

a) Find the feasible region (3)

b) Find the corner points of the feasible region. (2)

c) Find the maximum point. (1)

MARCH 2017

6. Consider the line programming problems:
Maximize $Z = 50x + 40y$ subject to the constraints
$x + 2y \ge 10,\ 3x + 4y \le 24\ \ x \ge 0, y \ge 0$

a) Find the feasible region. (3)

b) Find the corner points of the feasible region. (2)

c) Find the maximum value of Z. (1)

SAY 2016

7. Consider the following L.P.P., Maximise, $Z = 3x + 9y$
Subject to the constraints:
$x + 3y \le 60,\ x + y \ge 10,\ x \le y,\ x \ge 0, y \ge 0$

a) Draw its feasible region. (3)

b) Find the corner points of the feasible region. (3)

MARCH 2016

8. Consider the following L.P.P. Maximize $Z = 3x + 2y$ subject to the constraints:
$x + 2y \le 10$
$3x + y \le 15$
$x, y \ge 0$

a) Draw its feasible region. (3)

b) Find the corner points of the feasible region. (2)

c) Find the maximum value of Z. (1)

SAY 2015

9. Consider the linear programming problem: Maximize $Z = 4x + y$ subject to the constraints:

$x + y \le 50$

$3x + y \ge 90$

$x \ge 0, y \ge 0$

a) Draw its feasible region (3)

b) Find the corner points of the feasible region. (2)

c) Find the corner at which Z attains its maximum. (1)

MARCH 2015

10. Consider the linear inequalities

$2x + 3y \le 6, 2x + y \le 4, x \ge 0, y \ge 0$

a) Mark the feasible region. (2)

b) Maximise the function $z = 4x + 5y$ subject to the given constraints. (2)

11. In a factory there are two machines A and B producing toys. They respectively produce 60 and 80 units in one hour. A can run a maximum of 10 hours and B a maximum of 7 hours a day. The cost of their running per hour respectively amounts to 2000 and 2500 rupees. The total duration of working these machines cannot exceed 12 hours a day. If the cost cannot exceed Rs 25000 per day and the total daily production is at least 800 units, then formulate the problem mathematically. (2)

JUNE 2014

12. Consider the linear programming problem: Minimise $Z = -3x + 4y$ subject to

$x + 2y \le 8$

$3x + 2y \le 12$

$x \ge 0, y \ge 0.$

a) Mark its feasible region. (3)

b) Find the corner points of the feasible region. (2)

c) Find the corner at which Z attains its minimum. (1)

MARCH 2014

13. Consider the linear programming problem: Maximize $Z = 3x + 9y$ subject to the constraints:

$x + 3y \le 60$

$x + y \ge 10$

$x < y$

$x \ge 0, y \ge 0$

a) Draw its feasible region (3)

b) Find the vertices of the feasible region. (2)

c) Find the minimum value of Z subject to the given constraints. (1)

SAY 2013

14. A bakery owner makes two types of cakes A and B. Three machines are needed for this purpose. The time (in minutes) required for making each type of cake in each machine is given below:

Machine	Types of cakes	
	A	B
I	12	6
II	18	0
III	6	9

Each machine is available for atmost 6 hours per day. Assume that all cakes will be sold out every day. The bakery owner wants to make maximum profit per day by making Rs. 7.5 from type A and Rs. 5 from type B.

a) Write the objective functions using suitable variables. (1)

b) Write the constraints. (2)

c) Find the maximum profit graphically. (3)

MARCH 2013

15. Consider the linear programming problem: Maximise $Z = 5x + 3y$ subject to

$3x + 5y \le 15,\ 5x + 2y \le 10,\ x \ge 0, y \ge 0$

a) Draw its feasible region. (3)

b) Find the corner points of the feasible region. (2)
c) Find the corner at which z attains its maximum. (1)

SAY 2012

16. Consider the following LPP: Minimize $Z = 200x + 500y$, subject to:
$x + 2y \geq 10, 3x + 4y \leq 24, x, y \geq 0$
i) Draw the feasible region. (3)
ii) Find the co-ordinates of the corner points of the feasible region. (1)
iii) Solve the L.P.P (2)

MARCH 2012

17. Consider the linear programming problem: maximize $Z = x + y$ subject to
$2x + y - 3 \geq 0$
$x - 2y + 1 \leq 0$
$y \leq 3$
$x \geq 0, y \geq 0$
a) Draw its feasible region. (3)
b) Find the corner points of the feasible region. (2)
c) Find the corner at which Z attains its maximum. (1)

SAY 2011

18. A manufacture produces nuts and bolts. It takes 1 hour of work on machine A and 3 hours on machine B to produce a package of nuts. It takes 3 hours on machine B to produce a package of bolts. He earns a profit of Rs 17.50 per package on nuts and Rs 7.00 per package on bolts. How many packages of each should be produced each day so as to maximize his profit, if he operates his machines for at the most 12 hours a day?
a) By suitably defining the variables write the objective function of the problem. (1)
b) Formulate the problem as a Linear Programming problem (L.P.P). (2)
c) Solve the problem by graphical method and find the number of packages of nuts and bolts to be manufactured. (3)

MARCH 2011

19. The graph of a linear programming problem is given below. The shaded region is the feasible region. The objective function is
$Max.\ Z = px + qy$
a) What are the co-ordinates of the corners of feasible region? (1)
b) Write the constraints. (1)
c) If the Max.Z occurs at A and B, what is the relation between p and q? (2)
d) If $q = 1$, write the objective function. (1)
e) Find the Max. Z. (1)

SAY 2010

20. A company produces two types of cricket balls A and B. The production time of one ball of type B is double the type A (time in units). The company has the time to produce a maximum of 2000 balls per day. The supply of raw material is sufficient for the production of 1500 balls (both A and B) per day. The company wants to make maximum profit by making profit of Rs. 3 from a ball of type A and Rs. 5 from a ball of type B. Then
a) By defining suitable variables, write the objective function. (1)
b) Write the constraints. (2)
c) How many balls should be produced in each type per day in order to get maximum profit? (3)