

TOPIC: “LINEAR PROGRAMMING”

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1 Food X contains 6 units of vitamin A and 7 units of vitamin B per gram and costs Rs . 12 per gram . Food Y contains 8 units Of vitamin A and 12 units of vitamin B per gram and costs Rs 20 per gram The daily minimum requirements of vitamin A and vitamin B are 100 units and 120 units respectively .

Formulate the above L.P.P. to minimize the cost.

2. A company manufactures two types of show pieces A and B made up of plywood . showpiece of types A requires 5 minutes for cutting and 10 minutes for assembling showpiece of types B needs 8 minutes for cutting and 8 minutes for assembling there are 3 hours and 20 minutes available for cutting and 4 hours for assembling . the profit is Rs.5 for each piece of types A and Rs. 6 for each piece of type B Formulate this problem as a L.P.P to maximize the profit .

3. A farmer wants to make sure that his herd gets the minimum daily requirements of three basic nutrients A ,B and C,,Daily requirement are 15 units of nutrient A, 20 unites of B and 30 unites of C one gram of product p has 3 unites of nutrient A, 2 unites of B and 2 unites of C one gram of product Q has 1 unites of A,2 unites of B and 4 unites of C, the cost of product P is Rs 5 per gram and cost of product Q is Rs 4 per gram. Formulate this problem as L.P.P to minimize the total cost .

4. A diet of a sick person must contain at least 48 units of vitamin A and 64 units of vitamin B two foods F_1 and F_2 are available food F_1 costs Rs. 6 per unit and food F_2 costs Rs 10 per unit one unit of good F_1 contains 6 unit of vitamin A and 7 units of vitamin B, one unit of good F_2 contains 8 units of vitamin A and 12 unite of vitamin B find the minimum costs for the diet that consists Of mixture of these two foods and also meeting the minimal nutritional requirements .

5. A diet is to contain at 80 units of vitamin A and 100 unit of minerals Two foods F_1 and F_2 are available F_1 and F_2 are available .food F_1 cost Rs. 4 per gram and food F_2 cost Rs.5 per gram .one gram of food F_1 contains minimum 3 units of vitamin A and 4 units of minerals one gram of food F_2 contains minimum 6 units of vitamin A and 3 units of minerals .Formulate this as L.P.P to minimize the cost of diet .

6. A toy manufacturing firm produces toys T_1 and T_2 each of which must be processed through two machines M_1 and M_2 .the maximum availability of machines M_1 and M_2 per day are 14 hours and 20 hours respectively . manufacturing to toy T_1 requires 5 hours on machine M_1 and 3 hours machine m_2 whereas toy t_2 requires 4 hours on machine m_1 and 6 hours On machine m_2 .if the profit on manufacturing of toy T_1 is Rs.50 and profit on manufacturing of toy T_2 is Rs.70, formulate this problem as L.P.P. in order to maximize the profit.

7. An aeroplane can carry a maximum load of 200 passengers Baggage allowed to the first class ticket holder is 30kg and for the economy class ticket holder is 20 kg Maximum capacity of the aero plane to carry the baggage is 4500kg the profit on Each first class ticket is Rs. 300 and each economy class passenger Rs.150. Formulate the problem ,as L.P.P to maximize the profit .

8. Cipla manufactures two brands of drugs D_1 and D_2 in capsule form which when taken together give immediate relief from Asthma .capsule D_1 contains 2 units and 5 units of compounds A and B respectively . capsule D_2 contains 1 units and 8 units of compounds A and B respectively it is found that at least 12 units of compound A and at least 74 units of compound B are required to get immediate number of capsules.

9. A dealer wishes to purchase a number of fans and sewing machines. He has only Rs5,760 to invest and has space for 20 items only A fan costs Rs.360 and a sewing machine costs Rs 240 His expectation is that he can sell a fan at a profit of Rs.22 & a sewing machine at a profit of Rs.18 . Assuming that he can sell all items that he can buy formulate this problem as a L.L.P to maximize his profit .

10. Two food products A and B are to be purchased their contents and price per unit are given in the following Table

product	A	B
Calories	2	3
Vitamins	2	1
Price	3	4

Minimum requirements of calories and vitamins are 36 and 14 units respectively .Formulate this problem as a L.P.P to Minimize the cost.

11. A company manufactures two products. The basic time data machine capacity and profit contribution are given in the following table:

Machines	Product A	Product B	Hours available per week
Lathes	1	1	80
Milling	1	2	120
Profit in Rs	6	8	

Formulate the above L.P. P to maximize the profit .

12. Obtain the feasible region of the constraints $2x + 3y \leq 6, x + y \geq 1, x \geq 0, y \geq 0$

13. Solve the following L.P.P graphically Maximize $Z = 10x + 25y$

Subject to $x \leq 3, y \leq 3, x + y \leq 5, x \geq 0, y \geq 0$

14. Solve the following L.L.P graphically Maximize $Z = 6x + 2y$

Subject to $5x + 9y \leq 90, x + y \geq 4, y \leq 8, x \geq 0, y \geq 0$

15. Draw a graph of the following inequalities $2x + 2y \geq 12$, $5x + y \geq 10$; $x + 4y \geq 12$, $x \geq 0$, $y \geq 0$

State only the vertices of the feasible region .

16. Draw the graph and state only the vertices of the feasible region for the following inequalities

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$$x + y \leq 4, x - y \leq 2, x \geq 0, y \geq 0.$$

17. Maximize $Z = 6x + 4y$; Subject to $3x + 2y \geq 12$, $x + y \geq 5$, $0 \leq x \leq 4$, $0 \leq y \leq 4$

18. Solve the following L.L.P by using graphical method Maximize $Z = 6x + 4y$

Subject to $x \leq 2$, $x + y \leq 3$, $-2x + y \leq 1$, $x \geq 0$, $y \geq 0$ also find maximum value of Z .

19. Draw the graph and state only the vertices of feasible region of the following inequalities .

$$3x + 5y \leq 15, 5x + 2y \leq 10, x \geq 0, y \geq 0$$

20. write the following L.P.P in standard form for the simplex method Maximize $Z = 4x_1 + 6x_2$

subject to $x_1 + 3x_2 \leq 240$, $3x_1 + 4x_2 \leq 370$

$$2x_1 + x_2 \leq 180$$

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

21. Solve the following L.P.P graphically $Z = 6x + 7y$;

Subject to $x + 3y \geq 3$, $2x + y \geq 2$, $x \geq 0$, $y \geq 0$

22. Solve : Maximize $Z = 9x + 13y$; Subject to $2x + 3y \leq 18$

$2x + y \leq 10$ & $x \geq 0$, $y \geq 0$ with the help of the following graph .

23. Solve with the help of the following graph . Minimize : $Z = 100x + 70y$

$$2x \geq 0, y \leq 3, x + y \leq 8, x \geq 0 \text{ and } y \geq 0$$