1. Question

A small manufacturing firm produces two types of gadgets A and B, which are first processed in the foundry, then sent to the machine shop for finishing. The number of man - hours of labour required in each shop for the production of each unit of A and B, and the number of man - hours the firm has available per week are as follows:

Gadget	Foundry	Machine - shop
A	10	5
B	6	4
Firm's capacity per week	1000	600

The profit on the sale of A is Rs 30 per unit as compared with ₹ 20 per unit of B. The problem is to determine the weekly production of gadgets A and B, so that the total profit is maximized. Formulate this problem as a LPP.

2. Question

Solve each of the following linear programming problems by graphical method.

Maximize $Z = 9x + 3y$

Subject to :

$2x + 3y \leq 13$

$3x + y \leq 5$

$x, y \geq 0$

3. Question

To maintain one's health, a person must fulfill certain minimum daily requirement for the following three nutrients : calcium, protein and calories. The diet consists of only items I and II whose prices and nutrient contents are shown below :

	Food I	Food II	Minimum daily requirement
Calcium	10	4	20
Protein	5	6	20
Calories	2	6	12
Price	₹0.60 per unit	₹1.00 per unit	

4. Question

A hospital dietician wishes to find the cheapest combination of two foods, A and B, that contains at least 0.5 milligram of thiamine and at least 600 calories. Each unit of A contains 0.12 milligram of thiamine and 100 calories, while each unit of B contains 0.10 milligram of thiamine and 150 calories. If each food costs 10 paise per unit, how many units of each should be combined at a minimum cost?

5. Question

The maximum value of $Z = 4x + 2y$ subjected to the constraints $2x + 3y \leq 18$, $x + y \geq 10$; $x, y \geq 0$ is

A. 36

B. 40

C. 20

D. none of these

6. Question

A company sells two different products A and B. The two products are produced in a common production process and are sold in two different markets. The production process has a total capacity of 45000 man - hours. It takes 5 hours to produce a unit of A and B hours to produce a unit of B. The market has been surveyed and company officials feel that the maximum number of units of A that can be sold is 7000 and that of B is 10, 000. If the profit is Rs 60 per unit for the product A and Rs 40 per unit for the product B, how many units of each product should be sold to maximize profit? Formulate the problem as LPP.

7. Question

Solve each of the following linear programming problems by graphical method.

Maximize $Z = 10x + 6y$

Subject to :

$2x + 5y \leq 34$

$3x + y \leq 12$

$x, y \geq 0$

8. Question

A factory owner purchases two types of machines, A and B, for his factory. The requirements and limitations for the machines are as follows :

	Area occupied by the machine	Labour force for each machine	Daily output in units
Machine A	1000 sq. m	12 men	60
Machine B	1200 sq. m	8 men	40

He has an area of 7600 sq.m available and 72 skilled men who can operate the machines. How many machines of each type should he buy to maximize the daily output?

9. Question

A company produces two types of goods, A and B, that require gold and silver. Each unit of type A requires 3 gm of silver and 1 gm of gold while that of type B requires 1 gm of silver and 2 gm of gold. The company can produce 9 gm of silver and 8 gm of gold. If each unit of type A brings a profit of ₹ 40 and that of type B ₹ 50, find the number of units of each type that the company should produce to maximize the profit. What is the maximum profit?

10. Question

An automobile manufacturer makes automobiles and trucks in a factory that is divided into two shops. Shop A, which performs the basic assembly operation, must work 5 man - days on each truck but only 2 man - days on each automobile. Shop B which performs finishing operations, must work 3 man - days for each automobile or truck that it produces. Because of men and machine limitations, shop A has 180 man - days per week available while shop B has 135 man - days per week. If the manufacturer makes a profit of Rs 30000 on each truck and Rs 2000 on each automobile, how many of each should he produce to maximize his profit? Formulate this as a LPP.

11. Question

Two tailors A and B earn Rs 150 and Rs 200 per day respectively. A can stitch 6 shirts and 4 pants per day while B can stitch 10 shirts and 4 pants per day. Form a linear programming problem to minimize the labour cost to produce at least 60 shirts and 32 pants.

12. Question

Solve each of the following linear programming problems by graphical method.

Minimize $Z = 30x + 20y$

Subject to :

$x + y \leq 8$

$x + 4y \geq 12$

$5x + 8y = 20$

$x, y \geq 0$

13. Question

A firm manufacturing two type of electric items, A and B, can make a profit of 20 per unit of A and ₹ 30 per unit of B. Each unit of A requires 3 motors and 4 transformers and each unit of B requires 2 motors and 4 transformers. The total supply of these per month is restricted to 210 motors and 300 transformers. Type B is an export model requiring a voltage stabilizer which has a supply restricted to 65 units per month. Formulate the linear programming problem for maximum profit and solve it graphically.

14. Question

A factory uses three different resources for the manufacture of two different products,20 units of the resources a, 12 units of B and 16 units of C being available 1 unit of the first product requires 2,2 and 4 units of the respective resources and 1 unit of the second product requires 4,2 and 0 units of respective resources. It is known that the first product gives a profit of 2 monetary units per unit and the second 3. Formulate the linear programming problem. How many units of each product should be manufactured for maximizing the profit? Solve it graphically.

15. Question

The point at which the maximum value of $x + y$, subject to the constraints $x + 2y \leq 70$, $2x + y \leq 95$, $x, y \geq 0$ is obtained, is

A. (30, 25)

B. (20, 35)

C. (35, 20)

D. (40, 15)

16. Question

A firm manufactures two products, each of which must be processed through two departments, 1 and 2. The hourly requirements per unit for each product in each department, the weekly capacities in each department, selling price per unit, labour cost per unit, and raw material cost per unit are summarized as follows :

	Product A	Product B	Weekly capacity
Department 1	3	2	130
Department 2	4	6	260
Selling price per unit	Rs. 25	Rs. 30	
Labour cost per unit	Rs. 16	Rs. 20	
Raw material cost per unit	Rs. 4	Rs. 4	

The problem is to determine the number of units to produce each product so as to maximize total contribution to profit. Formulate this as a LPP.

17. Question

Solve each of the following linear programming problems by graphical method.

Maximize $Z = 2x + 3y$

Subject to :

$x + y \geq 1$

$10x + y \geq 5$

$x + 10y \geq 1$

$x, y \geq 0$

18. Question

Solve each of the following linear programming problems by graphical method.

Maximize $Z = - x_1 + 2x_2$

Subject to :

$- x_1 + 3x_2 \leq 10$

$x_1 + x_2 \leq 6$

$x_1 - x_2 \leq 2$

$x_1, x_2 \geq 0$

19. Question

A manufacturer makes two products A and B. Product A sells at 200 each and takes 1/2 hour to make. Product A sells at ₹ 300 each and takes 1 hours to make. There is a permanent order for 14 of product A and 16 of product B. A working week consists of 40 hours of production and weekly turnover must not be less than Rs 10000. If the profit on each of product A is ₹ 20 and on product B is Rs 30, then how many of each should be produced so that the profit is maximum. Also, find the maximum profit.

20. Question

A manufacturer produces two type of steel trunks. He has two machines A and B. For completing, the first types of the trunk requires 3 hours on machine A and 3 hours on machine B, whereas the second type of the trunk requires 3 hours on machine A and 2 hours on machine B . Machines A and B can work at most for 18 hours and 15 hours per day respectively. He earns a profit of Rs 30 and Rs 25 per trunk of the first type and the second type respectively. How many trunks of each type musthe make each day to make maximum profit?

21. Question

Solve each of the following linear programming problems by graphical method.

Maximize $Z = 3x + 4y$

Subject to :

$x - y \leq 1$

$x + y \geq 3$

$x, y \geq 0$

22. Question

Solve each of the following linear programming problems by graphical method.

Show the solution zone of the following inequalities on a graph paper:

$5x + y \geq 10$

$x + y \geq 6$

$x + 4y \geq 12$

$x \geq 0, y \geq 0$

Find x and y for which $3x + 2y$ is minimum subject to these inequalities. Use a graphical method.