

# LINEAR PROGRAMMING PROBLEM

11

Marks	4	5	Total Marks
No. of Questions	1(S)	1(S)	9
(or)	–	1	5

## 4 MARK QUESTIONS

(Skill)

- There are two types of fertilisers  $F_1$  and  $F_2$ .  $F_1$  consists of 10% nitrogen and 6% phosphoric acid and  $F_2$  consists of 5% nitrogen and 10% phosphoric acid. After testing the soil conditions, a farmer Vaidhya finds that he needs atleast 14kg of nitrogen and 14kg of phosphoric acid for the crop. If  $F_1$  costs ₹6 per kg and  $F_2$  costs ₹5 per kg, how should the fertilizers be used so that nutrient requirements are met at a minimum cost. Formulate the LPP.
- A diet must contain at least 4,000 units of vitamins, 50 units of minerals & 1400 calories. Two foods A and B are available at a cost of ₹5 and ₹4 per unit respectively. If one unit of A contains 200 unit of vitamin, 1 unit of mineral and 40 calories and one unit of food B contains 100 units of vitamins, 2 units of minerals and 40 calories, what combination of foods must be used to have minimum cost. formulate the LPP.
- A company produces two products P and Q. Each P requires 4 hours of grinding and 2 hours of polishing and each Q requires 2 hours of grinding and 5 hours of polishing. The total available hours for grinding is 20 and for polishing is 24. profit per unit of P is ₹6 and that of Q is ₹8. Formulate the LPP so as to maximise the total profit.
- A dietician wishes to mix two types of food F1 and F2 in such a way that the vitamin contents of the mixture contains atleast 6 units of vitamin A and 8 units of vitamin B. Food F1 contains 2 units/kg of vitamin A and 3 units / kg of vitamin B while food F2 contains 3 units/ kg of vitamin A and 4 units/kg of vitamin B. Food F1 costs ₹50 per kg and food F2 costs ₹75 per kg. Formulate the L.P.P to minimise the cost of the mixture.
- Pratheek wants to decide the constitution of diet which will fulfil his daily requirements of proteins, fats and carbohydrates at minimum cost. The combination is made among 2 food products A and B whose contents are indicated below:

Food	A	B	Minimum requirements
Proteins (mg)	5	2	800 Units
Fats (mg)	6	5	200 Units
Carbohydrates (mg)	4	3	700 Units
Cost / Unit in ₹	70	50	

Formulate the LPP to minimise the cost.

**QUESTION BANK****II PUC**

6. A pesticide company must produce 200 kg mixture consisting of chemicals A and B. Cost of A is 3/kg and that of B is 8/kg. Maximum 80 kg of chemical A and atleast 60 kg of chemical B should be used. Formulate the LPP to minimise the cost of the mixture.
7. A firm manufactures 2 types of products A and B and sell them at a profit of 2 on type A and 3 on type B. Each product is processed on machines M1 and M2. Type A requires one minute of processing time on M1 and two minutes on M2. Type B requires one minute of time on M1 and one minute on M2. The machine M1 is available for not more than 6 hours 40 minutes while M2 is available for 10 hours during any working day. Formulate the LPP in order to find how many products of each type should the firm produce each day so that profit is maximum.
8. A cooperative society of farmers has 50 hectares of land to grow two crops  $x$  and  $y$ . The profits from each of the two types of crops per hectare are estimated as 10,500 and 9,000 respectively. To control weeds, a liquid herbicide has to be used for crops  $x$  and  $y$  at the rate of 20 litres and 10 litres per hectare. Further, not more than 800 litres of herbicide should be used in order to protect fish and wild life wing a pond which collects drainage from this land. How much land should be allocated to each crop so as to maximise the total profit of the society? formulate the LPP.

**5 MARK QUESTIONS****(Skill)**

Solve the following LPP graphically:

1. Maximise  $z = 60x + 15y$

Subject to the constraints  $x + y \leq 50$   
 $3x + y \leq 90$   
and  $x \geq 0, y \geq 0$

2. Solve the LPP graphically

Maximise  $z = 5x + 3y$   
Subject to the constraints  $3x + 5y \leq 15,$   
 $5x + 2y \leq 10$   
and  $x \geq 0, y \geq 0.$

3. Solve the LPP graphically

Maximise  $z = 0.08x + 0.10y$   
Subject to the constraints  $x + y \leq 12,000,$   
 $x \leq 2,000,$   
 $y \geq 4,000,$   
and  $x \geq 0, y \geq 0.$

## BASIC MATHEMATICS

4. Solve the LPP graphically

Maximise  $z = 20x + 50y$

Subject to the constraints:

$$0.2x + 0.4y \leq 160,$$

$$x \leq 400,$$

$$y \leq 300,$$

and

$$x \geq 0, \quad y \geq 0.$$

5. Solve the LPP graphically

Maximise  $z = 6x + 8y$

Subject to the constraints:

$$4x + 2y \leq 20,$$

$$2x + 5y \leq 24,$$

and

$$x \geq 0, \quad y \geq 0.$$

6. Solve the LPP graphically

Minimise  $z = 3x + 5y$

Subject to the constraints:

$$x + 3y \geq 3,$$

$$x + y \geq 2,$$

and

$$x, y \geq 0.$$

7. Solve the LPP graphically

Minimise  $z = 6x + 5y$

Subject to the constraints:

$$2x + y \geq 280,$$

$$3x + 5y \geq 700,$$

and

$$x \geq 0, \quad y \geq 0.$$

8. Solve the LPP graphically

Minimise  $z = 20x + 16y$

Subject to the constraints:

$$6x + 2y \geq 12,$$

$$2x + 2y \geq 8,$$

and

$$x, y \geq 0.$$

9. Solve the LPP graphically

Minimise  $z = 5x + 4y$

Subject to

$$200x + 100y \geq 4,000$$

$$40x + 40y \geq 1400,$$

$$x + 2y \geq 50,$$

and

$$x, y \geq 0.$$

**QUESTION BANK****II PUC**

10. Solve the LPP graphically

$$\text{Minimise } z = 8x + 5y$$

Subject to to the constraints:

$$2x + y \geq 8,$$

$$6x + y \geq 12,$$

$$x + 3y \geq 9,$$

and

$$x \geq 0, \quad y \geq 0.$$

11. Solve the LPP graphically

$$\text{Minimise } z = 200x + 400y$$

Subject to to the constraints:

$$x + y \geq 200,$$

$$x + 3y \geq 400,$$

$$x + 2y \leq 350,$$

and

$$x \geq 0, \quad y \geq 0.$$

12. Solve the LPP graphically

$$\text{Maximise } z = 120x + 80y$$

Subject to to the constraints:

$$2x + y \leq 6,$$

$$7x + 8y \leq 28,$$

and

$$x \geq 0, \quad y \geq 0.$$

13. Solve the LPP graphically

$$\text{Maximise } z = 0.5x - 0.1y$$

Subject to to the constraints:

$$2x + 5y \leq 80,$$

$$x + y \leq 20,$$

and

$$x \geq 0, \quad y \geq 0.$$

14. Solve the LPP graphically

$$\text{Minimise } z = 1.5x + 2.5y$$

Subject to to the constraints:

$$x + 3y \geq 3,$$

$$x + y \geq 2,$$

and

$$x \geq 0, \quad y \geq 0.$$

\*\*\*\*