

ASSIGNMENT CLASS XII LINEAR PROGRAMMING

1. A diet for a sick person must contain at least 4000 units of vitamins, 50 units of minerals and 1400 units of calories. Two foods A and B are available at the cost of Rs 5 and Rs 4 per unit respectively. One unit of the food A contains 200 units of vitamins, 1 unit of minerals and 40 units of calories, while one unit of food B contains 100 units of vitamins, 2 units of minerals and 40 units of calories. Find what combination of the foods A and B should be used to have least cost.

2. Every gram of wheat provides 0.1 gm of proteins and 0.25 gm of carbohydrates. The corresponding values for rice are 0.05 gm and 0.5 gm respectively. Wheat costs Rs. 4 per kg and rice Rs. 6 per kg. The minimum daily requirements of proteins and carbohydrates for an average child are 50 gms and 200 gms respectively. In what quantities should wheat and rice be mixed in the daily diet to provide minimum daily requirements of proteins and carbohydrates at minimum cost. Frame an L.P.P. and solve it graphically.

3. A furniture firm manufactures chairs and tables, each requiring the use of three machines A, B and C. Production of one chair requires 2 hours on machine A, 1 hour on machine B and 1 hour on machine C. Each table requires 1 hour each on machine A and B and 3 hours on machine C. The profit obtained by selling one chair is Rs. 30 while by selling one table the profit is Rs. 60. The total time available per week on machine A is 70 hours, on machine B is 40 hours and on machine C is 90 hours. How many chairs and tables should be made per week so as to maximize profit? Formulate the problem as L.P.P. and solve it graphically.

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

Machine	Area occupied (in m ²)	Labour force	Daily output (in units)
A	1000	12 men	60
B	1200	8 men	40

He has maximum area of 9000 m² available, and 72 skilled labourers who can operate both the machines. How many machines of each type should he buy to maximize the daily output?

5. An oil company requires 12000, 20000 and 15000 barrels of high-grade, medium-grade and low-grade oil, respectively. Refinery A produces 100, 300 and 200 barrels per day of high-grade, medium-grade and low-grade oil, respectively, while refinery B produces 200, 400 and 100 barrels per day of high-grade, medium-grade and low-grade oil, respectively. If the refinery A costs Rs 400 per day and refinery B costs Rs 300 per day to operate, how many days should each be run to minimize costs.

6. A manufacturer produces two types of steel trunks. He has two machines A and B. The first type of trunk requires 3 hours on machine A and 3 hours on machine B. The second type of 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 second type respectively. How many trunks of each type must he make each day to make the maximum profit?

7. A dealer wishes to purchase a number of fans and sewing machines. He has only Rs 5760 to invest and has space for at most 20 items. A fan costs him Rs 360 and a sewing machine costs him Rs 240. He expects to sell a fan a profit of Rs 22 and a sewing machine at a profit of Rs 18. Assuming that he can sell all the items that he buys, how should he invest his money to maximize the profit? what is the maximum profit?

8. If a young man drives his vehicle at 25 km/hr, he has to spend Rs 2 per km on petrol. If he rides at a faster speed of 40 km/hr, the petrol cost increases at Rs 5 per km. He has Rs 100 to spend on petrol and wishes to find what is the maximum distance he can travel in one hour. Express this as an LPP and solve it graphically.

ANSWERS

1. 5 units of A and 30 units of B; minimum cost is Rs 145
2. 400 g of wheat and 200 g of rice; minimum cost is Rs 2.80
3. 15 chairs and 25 tables; maximum profit is Rs 1,950
4. 6 machines of type A and no machine of type B OR 2 machines of type A & 6 machines of type B
5. A for 60 days, B for 30 days
6. 3 trunks of each type; maximum profit is Rs 165
7. 8 fans and 12 sewing machines; maximum profit is Rs 392
8. at 25 km/hr – $50/3$ km; at 40 km/hr – $40/3$ km; maximum distance is 30 km