

Assignment-1
(NCERT Exercise - 12 Linear Programming)

1. A firm has to transport 1120 packages using large vans which can carry 200 packages each and small vans which can take 80 packages each. The cost for engaging each large van is Rs. 400 and each small van is Rs. 200 . Not more than Rs. 3000 is to be sent on the job and the numbers of large vans cannot exceed the number of small vans. Formulate this problem as an LPP given that the objective is to minimise cost. Also solve it graphically.
 2. A company makes 3 models of calculators : A, B, C at factory I and factory II . The company has orders of at least 6,400 calculators of model A, 4000 calculators of model B and 4800 calculators of model C. At factory I , 50 calculators of model A, 50 of model B, 30 of model C are made every day: at factory II, 40 calculators of model A, 20 of model B, 30 of model C are made every day. It costs Rs 12000 and Rs 15000 each day to operate factory I and II respectively. Find the number of days each factory should operate to minimise the operating cost and still meet the demand.
 3. A manufacturer of electronic circuits has a stock of 150 resistors,120 transistors and 150 capacitors and is required to produce circuits of two types A and B. Type A requires 20 resistors, 10 transistors and 10 capacitors. Type B requires 10 resistors, 20 transistors and 30 capacitors. If the profit on type A circuit is Rs 50 and on type B circuit is Rs 60. Formulate and solve this problem as an LPP so that the manufacturer can maximize his profit.
 4. A company produces soft drink that has a contract which requires that a minimum of 80 units of the chemical A and 60 units of the chemical B go into each bottle of the drink. The chemicals are available in prepared mix packets from two different suppliers. Suppliers S had a packet of mix of 4 units of A and 2 units of B that costs Rs 10. The supplier T has a packet of mix of 1 unit of A and 1 unit of B costs Rs 4. How many packets of mixed from S and T should the company purchase to honour the contract requirement and yet minimize cost? Make a LPP and solve graphically.
-
5. A Company manufactures two types of screws A and B. All the screws have to pass through a threading machine and a slotting machine. A box of type A screws require 2 minutes on the threading machine and 3 minutes on the slotting machine. A box of type B screws requires 8 minutes of threading on the threading machine and 2 minutes on the slotting machine. In a week, each machine is available for 60 hours. On selling these screws, the company get a profit of Rs 100 per box on type A screw and Rs 170 per Box on type B Screws.
- 7
6. Every gram of wheat provides 0.1 g of proteins and 0.25 g of carbohydrates. The corresponding values for rice are 0.05 g and 0.5 g 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 g and 200 g 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. Form an LPP and solve it graphically.
 7. A manufacturer produces two models of bikes Model X and Model Y. Model X takes 6 man-hours to make per unit, while Model Y takes 10 man-hours per unit. There is a total of 450 man-hours available per week. Handling and marketing costs are Rs 2000 and Rs 1000 per unit for model X and Y respectively. The total funds available for these purposes are Rs 80,000 per week. Profits per unit for model X and Y are 1,000 and Rs 800 respectively. How many bikes of each Model should the manufacturer produce so as to yields a maximum profit? Find the maximum Profit.

8. A manufacturing company makes two types of television sets, one is black and white and other is coloured. The company has resources to make at most 300 sets a week. It takes Rs 1800 to make a black and white set and Rs 2700 to make a coloured set. The company can spend not more than Rs 648000 a week to make television sets. It makes a profit of Rs 510 per black and white set and Rs 675 per coloured set, how many sets of each type should be produced so that the company has maximum profit? Formulate this as LPP given that the objective is to maximise the profit.
9. In order to supplement daily diet, a person wishes to take some X and some Y tablets. The contents of iron, calcium and vitamin in X and Y (in mg per tablet) are given as below:

Tablets	Iron	Calcium	Vitamins
X	6	3	2
Y	2	3	4

The person needs at least 18 milligrams of iron, 21 milligrams of calcium and 16 milligrams of vitamins. The price of each tablets of X and Y is Rs 2 and Rs 1 respectively. How many tablets of each should the person take in order to satisfy the above requirements at the minimum cost?

ANSWERS

1. Minimum transportation Cost is Rs 2,400 at (4,4)
2. 18,60,000 at (80,60) is the minimum operational cost
3. The Maximum profit is Rs 480 at (6,3)
4. Minimum cost is Rs 260 at (10,40)
5. Maximum profit is Rs 138600 at (1080,180)
6. Cost will be maximum when 400 grams of wheat and 200 grams of rice are mixed in the daily diet, and minimum cost is Rs 2.8 gram.
7. Profit will be maximum when 25 bikes of model X and 30 bikes of model Y are produced. Maximum profit is Rs 40,000.
8. Profit will be maximum when 180 black and white and 120 coloured TV sets are produced. Maximum profit is Rs 1728000.
9. Minimum cost is Rs 8 when a person take 1 units of tablet x and 6 units of tablet Y