



# MATHS

## BOOKS - RD SHARMA MATHS (HINGLISH)

### LINEAR PROGRAMMING

#### Solved Examples And Exercises

1. A gardener has supply of fertilizer A which consists of 10% nitrogen and 6% phosphoric

acid and fertilizer B which consists of 5% nitrogen and 100/6 phosphoric acid. After testing the soil conditions, he finds that he needs at least 14 kg of nitrogen and 14 kg of phosphoric acid for his crop. If fertilizer A costs 10.60 per kg and fertilizer B costs 8A0 per kg, what is the minimum 'cost at which the farmer can meet the nutrient requirement by using a combination of both types of fertilizers? *Rs.*1488 b. *Rs.*1576 c. *Rs.*1648



**Watch Video Solution**

2. A fruit grower can use two types of fertilizer in his garden, brand P and brand Q. The amounts (in kg) of nitrogen, phosphoric acid, potash, and chlorine in a bag of each brand are given in the table. Tests indicate that the garden needs at least 240 kg of phosphoric acid, at least 270 kg of potash and at most 310 kg of chlorine. If the grower wants to minimise the amount of nitrogen added to the garden, how many bags of each brand should be used? What is the minimum amount of nitrogen added in the garden?



 [Watch Video Solution](#)

3. Solve the following linear programming problem graphically: Maximise

$$Z = 4x + y \dots (1) \text{ subject to the}$$

$$\text{constraints: } x + y \leq 50 \dots (2) \quad 3x + y \leq 90 \dots$$

$$(3) \quad x \geq 0, y \geq 0 \dots (4)$$



[Watch Video Solution](#)

4. (Transportation problem) There are two factories located one at place P and the other

at place Q. From these locations, a certain commodity is to be delivered to each of the three depots situated at A, B and C. The weekly requirements of the depo



[Watch Video Solution](#)

5. A manufacturer of a line of patent medicines is preparing a production plane on medicines A and B. There are sufficient ingredients available to make 20,000 bottles of A and 40,000 bottles of B but there are only 45,000

bottles into which either of the medicines can be put. Further more, it takes 3 hours to prepare enough material to fill 100 bottles of A, it takes 6 hours to prepare enough material to fill 1000 bottles of B and there are 66 hours available for this operation. The profit is Rs. 8 per bottle for A and Rs. 7 per bottle for B. Formulate this problem as a linear programming problem.



[Watch Video Solution](#)

6. A manufacturer makes two types of toys A and B. Three machines are needed for this purpose and the time (in minutes) required for each toy on the machines is given below:

Each machine is available for a maximum of 6 hours per day. If the profit on each toy of type A is Rs 7.50 and that on each toy of type B is Rs 5. show that 15 toys of type A and 30 of the B should be manufactured in a day to get maximum profit.



[Watch Video Solution](#)

7. 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.



[Watch Video Solution](#)

**8.** To maintain his health a person must fulfil certain minimum daily requirements for several kinds of nutrients. Assuming that there are only three kinds of nutrients-calcium, protein and calories and the person's diet consists of

only two food items, I and II, whose price and nutrient contents are shown in the table below:

	Food I (per lb)	Food II (per lb)	Minimum daily requirement
Calcium	10	5	2
Protein	5	4	6
Calories	20	20	13
Price (Rs.)	60	100	

What combination of two food items will satisfy the daily requirement and entail the least cost? Formulate this as a LPP.



[Watch Video Solution](#)

9. A firm manufactures two types of products, A and B, and sells them at a profit of 3 per unit to type B product and 5 per unit of type A product. Both products are processed on two machines, M1 and M2. One unit of type A requires one minute of processing time on M1 and two minutes of processing time on M2, whereas one unit of type B requires one minute of processing time on M1 and one minute on M2. Machines M1 and M2 are respectively available for at most 5 hours and

6 hours in a day. Find out how many units of each type of product the firm should produce a day in order to maximize the profit. Solve the problem graphically [CHSE 2000]



[Watch Video Solution](#)

**10.** 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 3 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.



[Watch Video Solution](#)

**11.** The objective of A diet problem is to ascertain the quantities of certain foods that should be eaten to meet certain nutritional requirement at minimum cost. The consideration is limited to milk, beef and eggs, and to vitamins A, B, C. The number of milligrams of each of these vitamins contained within A unit of each food is given below:

Vitamin	Litre of milk	Kg of beef	Dozen of eggs	Minimum daily requirements
A	1	10	100	1
B	10	10	10	100
C	1	10	10	100

Cost, 1 mg 50 mg 10 mg

Rs. 1.00, Rs. 1.10, Rs. 0.50, What is the linear programming formulation for this problem?



[Watch Video Solution](#)

**12.** (Transportation problem) There are two factories located one at place P and the other at place Q. From these locations, a certain commodity is to be delivered to each of the three depots situated at A, B and C. The weekly requirements of the depo



[Watch Video Solution](#)

**13.** A factory produces two product  $P_1$  and  $P_2$  . Each of the product  $P_1$  requires 2 hrs for moulding, 3 hrs for grinding and 4 hrs for polishing, and each of the product  $P_2$  requires 4 hrs for moulding, 2 hrs for grinding and 2 hrs for polishing. The factory has moulding machine available for 20 hrs, grinding machine for 24 hrs polishing machine available for 13 hrs. The profit is Rs. 5 per unit of  $P_1$  and Rs 3 per unit of  $P_2$  and the factory can sell all that it



produces . Formulate the problem as a linear programming problem to maximize the profit.



[Watch Video Solution](#)

**14.** A merchant plans to sell two types of personal computers - a desktop model and a portable model that will cost Rs 25000 and Rs 40000 respectively. He estimates that the total monthly demand of computers will not exceed 250 units. Determine the number of units of each type of computers which the merchant

should stock to get maximum profit if he does not want to invest more than Rs 70 lakhs and if his profit on the desktop model is Rs 4500 and on portable model is Rs 5000.



[Watch Video Solution](#)

**15.** A toy company manufactures two types of doll; a basic version doll; a basic version doll A and a deluxe version doll B. Each doll of type B takes twice as long to produce as one of type A and the company would have time to ,make

a maximum of 2,000 per day if it produces only the basic version. The supply of plastic is sufficient to produce 1500 dolls per day (both A and B combined). The deluxe version requires a fancy dress of which there are only 600 per day available. If the company makes profit Rs. 3 and Rs. 5 per doll respectively on doll A and doll B; how many of each should be produced per day in order to maximize profit?



**Watch Video Solution**

**16.** A manufacturer of a line of patent medicines is preparing a production plan on medicines A and B. There are sufficient ingredients available to make 20,000 bottles of A and 40,000 bottles of B but there are only 45,000 bottles into which either of the medicines can be put. Furthermore, it takes 3 hours to prepare enough material to fill 100 bottles of A, it takes 1 hour to prepare enough material to fill 1000 bottles of B and there are 66 hours available for this operation. The profit is Rs. 8 per bottle for A and Rs. 7 per

bottle for B. Formulate this problem as a linear programming problem.



[Watch Video Solution](#)

**17.** A furniture form 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 machines A and B and 3 hours on machine C. Profit realized by

selling one chair is Rs. 30 while for a table the figure 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 table should be made per week so as to maximize profit? Develop a mathematical formulation.



[Watch Video Solution](#)

**18.** A company makes two kinds of leather belts, A and B. Belt A is high quality belt, and B

is of lower quality. The respective profits are Rs. 40 and Rs. 30 per belt. Each belt of type A requires twice as much time as a belt of type B, and if all belts were of type B, the company could make 1000 belts per day. The supply of leather is sufficient for only 800 belts per day (both A and B combined). Belt A requires a fancy buckle, and only 400 buckles per day are available. There are only 700 buckles available for belt B. What should be the daily production of each type of belt? Formulate the problem as a LPP.



[Watch Video Solution](#)

**19.** A resourceful home decorator manufactures two types of lamps say A and B. Both lamps go through two technician, first a cutter, second a finisher. Lamp A requires 2 hours of the cutter's time and 1 hour of the finisher's time. Lamp B requires 1 hour of cutter's and 2 hours of finisher's time. The cutter has 104 hours and finisher has 76 hours of time available each month. Profit of one lamp A is Rs. 6.00 and on one lamp B is Rs.11.00. Assuming that he can sell all that he



produces, how many of each type of lamps should he manufacture to obtain the best return.



[Watch Video Solution](#)

**20.** A diet is to contain at least 4000 units of carbohydrates, 500 units of fat and 300 units of protein. Two foods  $F_1$  and  $F_2$  are available. Food  $F_1$  costs 2 Rs. per unit and food  $F_2$  costs 4 Rs. per unit. A unit of food  $F_1$  contains 10 units of carbohydrates, 20 units of fat and 15

units of protein. A unit of food  $F_2$  contains 25 units of carbohydrates, 10 units of fat and 20 units of protein. Find the minimum cost for a diet that consists of a mixture of these two foods and also meets the minimum requirements.



[Watch Video Solution](#)

**21.** A dietician wishes to mix two types of food in such a way that the vitamin contents of the mixture contain at least 8 *units* of Vitamin A

and 10 *units* of vitamin C, Food I contains 2 *units per kg* of vitamin A and 1 *unit per kg* of vitamin C while food II contains 1 *unit per kg* of vitamin A and 2 *units per kg* of vitamin C. It costs *Rs 50.00 per kg* to purchase food I and *Rs. 70.00 per kg* to produce food II. Formulate the above linear programming problem to minimize the minimize the cost of such a mixture.



**Watch Video Solution**

22. A farmer mixes two brands  $P$  and  $Q$  of cattle feed. Brand  $P$ , costing  $Rs\ 250$  per bag, contains  $3$  units of nutritional element  $A$ ,  $2.5$  units of element  $B$  and  $2$  units of element  $C$ . Brand  $Q$  costing  $Rs\ 200$  per bag contains  $1.5$  units of nutritional element  $A$ ,  $11.25$  units of element  $B$ , and  $3$  units of element  $C$ . The minimum requirements of nutrients  $A$ ,  $B$  and  $C$  are  $18$  units,  $45$  units and  $24$  units respectively. Determine the number of bags of each brand which should be mixed in order to produce a mixture having a minimum cost per

bag? What is the minimum cost of the mixture per bag?



[Watch Video Solution](#)

**23.** Kellogg is a new cereal formed of a mixture of bran and rice, that contains at least 88 grams of protein and at least 36 milligrams of iron. Knowing that bran contains 80 grams of protein and 40 milligrams of iron per kilogram and that rice contains 100 grams of protein and 30 milligrams of iron per kilogram, find

the minimum cost of producing this new cereal f bran costs 5 per kilogram and rice costs 4 per kilogram



[Watch Video Solution](#)

**24.** Solve the following linear programming problems by graphical method: Maximize

$Z = -x_1 + 2x_2$ , if possible, Subject to the

constraints  $x_1 - x_2 \leq -1$   $-x_1 + x_2 \leq 0$

$x_1, x_2 \geq 0$



[Watch Video Solution](#)

**25.** There are two types of fertilisers 'A' and 'B'. 'A' consists of 12% nitrogen and 5% phosphoric acid whereas 'B' consists of 4% nitrogen and 5% phosphoric acid. After testing the soil conditions, farmer finds that he needs at least 12 kg of nitrogen and 12 kg of phosphoric acid for his crops. If 'A' costs Rs. 10 per kg and 'B' cost Rs. 8 per kg, then graphically determine how much of each type of fertilizer should be used so that nutrient requirement are met at a minimum cost.

A.  $A = 30kg$   $B = 210kg$

B.  $A = 40kg$   $B = 200kg$

C.  $A = 50kg$   $B = 220kg$

D.  $A = 60kg$   $B = 240kg$

**Answer: A**



**Watch Video Solution**

**26.** A dietician wishes to mix together two kinds of food X and Y in such a way that the mixture contains at least 10 units of vitamin A,



12 units of vitamin B and 8 units of vitamin C. The vitamin contents of one kg food is given below: One kg of food X costs Rs 16 and one kg of food Y costs Rs 20. Find the least cost of the mixture which will produce the required diet?



[Watch Video Solution](#)

27. (Manufacturing problem) A manufacturing company makes two models A and B of a product. Each piece of Model A requires 9 labour hours for fabricating and 1 labour hour

for finishing. Each piece of Model B requires 12 labour hours for fabricating and 3 labour hours for finishing. For fabricating and finishing, the maximum labour hours available are 180 and 30 respectively. The company makes a profit of Rs 8000 on each piece of model A and Rs 12000 on each piece of Model B. How many-pieces of Model A and Model B should be manufactured per week to realise a maximum profit? What is the maximum profit per week?



[Watch Video Solution](#)

**28.** Solve the following linear programming problem graphically: Maximize  $Z = 50x + 15y$

Subject to  $5x + y \leq 100$   $x + y \leq 60$   $x, y \geq 0$



**Watch Video Solution**

**29.** Determine graphically the minimum value of the objective function

$Z = 50x + 20y$  . . .(1) subject to

the constraints:  $3x - y \geq -5$  . . .(2)

$$3x + y \geq 3 \quad \dots (3) \quad 2x - 3y \leq 12 \quad \dots (4)$$

$$x \geq 0, y \geq 0 \dots (5)$$



Watch Video Solution

**30.** Solve the Following Linear Programming

Problem graphically : Minimise

$Z = 3x + 4y$  Subject to

$$x + 2y \leq 8, 3x + 2y \leq 12, x \geq 0, y \geq 0.$$



Watch Video Solution

31. A linear programming problem is as follows: Minimize  $30x + 50y$  subject to the constraints,  $3x + 5y \geq 15$   $2x + 3y \leq 18$   $x \geq 0$ ,  $y \geq 0$   
In the feasible region, the minimum value of  $Z$  occurs at

- A. a Unique Point
- B. no point
- C. infinite many point
- D. two point only

**Answer: C**



Watch Video Solution

32. In a linear programming problem, the constraints on the decision variables  $x$  and  $y$  are  $x - 3y \geq 0$ ,  $y \geq 0$ ,  $0 \leq x \leq 3$ . The feasible region

- A. is not in the first quadrant
- B. is bounded in the first quadrant
- C. is unbounded in the first quadrant
- D. does not exist

**Answer: B**



**Watch Video Solution**

**33.** Solve the Following Linear Programming

Problem graphically : Maximise

$Z = 5x + 3y$  subject to

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



**Watch Video Solution**

**34.** A dealer wishes to purchase a number of fans and sewing machines. He has only Rs. 5,760 to invest and has a space for at most 20 items. A fan costs him Rs. 360 and a sewing machine Rs. 240. His expectation is that he can sell a fan at 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 can buy, how should he invest his money in order to maximize the profit? Formulate this as a linear programming problem and solve it graphically.



**Watch Video Solution**



**35.** A small manufacturer has employed 5 skilled men and 10 semi - skilled men and makes an article in two qualities-deluxe model and an ordinary model. The making of a deluxe model requires 2 hrs work by a skilled man and 2 hrs work by a semi skilled man. The ordinary model requires 1 hr by a skilled man and 3 hrs by a semi skilled man. By union rules, no man may work more than 8 hrs per day. The manufacture's clear profit on deluxe model is Rs.15 and an ordinary model is Rs. 10. How

many of each type should be made in order to maximize his total daily profit.



[Watch Video Solution](#)

**36.** A factory manufactures two types of screws, A and B. Each type of screw requires the use of two machines, an automatic and a hand operated. It takes 4 minutes on the automatic and 6 minutes on hand operated machines to manufacture a package of screws A, while it takes 6 minutes on automatic and 3

minutes on the hand operated machines to manufacture a package of screws B. Each machine is available for at the most 4 hours on any day. The manufacturer can sell a package of screws A at a profit of 70 paise and screws B at a profit of Rs 1. Assuming that he can sell all the screws he manufactures, how many packages of each type should the factory owner produce in a day in order to maximise his profit? Formulate the above LPP and solve it graphically and determine the maximum profit.



**Watch Video Solution**

**37.** Reshma wishes to mix two types of food P and Q in such a way that the vitamin contents of the mixture contain at least 8 units of vitamin A and 11 units of vitamin B. Food P costs Rs 60 / kg and Food Q costs Rs 80 / kg. Food P contains 3 units/kg of Vitamin A and 5 units / kg of Vitamin B while food Q contains 4 units /kg of Vitamin A and 2 units/kg of vitamin B. Determine the minimum cost of the mixture.



**38.** For an objective function  $Z=ax+by$ , where  $a, b > 0$ ; the corner points of the feasible region determined by a set of constraints (linear inequalities) are  $(0, 20), (10, 10), (30, 30)$  and  $(0, 40)$ . The condition on  $a$  and  $b$  such that the maximum  $Z$  occurs at both the points  $(30, 30)$  and  $(0, 40)$  is:

A.  $b-3a=0$

B.  $a=3b$

C.  $a+2b=0$

D.  $2a-b=0$

**Answer: A**



[Watch Video Solution](#)

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

Maximize  $Z = x + y$  Subject to  $-2x + y \leq 1$

$$x \leq 2, x + y \leq 3, x, y \geq 0$$



[Watch Video Solution](#)

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

Maximize  $Z = 3x + 3y$  Subject to the constraints  $x - y \leq 1$   $x + y \geq 3$   $x, y \geq 0$



**Watch Video Solution**

**41.** One kind of cake requires 200 g of flour and 25 g of fat, and another kind of cake requires 100 g of flour and 50 g of fat. Find the

maximum number of cakes which can be made from 5 kg of flour and 1 kg of fat assuming that there is no shortage of the other ingredients used in making the cakes. Make an L.P.P. of the above and solve it graphically.



[Watch Video Solution](#)

**42.** If a young man rides his motorcycle at 25 km/hr, he has to spend 2 per kilometer on petrol if per he rides it at a faster speed of 40 km/hr the petrol cost increases to 5 per



kilometer. He has 100 to spend on petrol and wishes to find the maximum distance he can travel within one hour. Express this as a linear programming problem and then solve it.



[Watch Video Solution](#)

**43.** Two tailors A and B earn 15 and 20 per day respectively. A can stitch 6 shirts and 4 pants while B can stitch 10 shirts and 4 pants per day. To minimise the cost to stitch 60

shirts and 32 paints, how many days should they work?



[Watch Video Solution](#)

**44.** A manufacturer makes two types of toys A and B. Three machines are needed for this purpose and the time (in minutes) required for each toy on the machines is given below: Each machine is available for a maximum of 6 hours per day. If the profit



[Watch Video Solution](#)

**45.** A factory uses three different resources for the manufacture of two different products. The resources  $A$ ,  $B$  and  $C$  being available. One unit of the first product requires 2, 2 and 4 units of the respective resources and one unit of the second 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.



**Watch Video Solution**

**46.** A cottage industry manufactures pedestal lamps and wooden shades, each requiring the use of grinding/cutting machine and a sprayer. It takes 2 hours on the grinding/cutting machine and 3 hours on the sprayer to manufacture a pedestal lamp. It takes one hour on the grinding/cutting machine and 2

hours on the sprayer to manufacture a shade. On any day, the sprayer is available for at the most 20 hours and the grinding/cutting machine for at the most 12 hours. The profit from the sale of a lamp is Rs. 5 and that from a shade is Rs. 3. Assuming that the manufacturer can sell all the lamps and shades that he produces, how should he schedule his daily production in order to maximise his profit? Make an L.P.P. and solve it graphically.



**Watch Video Solution**

**47.** A small firm manufactures items A and B. The total number of items that it can manufacture in a day is at the most 24. Item A takes one hour to make while item B takes only half an hour. The maximum time available per day is 16 hours. If the profit on one unit of item A be 300 and that on one unit of item B be 160, how many of each type of item should be produced to maximize the profit? Solve the problem graphically



**Watch Video Solution**

**48.** A small firm manufactures items A and B. The total number of items that it can manufacture in a day is at the most 24. Item A takes one hour to make while item B takes only half an hour. The maximum time available per day is 16 hours. If the profit on one unit of item A be 300 and that on one unit of item B be 160, how many of each type of item should be produced to maximize the profit? Solve the problem graphically



**Watch Video Solution**

**49.** A small firm manufactures gold rings and chains. The total number of rings and chains manufactured per day is at most 24. It takes 1 hour to make a ring and 30 minutes to make a chain. The maximum number of hours available per day is 16. If the profit on a ring is Rs. 300 and that on a chain is Rs 190, find the number of rings and chains that should be manufactured per day, so as to earn the maximum profit. Make it as an L.P.P. and solve it graphically.



**Watch Video Solution**



50. Objective function of a LLP is

(A) a constraint

(B) a function to be optimized

(C) a relation between the variables

(D) none of these

A. a constraint

B. a function to be optimized

C. a relation between the variables

D. none of these

**Answer: B**



**Watch Video Solution**

51. The maximum value of  $Z = 4x + 2y$  subjected to the constraints  $2x + 3y \leq 18$ ,  $x + y \geq 10$ ;  $x, y \geq 0$  is 36 b. 40 c. 20 d. none of these



**Watch Video Solution**

52. The optimal value of the objective function is attained at the points

- A) Given by intersection of inequations with the axes only
- B) Given by intersection of inequations with the axes only
- C) Given by corner points of the feasible region
- D) None of these



[Watch Video Solution](#)

Others

1. 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.



[View Text Solution](#)

2. Vitamins A and B are found in two different foods  $F_1$  and  $F_2$ . One unit of food  $F_1$  and 2

units of vitamin A and 3 units of vitamin B. One unit of food  $F_2$  contains 4 units of vitamin A and 2 units of vitamin B. One unit of food  $F_1$  and  $F_2$  cost Rs. 50 and 25 respectively. The minimum daily requirements for a person of vitamin A and B is 40 and 50 units respectively. Assuming that anything in excess of daily minimum requirement of vitamin A and B not harmful, find out the optimum mixture of food  $F_1$  and  $F_2$  at the minimum cost which meets the daily minimum requirement of vitamin A and B. Formulate this as a LPP.



[View Text Solution](#)

**3.** A company is making two products A and B. The cost of producing one unit of products A and B are Rs. 60 and 80 respectively. As per the agreement, the company has to supply at least 200 units of product B to its regular customers. One unit of product A requires one machine hour whereas product B has machine hours available abundantly within the company. Total machine hours available for product A are 400 hours. One unit of each product A and B requires one labour hour

each and total of 500 labour hours are available. The company wants to minimize the cost of production by satisfying the given requirements. Formulate the problem as a LPP.



[View Text Solution](#)

4. 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 mater cost per unit are summarized as follows: , Product A, Product B, Weekly capacity

	Department 1	Department 2	Selling price per unit
Labour cost per unit	Rs. 25	Rs. 16	Rs. 40
Raw material cost per unit	Rs. 4	Rs. 6	Rs. 30
Weekly capacity	130	260	

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.



[View Text Solution](#)



5. An airline agrees to charter planes for a group. The group needs at least 160 first class seats and at least 300 tourist class seats. The airline must use at least two of its model 314 planes which have 20 first class and 30 tourist class seats. The airline will also use some of its model 535 planes which have 20 first class seats and 60 tourist class seats. Each flight of a cost Rs. 150,000. How many of each type of plane should be used to minimize the flight cost? Formulate this as a LPP.



[View Text Solution](#)

6. Solve the following LPP by graphically method: Minimize  $Z = 20x + 10y$  Subject to  $x + 2y \leq 40$   $3x + y \geq 30$   $4x + 3y \geq 60$  and,  $x, y \geq 0$



[View Text Solution](#)

7. Solve the following liner programming problems by graphical method: Maximize  $Z = 5x + 3y$  Subject to  $4x + 5y \leq 15$   $5x + 2y \leq 10$   $x, y \geq 0$



[View Text Solution](#)

8. A firm manufacturing two types of electric items, A and B, can make a profit of Rs. 20 per unit of A and Rs. 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.



[View Text Solution](#)

**9.** A furniture manufacturing company plans to make two products: chairs and tables. From its available resources which consists of 400 square feet of teak wood and 450 man hours. It is known that to make a chair requires 5 square feet of wood and 10 man-hours and yields a profit of Rs. 45, while each table uses

20 square feet of wood and 25 man-hours and yields a profit of Rs. 80. How many items of each product should be produced by the company so that the profit is maximum?



[View Text Solution](#)

**10.** A firm manufactures two products A and B. Each product is processed on two machines  $M_1$  and  $M_2$ . Product A requires 4 minutes of processing time on  $M_1$  and 8 min. on  $M_2$ ; product B requires 4 minutes on  $M_1$  and 4

min. on  $M_2$  . The machine  $M_1$  is available for not more than 8 hrs 20 min. while machine  $M_2$  is available for 10 hrs. during any working day. The products A and B are sold at a profit of Rs. 3 and Rs. 4 respectively. Formulate the problem as a linear programming problem and find how many products of each type should be produced by the firm each day in order to get maximum profit.



[View Text Solution](#)

**11.** A manufacturer considers that men and women workers are equally efficient and so he pays them at the same rate. He has 30 and 17 units of workers (male and female) and capital respectively, which he uses to produce two types of goods A and B. To produce one unit of A, 2 workers and 3 units of capital are required while 3 workers and 1 unit of capital is required to produce one unit of B. If A and B are priced at Rs. 100 and Rs. 120 per unit respectively, how should he use his resources to maximize the total revenue? Form the

above as an LPP and solve graphically. Do you agree with this view of the manufacture that men and women workers are equally efficient and so should be paid at the same rate?



[View Text Solution](#)

**12.** A publisher sells a hard cover edition of a text book for Rs. 72.00 and a paperback edition of the same ext for Rs. 40.00. Costs to the publisher are Rs. 56.00 and Rs. 28.00 per book respectively in addition to weekly costs



of Rs. 9600.00. Both types require 5 minutes of printing time, although hardcover requires 10 minutes binding time and the paperback requires only 2 minutes. Both the printing and binding operations have 4,800 minutes available each week. How many of each type of book should be produced in order to maximize profit?



[View Text Solution](#)

**13.** A house wife wishes to mix together two kind of food, X and Y, in such a way that the mixture contains at least 10 units of vitamin A, 12 units of vitamin B and 8 units of vitamin C.

Vitamin A	Vitamin B	Vitamin C	Food X:	Food Y:
1	2	2	2	3
1	2	2	3	1

One kg of food X cost Rs. 6 and one kg of food Y costs Rs. 10. Find the least cost of the mixture which will produce the diet.



**View Text Solution**

**14.** A toy manufacturer produces two types of dolls; a basic version doll A and a deluxe version doll B. Each doll of type B takes twice as long to produce as one doll of type A. The company has time to make a maximum of 2000 dolls of type A per day, the supply of plastic is sufficient to produce 1500 dolls per day and each type requires equal amount of it. The deluxe version i.e. type B requires a fancy dress of which there are only 600 per day available. If the company makes a profit of Rs. 3 and Rs. 5 per doll, respectively, on doll A and

B; how many of each should be produced per day in order to maximize profit? Solve it by graphical method.



[View Text Solution](#)