MATHS

BOOKS - CBSE COMPLEMENTARY MATERIAL MATHS (HINGLISH)

LINEAR PROGRAMMING

Long Answer Type Questions

1. Solve the following L.P.P graphically

Minimise and maximise z = 3x + 9y

Subject to the constraints $x + 3y \leq 60$

$x + y \geq 10$

$x \leq y$

$x \geq 0, y \geq 0$

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2. Determine graphically the minimum value of the objective function z = - 50x + 20 y, subject to he constraints.

$2x - y \geq -5$

$3x + y \geq 3$

$2x - 3y \leq 12$

$x \geq 0, y \geq 0$

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3. Two tailors A and B earn ₹150 and ₹200 per day respectively. A can stich 6 shirts and 4 pants per day, while B can stitch 10 shirts and 4 pants per day. Form a L.P .P to minimize the labour cost to produce (stitch) at least 60 shirts and 32 pants and solve it graphically.

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4. 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 he soil conditions a farmer finds that she needs at least 14 kg of nitrogen and 14 kg of phosphoric acid for her crop. If F_1 costs Rs. 6/kg and F_2 costs Rs. 5/kg, determine how much of each type of fertiliser should be used to that nutrient requirements are met at a minimum cost. What is the minimum cost?

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5. A man has Rs. 1500 to purchase two types of shares of two different companies s_1 and s_2. Markedt price of one share of s_1 is Rs. 180 and s_2 is Rs. 120. He wishes to purchase a maximum of ten shares only. If one share of type s_1 gives a yield of Rs. 11 and of type s_2 yields Rs. 8 then how much shares of each type must be purchased to get maximum profit? And what will be the maximum profit?

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6. A company manufactures two types of lamps say A and B. Both lamps go through a cutter and then a finisher. Lamp A requires 2 hours of the cutter's time and 1 hours of the finisher's time. Lamp B requires 1 hour of cutter's and 2 hours of finisher time. The cutter has 100 hours and finisher has 80 hours of time available each month. Profit on one lamp A is Rs. 7.00 and on one lamp B is Rs. 13.00. Assuming that he can sell all that he produces, how many of each type of lamps

should be manufactured to obtain maximum profit?

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7. 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.

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8. 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 hours. Express this as a linear programming problem and then solve it.

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9. A producer has 20 and 10 unit of labour and capital respectively which he can use to produce two kinds of goods X and Y. To produce one unit of x, 2 units of capital and 1 unit of labour is required. To produce one unit of Y,3 of labour and 1 unit of capital is

required. If X and Y are priced at Rs. 80 and Rs. 100 per unit respectively, how should the producer use his resources to maximise the total revenue?

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10. 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 Labour force Daily output (in units)

A $1000\ m^2$ $12\ men$ 60 B $1200\ m^2$ $8\ men$ 40 He has maximum area of $9000\ m^2$ available, and 72 skilled labourers who can operate both the machines. How many machines of each type should he buy to maximise the daily output?

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11. A manufacture makes two types of cups A and B. Three machines are required to manufacture the cups and the time in minutes required by each in as given below:

Types of Cup	Machines		
	I	II	III
A	12	18	6
B	6	0	9

Each machine is available for a maximum period of 6 hours per day. If the profit on each cup A is 75 paisa and on B is 50 paisa, find how many cups of each type should be manufactures to maximise the profit per day.

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12. A company produces two types of belts A and B. Profits on these belts are Rs. 2 and Rs.

1.50 per belt respectively. A belt of type A requires twice as much time as belt of type B. The company can produce at most 1000 belts of type B per day. Material for 800 belts per day is available. At most 400 buckles for belts of type A and 700 for type B are available per day. How much belts of each type should the company produce so as to maximise the profit?

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13. An aeroplane can carry a maximum of 200 passengers. A profit of Rs. 400 is made on each first class ticket and a profit of Rs. 300 is made on each second class ticket. The airline reserves at least 20 seats for first class. However, at least four times as many passengers prefer to travel by second class then by first class. Determine how many tickets of each type must be sold to maximise profit for the airline. Form an LPP and solve it graphically.

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14. 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 a cost of Rs. 5 and Rs. 4 per unit respectively. One unit of food A contains 200 units of vitamins, 1 unit of minerals and 40 units of calories whereas one unit of food B contains 100 units of vitamins, 2 units of minerals and 40 units of calories. Find what combination of the food A and B should

be used to have least cost but it must satisfy the requirements of the sick person.

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15. Anil wants to invest at the most Rs.12000 in bonds. A and B. According to rules, he has to invest at least Rs.2000 in Bond A is 8% per annum and on Bond B, it is 10% per annum, how should he invest his money for maximum interest ? Solve the problem graphically.

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One Marks Questions

1. Objective function of an LPP is

A. A constraint

B. A function to be opptimised

C. A relation between the variables

D. None of these

Answer: A::B

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

A. Given by intersections of equations with axis only

B. Given by intersections of inequations with x-axis only

C. Given by corner points of the feasible region

D. None of these

Answer: C

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3. The solution set of the inequation $2x + y > 5$ is

A. open half-plane that contains the origin

B. open half-plane not containing the origin

C. whole xy-plane except the points lying on the line $2x + y = 5$

D. None of these

Answer: B

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4. If the constraints in a linear programming problem are changed

A. The problem is to be re-evaluled

B. solution not defined

C. The objective function has to be modified

D. The change in constraints is ignored

Answer: A

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5. Which of the following statements is correct?

(a) Every L.P.P admits an optimal solution

(b)A L.P.P admits unique optimal solution

(c) If a L.P.P adimits two optimal solutions it has an infinite number of optimal solutions

(d)None of these

A. Every L.P.P admits an optimal solution

B. A L.P.P admits unique optimal solution

C. If a L.P.P adimits two optimal soluctions it has an idfinite number of optimal solutions

D. None of these

Answer: C

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6. Solution set of inequation $x \geq 0$ is

A. Half-plane on the left of y-axis

B. Half-plane on the right of y-axis excluding the points on y-axis

C. Half-plane on the right of y-axis including the points on y-axis

D. None of these

Answer: C

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7. Solution set of the inequality $y \leq 0$ is

A. Half-plane below the x-axis exduding the point on x-axis

B. Half-plane below the x-axis including the point on x-axis

C. Half-plane above the x-axis

D. None of these

Answer: B

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8. Regions represented by equation $x \geq 0, y \geq 0$ is

A. first quatrant

B. Second quadrant

C. Third quadrant

D. Fourth quadrant

Answer: A

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