# MATHS

## BOOKS - BITSAT GUIDE

## LINEAR PROGRAMMING

**Practice Exercise**

**1.** A whosesale merchant wants to start the business of cereal with Rs. 24000. Wheat is Rs. 400 per quintal and rice is Rs. 600 per quintal cereal. He has capacity to store 200 quintal cereal. He earns the profit Rs. 25 per quintal on wheat and Rs. 40 per quintal on rice. If the stores x quintal rice and y quintal wheat, then for maximum profit, the objective function is

A. $25x + 40y$

B. $40x + 25y$

C. $400x + 600y$

D. $\frac{400}{40}x + \frac{600}{25}y$

**Answer: B**

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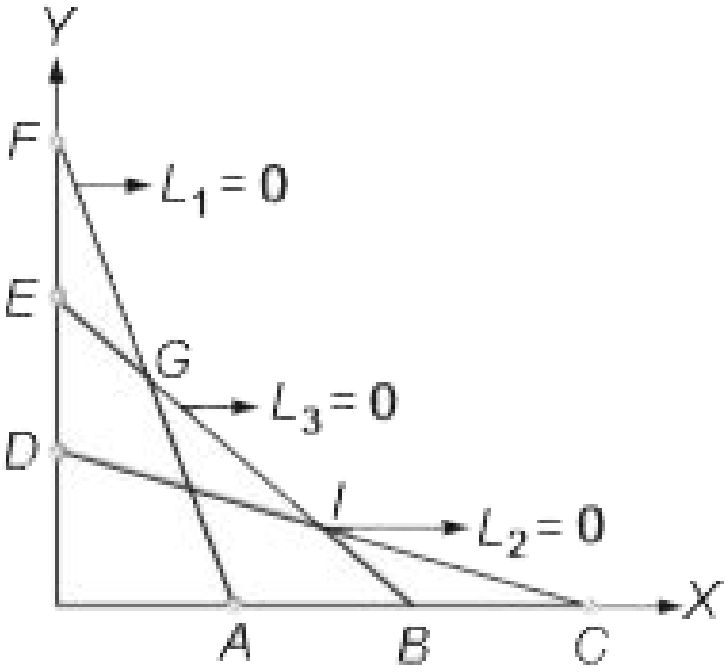
**2.** The feasible region for the following constraints $L_1 \leq 0, L_2 \geq 0, L_3 = 0, x \geq 0, y \geq 0$ in the diagram shown is




A. area DHF

B. area AHC

C. line segment EG

D. line segment GI

**Answer: C**

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**3.** The linear programming problem Maximise $Z = x_1 + x_2$

Subject to constraints

$$x_1 + 2x_2 \leq 2000$$
$$x_1 + x_2 \leq 1500$$
$$x_2 \leq 600$$
$$x_1 \geq 0$$

has

A. no feasible solution

B. unique optimal solution

C. a finite number of optimal solutions

D. infinite number of optimal solutions

**Answer: D**

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**4.** The objective function $Z = 30x + 20y$, subject to constraints $x + y \leq 8, x + 2y \geq 4, 6x + 4y \geq 12, x \geq 0, y \geq 0$, has

A. unique solution

B. infinitely many solutions

C. minimum at (4, 0)

D. minimum 60 at point (0, 3)

**Answer: D**

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**5.** If the objective function $Z = 4x + 2y$, subject to constraints $4x + 2y \geq 46$, $x + 3y \leq 24$ and x and y are greater than or equal to zero, then the maximum value of Z is

A. 46

B. 96

C. 52

D. none of these

**Answer: B**

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**6.** The maximum and minimum values of $Z = 5x + 2y$, subject to the constraints

$2x + 3y \geq 3, x - 2y \geq 2, 6x + 4y \leq 24, \ -3x + 2y \leq 3 \ \text{and} \ \ x, y \geq 0$

, are respectively

A. $\frac{18}{7}, \frac{2}{7}$

B. $\left(19, \frac{63}{13}\right.$

C. $19, 63$

D. $19, 13$

**Answer: B**

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**7.** The maximum value of $Z = 10x + 6y$ subject to constraints $x \geq 0, y \geq 0, x + y \leq 12, 2x + y \leq 20$, is

A. $72$

B. $80$

C. $104$

D. $110$

**Answer: C**

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**8.** The maximum value of $Z = 3x + 5y$, under the constraints $x + 2y \leq 2000, x + y \leq 1500, y \leq 600$ and $x, y \geq 0$, is

A. 5000

B. 5500

C. 6000

D. none of these

**Answer: B**

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**9.** If $x_1$ and $x_2$ are optimal solution of LPP, then which of the following is also an optimal solution?

A. $x = kx_1 + (1-k)x_2, k \in R$

B. $x = kx_1 + (1-k)x_2, 0 \leq k \leq 1$

C. $x = kx_1 + (1+k)x_2, 0 \leq k \leq 1$

D. $x = kx_1 + (1+k)x_2, k \in R$

**Answer: B**

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**10.** The maximum value of $Z = 9x + 13y$ subject to constraints $2x + 3y \leq 18, 2x + y \leq 10, x \geq 0, y \geq 0$, is

A. 130

B. 81

C. 79

D. 99

**Answer: C**

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**11.** Which of the following is a convex set?

A. $\{(x, y) : x^2 + y^2 \geq 4\}$

B. $\{(x, y) : 3x^2 + 2y^2 \leq 6\}$

C. $\{x, y\} : 9 \leq x^2 + y^2 \leq 25$

D. none of these

**Answer: B**

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**12.** The maximum value of $Z = 5x + 3y$, subject to the constraints $3x + 5y \leq 15, 5x + 2y \leq 10, x, y \geq 0$, is

A. $\frac{235}{19}$

B. $\frac{325}{19}$

C. $\frac{523}{19}$

D. $\frac{532}{19}$

**Answer: A**

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**13.** The minimum value of $Z = 2x_1 + 3x_2$, subject to the constraints $2x_1 + 7x_2 \geq 22, x_1 + x_2 \geq 6, 5x_1 + x_2 \geq 10$ and $x_1, x_2 \geq 0$, is

A. $14$

B. $20$

C. $10$

D. $16$

**Answer: A**

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## Bitsat Archives

**1.** A furniture dealer deals in only two items namely tables and chairs. He has Rs. 5000 to invest and space to store at most 60 pieces. A table cost him Rs. 250 and a chair Rs. 60. He can sell a table at a profit of Rs.

15. Assume that he can sell all the items that he produced. The number of constraints in the problem are

A. 2

B. 3

C. 4

D. 5

**Answer: C**

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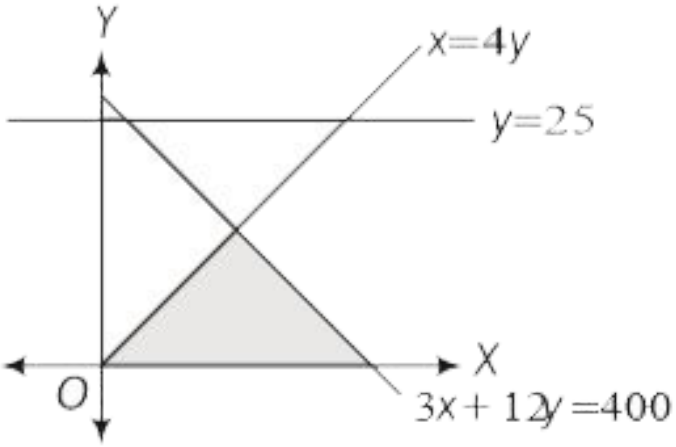
**2.** The shaded region given below represents the constraints (other than $x \geq 0, y \geq 0$)




A. $3x + 4y \leq 400, y \leq 25, x \leq 4y$

B. $3x + 12y \geq 400, y \leq 25, x \geq 4y$

C. $3x + 12y \leq 400, y \leq 25, x \geq 4y$

D. none of these

**Answer: C**

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**3.** The optimal value of the objective function is attained at the point

A. given by intersection of inequations with axes only

B. given by intersection of inequations with X-axis only

C. given by corner point of the feasible region

D. none of these

**Answer: C**