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Class :-12 (Maths)

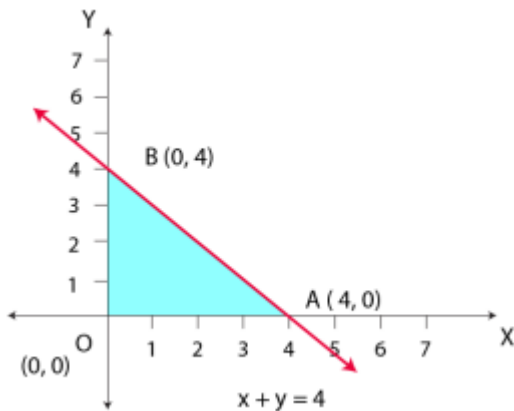
Date 26.12.2020

1. Maximise $Z = 3x + 4y$

Subject to the constraints: $x + y \leq 4, x \geq 0, y \geq 0$.

Solution:

The feasible region determined by the constraints, $x + y \leq 4, x \geq 0, y \geq 0$, is given below



O (0, 0), A (4, 0), and B (0, 4) are the corner points of the feasible region. The values of Z at these points are given below

Corner point	$Z = 3x + 4y$	
O (0, 0)	0	
A (4, 0)	12	
B (0, 4)	16	Maximum

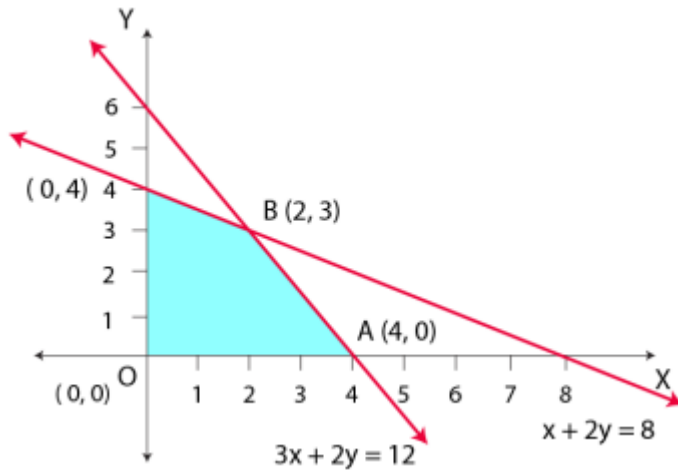
Hence, the maximum value of Z is 16 at the point B (0, 4)

2. Minimise $Z = -3x + 4y$

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

Solution:

The feasible region determined by the system of constraints, $x + 2y \leq 8, 3x + 2y \leq 12, x \geq 0, y \geq 0$ is given below



O (0, 0), A (4, 0), B (2, 3) and C (0, 4) are the corner points of the feasible region

The values of Z at these corner points are given below

Corner point	$Z = -3x + 4y$	
O (0, 0)	0	
A (4, 0)	-12	Minimum
B (2, 3)	6	
C (0, 4)	16	

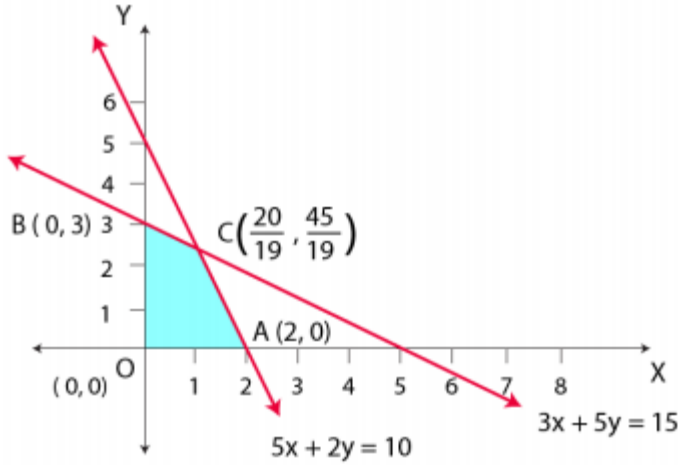
Hence, the minimum value of Z is – 12 at the point (4, 0)

3. Maximise $Z = 5x + 3y$

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

Solution:

The feasible region determined by the system of constraints, $3x + 5y \leq 15$, $5x + 2y \leq 10$, $x \geq 0$, and $y \geq 0$, are given below



O (0, 0), A (2, 0), B (0, 3) and C (20 / 19, 45 / 19) are the corner points of the feasible region. The values of Z at these corner points are given below

Corner point	Z = 5x + 3y	
O (0, 0)	0	
A (2, 0)	10	
B (0, 3)	9	
C (20 / 19, 45 / 19)	235 / 19	Maximum

Hence, the maximum value of Z is 235 / 19 at the point (20 / 19, 45 / 19)