CHAPTER - 23
LINEAR PROGRAMMING

1. (A)

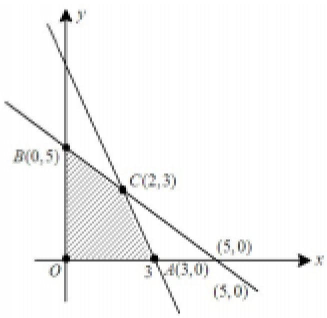
Let $z = 2x + 3y$

$x + y \le 5$ .... (1)

$3x + y \le 9$ .... (2)

The feasible region of the system of inequalities given in the constrains.

We convert in equalities to equations



$x = 0, y = 0$

$x + y = 5, 3x + y = 9$

Solve: $x = 2, y = 3$

$\therefore$ C(2, 3)

$A(3,0) \Rightarrow z = 6$

$C(2,3) \Rightarrow z = 4 + 9 = 13$

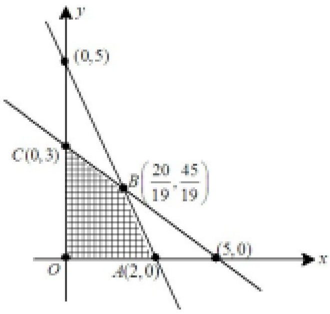
$B(0,5) \Rightarrow z = 15$

2. (A)

$3x + 5y = 15$; $5x + 2y = 10$

$(5,0),(0,3)$ and $(2,0),(0,5)$

$z = 5x + 3y$



O(0, 0) $\Rightarrow z = 0$

$A(2,0) \Rightarrow z = 10$

$B\left(\frac{20}{19}, \frac{45}{19}\right) \Rightarrow z = \frac{235}{19}$

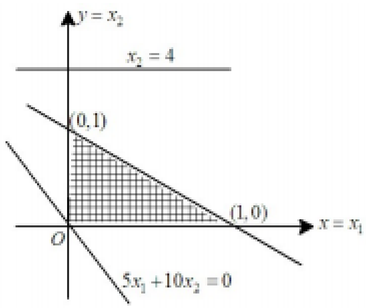
$C(0,3) \Rightarrow z = 9$

$\therefore$ Maximum (z) = $\frac{235}{19}$.

3. (A)

$z = x_1 + x_2$

$5x_1 + 10x_2 \ge 0$



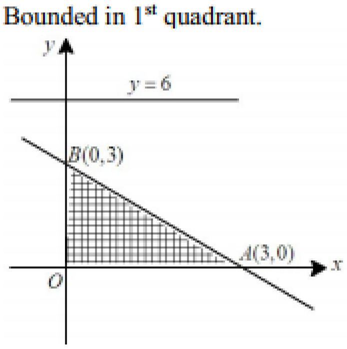
$x_1 + x_2 \le 1$

$x_2 \le 4$; $x_1, x_2 \ge 0$

$\therefore$ There is a bounded solutions

4. (C)

Bounded in 1st quadrant.



5. (B)
6. (B)

x quintal rice, y quintal wheat

$\therefore\ z = 40x + 25y$

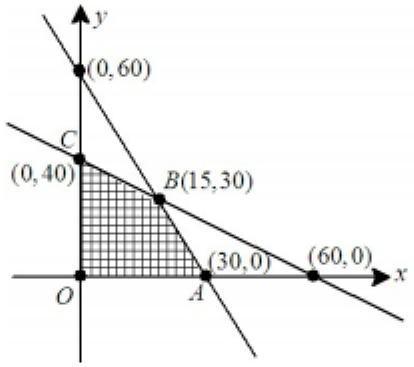
7. (C)

At B(10, 50)

$\Rightarrow\ z = 50(10) + 15(50)$

= 500 + 750 = 1250

8. (A)



Consider

$2x + 3y = 120$ …. (1)

$2x + y = 60$ ….. (2)

From eq.(1) $(60,0);(0,40)$

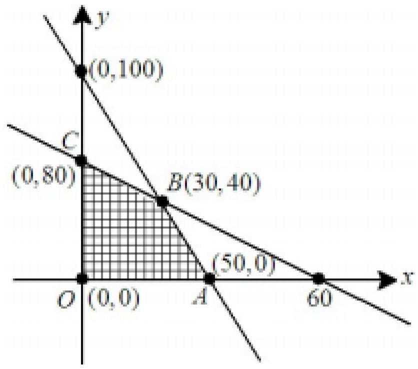
From eq.(2) $(30,0);(0,60)$

Solve from eqs. (1) and (2)

$\Rightarrow\ 2y = 60,\ y = 30\ \Rightarrow\ x = 15$

$\therefore$ B(15, 30)

9. (E)
10. (D)



$Z = 7x + 5y$

Consider

$2x + y = 100$ ….. (1)

$4x + 3y = 240$ …. (2)

From eq. (1), $(50,0);(0,100)$

From eq. (2), $(60,0);(0,80)$.

Solve eqs. (1), (2)

$$\begin{array}{l} 2x + y = 100 \\ \underline{4x + 3y = 240} \\ x = 30,\ y = 40 \end{array}$$

$\therefore\ B(30,40)$.

O(0, 0) $\Rightarrow$ z = 0

$A(50,0) \Rightarrow z = 350$

$B(30,40) \Rightarrow z = 410$

$C(0,80) \Rightarrow z = 350$.