1. A company prodces two types of goods,A and B,that require gold and silver.Each unit of type A requires 3g of silver and 1g of gold,while that of type B requires 1 g of silver and 2 g of gold.The company can use at the most 9 g of silver and 8 g of gold.If each unit of type A brings a profit of ₹ 120 and that of type B ₹ 150, then find the number of units of each type that the company should produce to maximise profit.
   Formulate the above LPP and solve it graphically.Also,find the maximum profit.

2. Find the maximum value of $7x + 6y$ subject to the constraints :

$$x + y >= 2 \tag{1}$$
$$2x + 3y <= 6 \tag{2}$$
$$x >= 0 \text{ and } y <= 0 \tag{3}$$

3. (a) A window is in the form of a rectangle mounted by a semi-circular opening.The total perimeter of the window is 10 m.Find the dimensions of the rectangular part of the window to admit maximum light through the whole opening.
   (b) Divide the number8 into two positive numbers such that the sum of the cube of one and the square of the other is minimum.

4. Find the maximum and the minimum values of

$$z = 5x + 2y$$

   subject to the constraints:

$$-2x - 3y <= -6 \tag{4}$$
$$x - 2y <= 6... \tag{5}$$
$$6x + 4y <= 24 \tag{6}$$
$$-3x + 2y <= 3 \tag{7}$$
$$x >= 0, y >= 0 \tag{8}$$

5. Based on the given shadedd region as the feasible region in the graph,at which point(s) is the objective function $Z = 3x + 9y$ maximum?

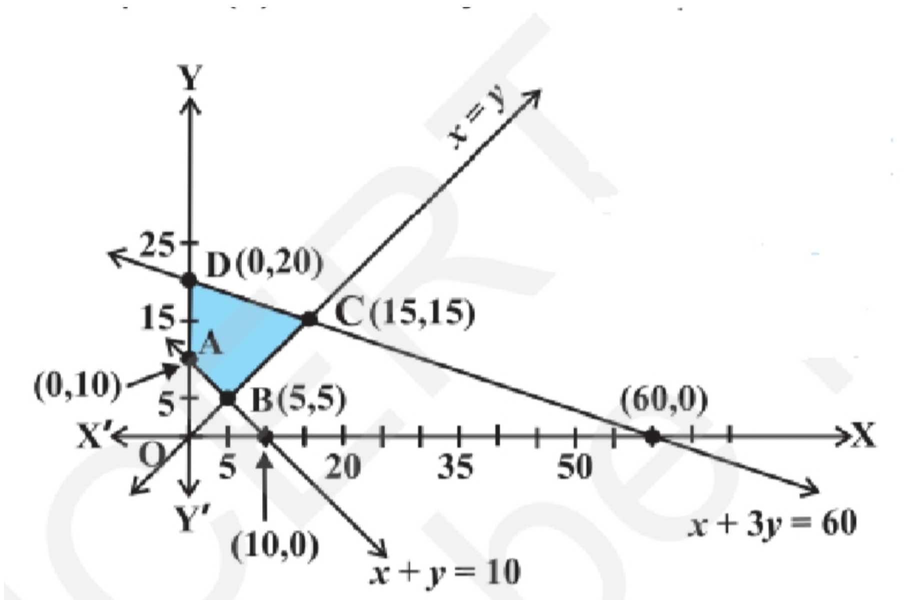

Figure 1: graph

(A) Point B

(B) Point C

(C) Point D

(D) every point on the line segment CD

6. The least value of the function $f(x) = 2\cos x + x$ in the closed interval$[0, \frac{\pi}{2}]$

(A) 2

(B) $\frac{\pi}{6} + \sqrt{3}$

(C) $\frac{\pi}{2}$

(D) The least value does not exist

7. In the given graph,the feasible region for a LLP is shaded.The objective function

$$Z = 2x - 3y \tag{9}$$

,will be minimum at.

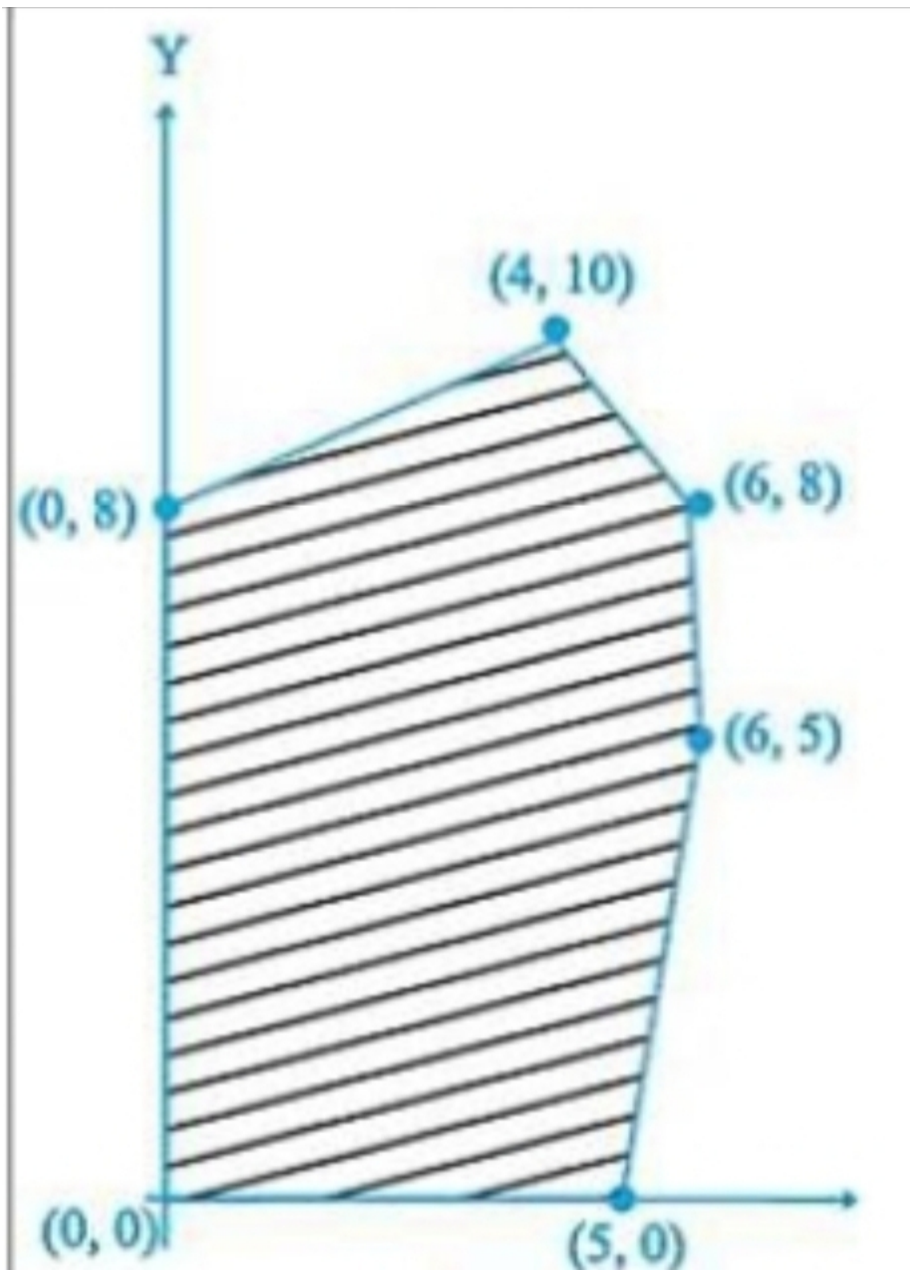

Figure 2: graph

(a)

$$(4, 10)$$

(b)

$$(6, 8)$$

(c)

$$(0, 8)$$

(d)

$$(6, 5)$$

8. A linear programming problem is as follows:
minimize

$$Z = 30x + 50y, \tag{10}$$

subject to the constraints,

$$3x + 5y >= 15 \tag{11}$$
$$2x + 3y <= 18 \tag{12}$$
$$x >= 0, y >= 0 \tag{13}$$

In the feasible region the minimum value of Z occurs at

(A) a unique point
(B) no point
(C) infinitely many points
(D) two points only

9. The area of a trapezium defined by function f and given by

$$f(x) = (10 + x) + \sqrt{(}100 - x^2), \tag{14}$$

Then the area when it is maximised is:

(A) $75cm^2$
(B) $7\sqrt{3}cm^2$
(C) $75\sqrt{3}cm^2$
(D) $5cm^2$

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

(A)

$$-3a = 0$$

(B)

$$a = 3b$$

(C)

$$a + 2b = 0$$

(D)

$$2a - b = 0$$

11. In a linear programming problem,the constraints on the decision variables x and y are

$$x - 3y >= 0 \tag{15}$$

$$y >= 0, \tag{16}$$

$$0 <= x <= 3, \tag{17}$$

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