# *Previous Year CBSE problems with Solutions*

## *Problem 1:*

A manufacturer produces two products $A$ and $B$. Both the products are processed on two different machines. The available capacity of first machine is 12 hours and that of second machine is 9 hours per day. Each unit of product $A$ requires 3 hours on both machines and each unit of product $B$ requires 2 hours on first machine and 1 hour on second machine. Each unit of product $A$ is sold at ₹7 profit and that of $B$ at a profit of ₹4. Find the production level per day for maximum profit graphically.

## *Solution:*

**3.** The given information can be represented in the tabular form as below:

| Machines | Time required to produce product | | Maximum machine hours available |
|---|---|---|---|
| | $A$ | $B$ | |
| First machine | 3 | 2 | 12 |
| Second machine | 3 | 1 | 9 |
| Profit (in ₹) | 7 | 4 | |

Let the manufacturer produces $x$ units of product $A$ and $y$ units of product $B$ per day.

$\therefore \quad 3x + 2y \leq 12$ and $3x + y \leq 9$

Let $Z$ denote the total profit.

$\therefore \quad Z = 7x + 4y$

Clearly $x \geq 0$ and $y \geq 0$.

Above LPP can be stated mathematically as:

Maximise $Z = 7x + 4y$

subject to the constraints

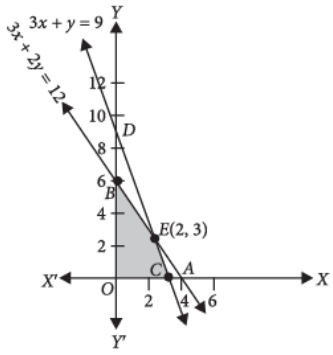
$3x + 2y \leq 12$, $3x + y \leq 9$ and $x, y \geq 0$

To solve graphically, we convert the inequations into equations to obtain the following lines:

$3x + 2y = 12$, $3x + y = 9$, $x = 0$, $y = 0$

The line $3x + 2y = 12$ meets the coordinate axes at $A(4, 0)$ and $B(0, 6)$. Similarly $3x + y = 9$ meets the coordinate axes at $C(3, 0)$ and $D(0, 9)$

The point of intersection of lines $3x + 2y = 12$ and $3x + y = 9$ is $E(2, 3)$.




Coordinates of the corner points of the feasible region $OCEB$ are $O(0, 0)$, $C(3, 0)$, $E(2, 3)$, $B(0, 6)$

Values of the objective function at corner points of the feasible region are

| Corner Points | Value of $Z = 7x + 4y$ |
|---|---|
| $O(0, 0)$ | 0 |
| $C(3, 0)$ | 21 + 0 = 21 |
| $E(2, 3)$ | 14 + 12 = 26 (Maximum) |
| $B(0, 6)$ | 0 + 24 = 24 |

$\therefore \quad Z$ is maximum at $x = 2$, $y = 3$

So, for maximum profit the manufacturer should manufacture 2 units of product $A$ and 3 units of product $B$.