(2). The curve $y = ax^3 + bx^2 + cx + 5$ touches the x axis at $A(-2,0)$ and cuts the y-axis at a point B where its slope is 3. Then

(A) $a = \frac{1}{2}, b = -\frac{3}{4}, c = 3$

(B) $a = -\frac{1}{2}, b = -\frac{3}{4}, c = 3$

(C) $a = \frac{1}{2}, b = \frac{3}{4}, c = 3$

(D) all of above.

Ans. (B)

$$y = ax^3 + bx^2 + cx + 5 \quad \text{-(i)}$$

$$\frac{dy}{dx} = 3ax^2 + 2bx + c. \quad \text{-(ii)}$$

Since the curve (i) touches x-axis at $A(-2,0)$, $\therefore$ point A lies on eq (i) and $\frac{dy}{dx} = 0$

$$-8a + 4b - 2c + 5 = 0 \quad \text{- (iii)}.$$

$$12a - 4b + c = 0 \quad \text{(iv)}.$$

The curve (i) cuts y-axis at $B(0,5)$. It is given that

$$\left(\frac{dy}{dx}\right)_B = 3 \Rightarrow c = 3$$

$$\Rightarrow a = -\frac{1}{2}, \; b = -\frac{3}{4}, \; c = 3$$