

Question 06.

Integrate the following functions with respect to x

$$(a) \int (5x^2 + 3x - 2) dx$$

$$(b) \int \left(4 \sin x - \frac{2}{x} \right) dx$$

$$(c) \int \frac{dx}{4x + 5}$$

$$(d) \int (6x + 2)^3 dx$$

Solution

$$(a) \int (5x^2 + 3x - 2) dx = 5 \int x^2 dx + 3 \int x dx - 2 \int dx$$
$$= \frac{5x^3}{3} + \frac{3x^2}{2} - 2x + c$$

$$(b) \int \left(4 \sin x - \frac{2}{x} \right) dx = 4 \int \sin x dx - 2 \int \frac{dx}{x}$$
$$= -4 \cos x - 2 \ln x + c$$

$$(c) \int \frac{dx}{4x + 5} = \frac{1}{4} \int \frac{dX}{X}, \quad \text{where } X = 4x + 5$$
$$= \frac{1}{4} \ln X + c_1 = \frac{1}{4} \ln (4x + 5) + c_2$$

$$(d) \int (6x + 2)^3 dx = \frac{1}{6} \int X^3 dX, \quad \text{where } X = 6x + 2$$
$$= \frac{1}{6} \left(\frac{X^4}{4} \right) + c_1 = \frac{(6x + 2)^4}{24} + c_2$$