

Integration

Chapter 1 → Indefinite Integration

Formula -

$$\int f(x) dx$$

$$\hookrightarrow f(x) \Rightarrow x^2 + 2x$$

$$\Rightarrow 2x^3$$

$$\Rightarrow x^2 - 5x + 6x^{-1}$$

$$\textcircled{1} \int x^n dx = \frac{x^{n+1}}{n+1}$$

$$\text{Ex :- } \int x^2 dx = \frac{x^{2+1}}{2+1} = \frac{x^3}{3} = \frac{1}{3}x^3$$

$$\textcircled{2} \int \frac{dx}{x^n} = \frac{1}{(n-1)x^{n-1}}$$

$$\text{Ex :- } \int \frac{dx}{x^6} = -\frac{1}{5x^5}$$

$$\textcircled{3} \int \frac{dx}{\sqrt{x}} = 2\sqrt{x}$$

$$\textcircled{4} \int dx = x$$



$$(5) \int c \cdot dx = c \int dx = cx$$

where; $c \neq 0, c = \pm 1, \pm 2 \dots$

$$\text{Ex:- } \int 2 dx = 2 \int dx = 2x$$

$$\int -5 dx = -5 \int dx = -5x$$

$$(6) \int \frac{dx}{x} = \log x$$

$$(7) \int e^x dx = e^x$$

$$(8) \int e^{mx} dx = \frac{e^{mx}}{m}$$

$$\text{Ex:- } \int e^{2x} dx = \frac{e^{2x}}{2}$$

$$\int e^{-5x} dx = \frac{e^{-5x}}{-5}$$



$$(9) \int a^x dx = \frac{a^x}{\log a}$$

where $a > 0, a \neq 1$

i.e., $a = 2, 3, 4 \dots$

$$\text{Ex, } \int 3^x dx = \frac{3^x}{\log 3}$$

$$(10) \int a^{mx} dx = \frac{a^{mx}}{m \log a}$$

$m \neq 0, m = \pm 1, \pm 2 \dots$

$$\int 3^{5x} dx = \frac{3^{5x}}{5 \log 3}$$

$$\int 3^{-5x} dx = \frac{3^{-5x}}{-5 \log 3}$$

$$(11) \int \sin x dx = -\cos x$$

$$(12) \int \sin mx dx = \frac{-\cos mx}{m}$$

$$(13) \int \cos x dx = \sin x$$

$$(14) \int \cos mx dx = \frac{\sin mx}{m}$$

$$(15) \int \sec^2 x dx = \tan x$$

$$(16) \int \sec^2 mx dx = \frac{\tan mx}{m}$$

$$(17) \int \operatorname{cosec}^2 x dx = -\cot x$$

$$(18) \int \operatorname{cosec}^2 mx dx = \frac{-\cot mx}{m}$$

$$(19) \int \sec x \tan x dx = \sec x$$

$$(20) \int \sec mx \tan mx dx = \frac{\sec mx}{m}$$

$$(21) \int \operatorname{cosec} x \cot x dx = -\operatorname{cosec} x$$

$$(22) \int \operatorname{cosec} mx \cot mx dx = \frac{-\operatorname{cosec} mx}{m}$$

