

INTEGRATION

Definition:- Integration is regarded as the inverse of differentiation. It increases a function.

Mathematically, $\frac{d}{dx} [F(x)+c] = f(x)$

$$\& \int f(x) dx = F(x)+c$$

where, c= integration constant.

Formulae:-

$$(1) \int A f(x) dx = A \int f(x) dx$$

$$(2) \int x^n dx = \frac{x^{n+1}}{n+1} + c \quad [n \neq -1]$$

$$(3) \int \frac{1}{x} dx = \log x + c$$

$$(4) \int e^x dx = e^x + c$$

$$(5) \int a^x dx = \frac{a^x}{\log_e a} + c \quad [a > 0 \& a \neq -1]$$

$$(6) \int \sin x dx = -\cos x + c$$

$$(7) \int \cos x dx = \sin x + c$$

$$(8) \int \sec^2 x dx = \tan x + c$$

$$(9) \int \operatorname{cosec}^2 x dx = -\cot x + c$$

$$(10) \int \sec x \tan x dx = \sec x + c$$

$$(11) \int \operatorname{cosec} x \cot x dx = -\operatorname{cosec} x + c$$

$$(12) \int \tan x dx = \log|\sec x| + c$$

$$(13) \int \cot x dx = \log|\sin x| + c$$

$$(14) \int \sec x dx = \log|\sec x + \tan x| + c = \log\left|\tan\left(\frac{\pi}{4} + \frac{x}{2}\right)\right| + c$$

$$(15) \int \operatorname{cosec} x dx = \log|\operatorname{cosec} x - \cot x| + c = \log\left|\tan\frac{x}{2}\right| + c$$

$$(16) \int e^{mx} dx = \frac{e^{mx}}{m} + c$$

$$(17) \int a^{mx} dx = \frac{a^{mx}}{m \log_e a} + c$$

$$(18) \int \sin mx dx = -\frac{\cos mx}{m} + c$$

$$(19) \int \cos mx dx = \frac{\sin mx}{m} + c$$

$$(20) \int \sec^2 mx dx = \frac{\tan mx}{m} + c$$

$$(21) \int \operatorname{cosec}^2 mx dx = -\frac{\cot mx}{m} + c$$