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Class 11Sc

Sub Physics (Unit 02)

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## 0.6 INTEGRAL CALCULUS

### Integration

Integration is the reverse process of differentiation. It is the process of finding a function whose derivative is given. If derivative of function  $f(x)$  w.r.t.  $x$  is  $f'(x)$ , then integration of  $f'(x)$  w.r.t.  $x$  is  $f(x)$ . Symbolically, we can say

$$\text{if } \frac{d}{dx} [f(x)] = f'(x), \quad \text{then } \int f'(x) dx = f(x).$$

### Some Standard Elementary Integrals

Some standard elementary integrals alongwith their results on differentiation are as follows :

Differentiation	Integration
1. $\frac{d}{dx} (x^n) = nx^{n-1}$	$\int x^n dx = \frac{x^{n+1}}{(n+1)} + c$ provided $n \neq -1$ Here $c$ is constant of integration.
2. $\frac{d}{dx} (x) = 1$	$\int dx = x + c$
3. $\frac{d}{dx} (\log_e x) = \frac{1}{x}$	$\int \frac{dx}{x} = \log_e x + c$
4. $\frac{d}{dx} (\sin x) = \cos x$	$\int \cos x \cdot dx = \sin x + c$
5. $\frac{d}{dx} (\cos x) = -\sin x$	$\int \sin x \cdot dx = -\cos x + c$
6. $\frac{d}{dx} (\tan x) = \sec^2 x$	$\int \sec^2 x \cdot dx = \tan x + c$
7. $\frac{d}{dx} (\cot x) = -\operatorname{cosec}^2 x$	$\int \operatorname{cosec}^2 x \cdot dx = -\cot x + c$
8. $\frac{d}{dx} (\sec x) = \sec x \cdot \tan x$	$\int \sec x \cdot \tan x dx = \sec x + c$