Integrations

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

$$\int \frac{1}{x} = \log x + C$$

$$\int \sec^2 x = \tan x$$

$$\int \csc^2 x = -\cot x +$$

$$\int \sec x \tan x = \sec x + C$$

$$\int \csc x \cot x =$$

$$\int \frac{1}{1+x^2} dx = \tan^{-1} x$$

$$\int \frac{1}{\sqrt{1-x^2}} =$$

(i) $\int\left(\frac{x^2-1}{x^2+1}\right)dx$ (ii) $\int\left(\frac{x^6-1}{x^2+1}\right)dx$

(iii) $\int\left(\frac{x^4}{1+x^2}\right)dx$ (iv) $\int\left(\frac{x^2}{1+x^2}\right)dx$

$$\int\left(9\sin x-7\cos x-\frac{6}{\cos^2 x}+\frac{2}{\sin^2 x}+\cot^2 x\right)dx$$

$$\int\left(\frac{\cot x}{\sin x}-\tan^2 x-\frac{\tan x}{\cos x}+\frac{2}{\cos^2 x}\right)dx$$

(i) $\int \sec x(\sec x+\tan x)\,dx$ **[CBSE 2011]**

(ii) $\int \operatorname{cosec} x(\operatorname{cosec} x-\cot x)\,dx$

$$\int\left(9\sin x-7\cos x-\frac{6}{\cos^2 x}+\frac{2}{\sin^2 x}+\cot^2 x\right)dx \Rightarrow$$

$$\int\left(\frac{\cot x}{\sin x}-\tan^2 x-\frac{\tan x}{\cos x}+\frac{2}{\cos^2 x}\right)dx$$

$6\sec^2 x \quad + 2\csc^2 x \quad + \csc^2 x - 1$

$\tan x \quad + 2\cot x \quad + (\cot x) - x$

$-\tan^2 x = (\sec^2 x - 1)$

$-\cot^2 x = (\csc^2 x - 1)$

Evaluate:

1. (i) $\int x^7 dx$ (ii) $\int x^{-7} dx$ (iii) $\int x^{-1} dx$

   (iv) $\int x^{5/3} dx$ (v) $\int x^{-5/4} dx$ (vi) $\int 2^x \, dx$

   (vii) $\int \sqrt[3]{x^2} dx$ (viii) $\int \frac{1}{\sqrt[4]{x^3}} dx$ (ix) $\int \frac{2}{x^2} \, dx$

2. (i) $\int \left(6x^5 - \frac{2}{x^4} - 7x + \frac{3}{x} - 5 + 4e^x + 7^x \right) dx$

   (ii) $\int \left(8 - x + 2x^3 - \frac{6}{x^3} + 2x^{-5} + 5x^{-1} \right) dx$ (iii) $\int \left(\frac{x}{a} + \frac{a}{x} + x^a + a^x + ax \right) dx$

3. (i) $\int (2-5x)(3+2x)(1-x) \, dx$ (ii) $\int \sqrt{x}(ax^2 + bx + c) \, dx$

Evaluate:

(i) $\int x^9 dx$ *(ii)* $\int \sqrt[3]{x} \, dx$ *(iii)* $\int dx$

(iv) $\int \frac{1}{x^2} \, dx$ *(v)* $\int \frac{1}{x^{1/3}} \, dx$ *(vi)* $\int 5^x \, dx$

(i) $\int\left(6x^5-\frac{2}{x^4}-7x+\frac{3}{x}-5+4e^x+7^x\right)dx$

$\int 6x^5 d(x) - 2\int x^{-4} d(x) - 7\int x\, d(x) + 3\int \frac{1}{x} - \int 5\, d(x) + 4\int e^x + \int 7^x\, d(x)$

$\{a^x = a^x \log_a e\}$

$\Rightarrow \frac{6x^6}{6} - 2\frac{x^{-3}}{(-3)} - 7\frac{x^2}{2} + 3\log x - 5x + 4e^x + \frac{7^x}{\log_7 e}$

(viii) $\int \frac{1}{\sqrt[4]{x^3}} dx$

$$\int \frac{1}{(x^3)^{1/4}} d(x) \Rightarrow \int \frac{1}{x^{3/4}} d(x)$$

$$\Rightarrow \int x^{-3/4} \, d(x)$$

$3^{\log_3 x}$

$3^{\log_3 x^2} \Rightarrow x^2$

(vii) $\int \sqrt[3]{x^2}\,dx$

x^n

$$\int (x^2)^{1/3} d(x) \quad = \int x^{2/3} d(x)$$

$$= \int \frac{x^{2/3+1}}{2/3+1} + C$$

$$= \frac{3x^{5/3}}{5} + C$$

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