Integral Formulae

1. $\int x^n dx = \frac{x^{n+1}}{n+1}\ (n \neq -1)$ $\int e^x dx = e^x$	$\int \frac{1}{x} dx = \log_e x$ $\int a^x dx = \frac{a^x}{\log_e a}$
2. $\int \sin x dx = -\cos x$ $\int \tan x dx = -\log \cos x$ $\int \sec x dx = \log(\sec x + \tan x)$ $\int \sec^2 x dx = \tan x$	$\int \cos x dx = \sin x$ $\int \cot x dx = \log \sin x$ $\int \text{cosec} x dx = \log(\text{cosec} x - \cot x)$ $\int \text{cosec}^2 x dx = -\cot x$
3. $\int \frac{dx}{a^2+x^2} = \frac{1}{a}\tan^{-1}\frac{x}{a}$ $\int \frac{dx}{a^2-x^2} = \frac{1}{2a}\log\frac{a+x}{a-x}$ $\int \frac{dx}{x^2-a^2} = \frac{1}{2a}\log\frac{x-a}{x+a}$	$\int \frac{dx}{\sqrt{a^2-x^2}} = \sin^{-1}\frac{x}{a}$ $\int \frac{dx}{\sqrt{a^2+x^2}} = \sinh^{-1}\frac{x}{a}$ $\int \frac{dx}{\sqrt{x^2-a^2}} = \cosh^{-1}\frac{x}{a}$
4. $\int \sqrt{a^2-x^2} dx = \frac{x}{2}\sqrt{a^2-x^2} + \frac{a^2}{2}\sin^{-1}\frac{x}{a}$ $\int \sqrt{a^2+x^2} dx = \frac{x}{2}\sqrt{a^2+x^2} + \frac{a^2}{2}\sinh^{-1}\frac{x}{a}$ $\int \sqrt{x^2-a^2} dx = \frac{x}{2}\sqrt{x^2-a^2} - \frac{a^2}{2}\cosh^{-1}\frac{x}{a}$	
5. $\int e^{ax}\sin bx dx = \frac{e^{ax}}{a^2+b^2}[a\sin bx - b\cos bx]$	$\int e^{ax}\cos bx dx = \frac{e^{ax}}{a^2+b^2}[a\cos bx + b\sin bx]$
6. $\int \sinh x dx = \cos hx$ $\int \tanh x dx = \log\cosh x$ $\int \text{sech}^2 x dx = \tanh x$	$\int \cosh x dx = \sinh x$ $\int \coth x dx = \log\sinh x$ $\int \text{cosech}^2 x dx = -\coth x$

7. $\int\limits_0^{\pi/2} \sin^n x dx = \int\limits_0^{\pi/2} \cos^n x dx = \frac{n-1}{n}.\frac{n-3}{n-2}.\cdots \times \left(\frac{\pi}{2}\text{only if n is even}\right)$ $\int\limits_0^{\pi/2} \sin^m x \cos^n x dx = \frac{(m-1)(m-3)(m-5)\cdots(n-1)(n-3)\cdots}{(m+n)(m+n-2)(m+n-4)\cdots} \times \left(\frac{\pi}{2}\text{only if both m and n are even}\right)$
8. $\int\limits_0^a f(x)dx = \int\limits_0^a f(a-x)dx$ $\int\limits_0^a f(x)dx = \begin{cases} 2\int\limits_0^a f(x)dx \text{ if } f(x) \text{ is even function i.e., } f(-x) = f(x) \\ 0 \text{ if f(x) is odd function i.e., } f(-x) = -f(x) \end{cases}$ $\int\limits_0^{2a} f(x)dx = \begin{cases} 2\int\limits_0^a f(a-x)dx \text{ if } f(2a-x) = f(x) \\ 0 \text{ if } f(2a-x) = -f(x) \end{cases}$ $\int [f(x)]^n .f'(x)dx = \frac{[f(x)]^{n+1}}{n+1}$
9.Leibnitz General rule of integration by parts $\int udv = (u)(v) - (u')(v_1) + (u'')(v_2) - \cdots$ where ' denotes the times of differentiation of u and subscript number denotes the times of integration of v.