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

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

(24) $\int \tan mx \ dx = \frac{1}{m} \log|\sec mx| + c$

(25) $\int \cot mx \ dx = \frac{1}{m} \log|\sin mx| + c$

(26) $\int \sec mx \ dx = \frac{1}{m} \log|\sec mx + \tan mx| + c = \frac{1}{m} \log\left|\tan\left(\frac{\pi}{4} + \frac{mx}{2}\right)\right| + c$

(27) $\int cosec\ mx \ dx = \frac{1}{m} \log|cosec\ mx - \cot mx| + c = \frac{1}{m} \log\left|\tan\frac{mx}{2}\right| + c$

(28) $\int \frac{1}{x^2+a^2} dx = \frac{1}{a} \tan^{-1}\frac{x}{a} + c \quad [a \neq 0]$

(29) $\int \frac{1}{x^2-a^2} dx = \frac{1}{2a} \log\left|\frac{x-a}{x+a}\right| + c \quad [a \neq 0]$

(30) $\int \frac{1}{a^2-x^2} dx = \frac{1}{2a} \log\left|\frac{a+x}{a-x}\right| + c \quad [a \neq 0]$

(31) $\int \frac{1}{\sqrt{a^2-x^2}} dx = \sin^{-1}\frac{x}{a} + c = -\cos^{-1}\frac{x}{a} + c$

(32) $\int \frac{1}{x\sqrt{x^2-a^2}} dx = \frac{1}{a}\sec^{-1}\frac{|x|}{a} + c = -\frac{1}{a}\operatorname{cosec}^{-1}\frac{|x|}{a} + c$

Integration by parts:-

$$\int uv\ dx = u\int v\ dx - \int\left[\frac{du}{dx}\int v\ dx\right]dx$$

where, u is the 1st function of x & v is the 2nd function of x

How to choose 1st & 2nd function:-

Use this rule--------ILATE

where,

I= inverse function

L= logarithmic function

A= algebraic function

T= trigonometric function

E= exponential function

(33) $\int e^{ax} \sin bx\ dx = \frac{e^{ax}}{a^2+b^2}(a\sin bx - b\cos bx) + c = \frac{e^{ax}}{\sqrt{a^2+b^2}}\sin\left(bx - \tan^{-1}\frac{b}{a}\right) + c$

(34) $\int e^{ax} \cos bx\ dx = \frac{e^{ax}}{a^2+b^2}(a\cos bx + b\sin bx) + c = \frac{e^{ax}}{\sqrt{a^2+b^2}}\cos\left(bx - \tan^{-1}\frac{b}{a}\right) + c$

(35) $\int \sqrt{x^2 \pm a^2}\ dx = \frac{x}{2}\sqrt{x^2 \pm a^2} \pm \frac{a^2}{2}\log\left|x + \sqrt{x^2 \pm a^2}\right| + c$

(36) $\int \sqrt{a^2 - x^2}\ dx = \frac{x}{2}\sqrt{a^2 - x^2} + \frac{a^2}{2}\sin^{-1}\frac{x}{a} + c$

Definite Integral:-

(1)Definite integral as the limit of a sum