Ques:- $\int \frac{1}{\sin x \cdot \cos^3 x} dx =$

$$\frac{1}{\sin x \cdot \cos^3 x} = \frac{\sin^2 x + \cos^2 x}{\sin x \cdot \cos^3 x} = \int \left(\tan x \cdot \sec^2 x + \frac{1}{\sin x \cdot \cos x} \cdot dx \right)$$

t

$$\because \frac{\sin^2 x + \cos^2 x}{\sin x \cdot \cos x} = \int \tan x + \int \cot x + C$$

H.W. Q. $\displaystyle\int \frac{\cos 2x}{(\cos x+\sin x)^2}\,dx = \frac{\cos 2x}{\cos^2 x+\sin^2 x+2\sin x.\cos x} = \int \frac{\cos 2x\,dx}{1+\sin 2x}$

t

Q. $\displaystyle\int \sin^{-1}(\cos x)\,dx$

$\because \boxed{\cos\theta = \sin(\pi/2-\theta)}$

$\Rightarrow \sin^{-1}(\cos x) = \cancel{\sin^{-1}}\left[\cancel{\sin}\left(\frac{\pi}{2}-x\right)\right] = \pi/2 - x$

So, $\displaystyle\int\left(\frac{\pi}{2}-x\right)dx = \frac{\pi}{2}x - \frac{x^3}{2}+c$ Ans

H.W

$$\int \frac{e^x(1+x)}{\cos^2(e^x \cdot x)}\,dx$$

$e^x \cdot x \rightarrow t$

$$\int \frac{1}{\cos^2 t}\,dt$$

$(2)^2$

$(\sqrt{2})^2$

$$\int \frac{1}{\sqrt{x^2 - a^2}} \cdot dx$$

$$\int \frac{1}{a^2 - x^2}$$

$$\int \frac{1}{x^2 + 4} \cdot dx$$

maximum

1

$2x \cdot dx = dt$

?

Formula :-

$$\int \frac{1}{x^2-4}\,dx = \frac{1}{4}\log\left|\frac{x-2}{x+2}\right| + c$$

① $$\int \frac{1}{x^2-a^2}\,dx = \frac{1}{2a}\log\left|\frac{x-a}{x+a}\right| + c$$

② $$\int \frac{1}{a^2-x^2}\,dx = \frac{1}{2a}\log\left|\frac{a+x}{a-x}\right| + C$$

③ $$\int \frac{1}{x^2+a^2}\,dx = \frac{1}{a}\tan^{-1}\frac{x}{a} + c$$

(4) $\int \frac{1}{\sqrt{x^2 - a^2}} \cdot dx = \log\left|x + \sqrt{x^2 - a^2}\right| + C$

(5) $\int \frac{1}{\sqrt{a^2 - x^2}} \cdot dx = \sin^{-1}\frac{x}{a} + C$

(6) $\int \frac{1}{\sqrt{x^2 + a^2}} \cdot dx = \log\left|x + \sqrt{x^2 + a^2}\right| + C$

Q. $\int \frac{1}{\sqrt{1+4x^2}} \cdot dx \quad (2x)^2$

$\because \int \frac{1}{\sqrt{a^2+x^2}} = \log|x+\sqrt{a^2+x^2}|+C$

$\Rightarrow \frac{1}{\sqrt{1+(2x)^2}} \cdot dx \Rightarrow$ let $2x = t$

$2 \cdot dx = dt$

$dx = dt/2$

$\Rightarrow \int \frac{1}{\sqrt{1+t^2}} \cdot \frac{dt}{2} = \frac{1}{2}\int \frac{1}{\sqrt{1+t^2}} \cdot dt = \frac{1}{2} \log|t+\sqrt{1+t^2}|+C$

$= \frac{1}{2} \log|2x+\sqrt{1+4x^2}|+C$ Q

Q. $\int \frac{3x^2}{x^6+1} \cdot dx = \frac{3x^2}{\underbrace{(x^3)}_{t}{}^2+1}$

$x^3 = t$

$\boxed{3x^2 \cdot dx = dt}$

$\Rightarrow \int \frac{1}{t^2+1} \cdot dt = \frac{1}{1} \cdot \tan^{-1}\frac{t}{1} + C$

$= \tan^{-1}(x^3) + C$

Q. $\int \frac{1}{\sqrt{9-25x^2}} \cdot dx$

$\int \frac{1}{\sqrt{(3)^2-(5x)^2}} \cdot dx$

Q. $\int \frac{3x}{1+2x^4}\,dx$

$\frac{3x}{1+(\sqrt{2}\,x^2)^2}\,dx$

t

$\int \frac{1}{\text{Deno.}}$

value

t

Q. $\int \frac{x^2\,dx}{1-x^6} \Rightarrow \frac{x^2\,dx}{1-(x^3)^2}$

$x^3 = t$

$3x^2\,dx = dt$

$\Rightarrow \int \frac{dt/3}{1-t^2}$

Q. $$\int \frac{1}{\cos(x-a)\cos(x-b)}\,dx.$$

$$\therefore \frac{1}{\sin(a-b)}\int \left[\frac{1 \times \sin(a-b)}{\cos(x-a)\cdot\cos(x-b)}\right] = \frac{\sin\left[\overbrace{(x-b)}^{A} - \overbrace{(x-a)}^{B}\right]}{\cos(x-a)\cdot\cos(x-b)} \rightarrow \sin(A-B)$$

$$\Rightarrow \frac{\boxed{\sin(x-b)}\cos(x-a) - \cos(x-b)\boxed{\sin(x-a)}}{\boxed{\cos(x-a)}\cdot\boxed{\cos(x-b)}}$$

$$\Rightarrow \tan(x-b) - \tan(x-a)$$

$$\Rightarrow \Rightarrow \int \frac{1}{\sin(a-b)} \times \left[\tan(x-b) - \tan(x-a)\right] dx$$

$$\Rightarrow \frac{1}{\sin(a-b)} \times \left(\log\sec(x-b) - \log\sec(x-a)\right) + C \quad \text{Ans}$$