

Exercise 7.2

Integrate the functions in Exercises 1 to 37:

Question 1: $\frac{2x}{1+x^2}$

Answer 1:

Let $1 + x^2 = t$

$\therefore 2x \, dx = dt$

$$\Rightarrow \int \frac{2x}{1+x^2} dx = \int \frac{1}{t} dt$$

$$= \log |t| + C$$

$$= \log |1+x^2| + C$$

$$= \log(1+x^2) + C$$

Question 2:

$$\frac{(\log x)^2}{x}$$

Answer 2:

Let $\log |x| = t$

$$\therefore \frac{1}{x} dx = dt$$

$$\Rightarrow \int \frac{(\log |x|)^2}{x} dx = \int t^2 dt$$

$$= \frac{t^3}{3} + C$$

$$= \frac{(\log |x|)^3}{3} + C$$

Question 3: $\frac{1}{x+x \log x}$

Answer 3:

$$\frac{1}{x+x \log x} = \frac{1}{x(1+\log x)}$$

Let $1 + \log x = t$

$$\therefore \frac{1}{x} dx = dt$$

$$\Rightarrow \int \frac{1}{x(1+\log x)} dx = \int \frac{1}{t} dt$$

$$= \log |t| + C$$

$$= \log |1 + \log x| + C$$

Question 4: $\sin x \cdot \sin (\cos x)$

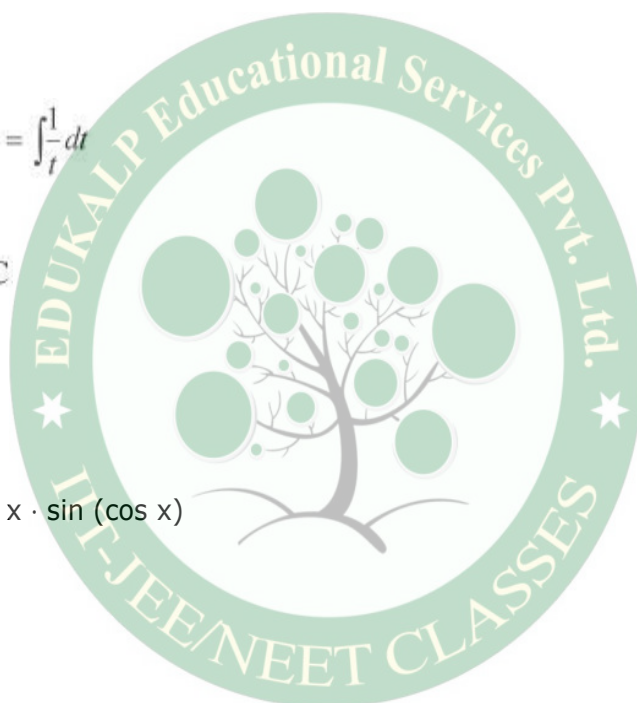
Answer 4:

$$\sin x \cdot \sin (\cos x)$$

Let $\cos x = t$

$$\therefore -\sin x dx = dt$$

$$\begin{aligned} \Rightarrow \int \sin x \cdot \sin (\cos x) dx &= -\int \sin t dt \\ &= -[-\cos t] + C \\ &= \cos t + C \\ &= \cos (\cos x) + C \end{aligned}$$



Question 5: $\sin(ax+b)\cos(ax+b)$ **Answer 5:**

$$\sin(ax+b)\cos(ax+b) = \frac{2\sin(ax+b)\cos(ax+b)}{2} = \frac{\sin 2(ax+b)}{2}$$

$$\text{Let } 2(ax+b) = t$$

$$\therefore 2adx = dt$$

$$\begin{aligned} \Rightarrow \int \frac{\sin 2(ax+b)}{2} dx &= \frac{1}{2} \int \frac{\sin t}{2a} dt \\ &= \frac{1}{4a} [-\cos t] + C \\ &= -\frac{1}{4a} \cos 2(ax+b) + C \end{aligned}$$

Question 6:

$$\sqrt{ax+b}$$

Answer 6:

$$\text{Let } ax+b = t$$

$$\Rightarrow adx = dt$$

$$\therefore dx = \frac{1}{a} dt$$

$$\Rightarrow \int (ax+b)^{\frac{1}{2}} dx = \frac{1}{a} \int t^{\frac{1}{2}} dt$$

$$= \frac{1}{a} \left(\frac{t^{\frac{3}{2}}}{\frac{3}{2}} \right) + C$$

$$= \frac{2}{3a} (ax+b)^{\frac{3}{2}} + C$$

Question 7: $x\sqrt{x+2}$ **Answer 7:**Let $x + 2 = t$ $\therefore dx = dt$

$$\begin{aligned}
 \Rightarrow \int x\sqrt{x+2} dx &= \int (t-2)\sqrt{t} dt \\
 &= \int \left(t^{\frac{3}{2}} - 2t^{\frac{1}{2}} \right) dt \\
 &= \int t^{\frac{3}{2}} dt - 2 \int t^{\frac{1}{2}} dt \\
 &= \frac{t^{\frac{5}{2}}}{\frac{5}{2}} - 2 \left(\frac{t^{\frac{3}{2}}}{\frac{3}{2}} \right) + C \\
 &= \frac{2}{5} t^{\frac{5}{2}} - \frac{4}{3} t^{\frac{3}{2}} + C \\
 &= \frac{2}{5} (x+2)^{\frac{5}{2}} - \frac{4}{3} (x+2)^{\frac{3}{2}} + C
 \end{aligned}$$

Question 8: $x\sqrt{1+2x^2}$ **Answer 8:**Let $1 + 2x^2 = t$ $\therefore 4x dx = dt$

$$\begin{aligned}
 \Rightarrow \int x\sqrt{1+2x^2} dx &= \int \frac{\sqrt{t} dt}{4} \\
 &= \frac{1}{4} \int t^{\frac{1}{2}} dt \\
 &= \frac{1}{4} \left(\frac{t^{\frac{3}{2}}}{\frac{3}{2}} \right) + C \\
 &= \frac{1}{6} (1+2x^2)^{\frac{3}{2}} + C
 \end{aligned}$$

Question 9: $(4x+2)\sqrt{x^2+x+1}$ **Answer 9:**

$$\text{Let } x^2 + x + 1 = t$$

$$\therefore (2x + 1)dx = dt$$

$$\int (4x+2)\sqrt{x^2+x+1} dx$$

$$= \int 2\sqrt{t} dt$$

$$= 2 \int \sqrt{t} dt$$

$$= 2 \left(\frac{t^{\frac{3}{2}}}{\frac{3}{2}} \right) + C$$

$$= \frac{4}{3} (x^2 + x + 1)^{\frac{3}{2}} + C$$

Question 10:

$$\frac{1}{x-\sqrt{x}}$$

Answer 10:

$$\frac{1}{x-\sqrt{x}} = \frac{1}{\sqrt{x}(\sqrt{x}-1)}$$

$$\text{Let } (\sqrt{x}-1) = t$$

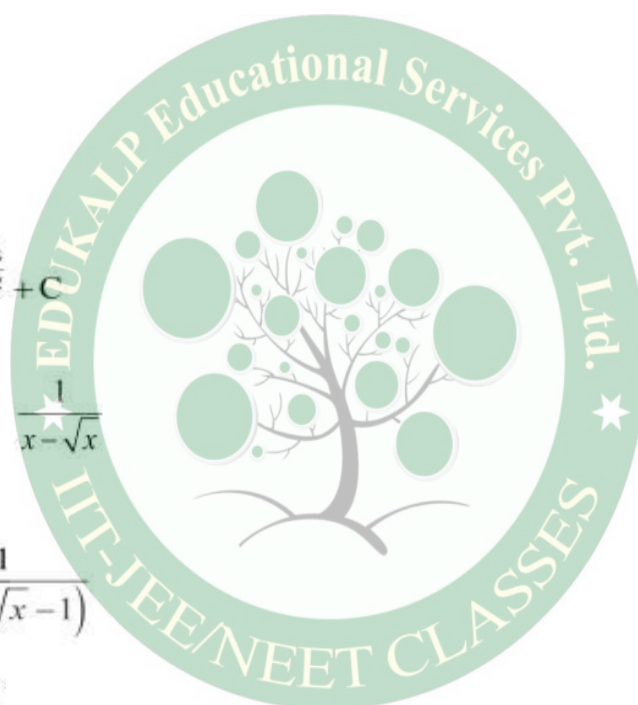
Let

$$\therefore \frac{1}{2\sqrt{x}} dx = dt$$

$$\Rightarrow \int \frac{1}{\sqrt{x}(\sqrt{x}-1)} dx = \int \frac{2}{t} dt$$

$$= 2 \log |t| + C$$

$$= 2 \log |\sqrt{x}-1| + C$$



Question 11: $\frac{x}{\sqrt{x+4}}, x > 0$

Answer 11:

Let $x + 4 = t$

$\therefore dx = dt$

$$\begin{aligned}
 \int \frac{x}{\sqrt{x+4}} dx &= \int \frac{(t-4)}{\sqrt{t}} dt \\
 &= \int \left(\sqrt{t} - \frac{4}{\sqrt{t}} \right) dt \\
 &= \frac{t^{\frac{3}{2}}}{\frac{3}{2}} - 4 \left(\frac{t^{\frac{1}{2}}}{\frac{1}{2}} \right) + C \\
 &= \frac{2}{3} (t)^{\frac{3}{2}} - 8(t)^{\frac{1}{2}} + C \\
 &= \frac{2}{3} t \cdot t^{\frac{1}{2}} - 8t^{\frac{1}{2}} + C \\
 &= \frac{2}{3} t^{\frac{1}{2}} (t - 12) + C \\
 &= \frac{2}{3} (x+4)^{\frac{1}{2}} (x+4-12) + C \\
 &= \frac{2}{3} \sqrt{x+4} (x-8) + C
 \end{aligned}$$

Question 12: $(x^3 - 1)^{\frac{1}{3}} x^5$

Answer 12:

Let $x^3 - 1 = t$

$\therefore 3x^2 dx = dt$

$$\begin{aligned}
 \Rightarrow \int (x^3 - 1)^{\frac{1}{3}} x^5 dx &= \int (x^3 - 1)^{\frac{1}{3}} x^3 \cdot x^2 dx \\
 &= \int t^{\frac{1}{3}} (t+1) \frac{dt}{3} \\
 &= \frac{1}{3} \int \left(t^{\frac{4}{3}} + t^{\frac{1}{3}} \right) dt \\
 &= \frac{1}{3} \left[\frac{t^{\frac{7}{3}}}{\frac{7}{3}} + \frac{t^{\frac{4}{3}}}{\frac{4}{3}} \right] + C \\
 &= \frac{1}{3} \left[\frac{3}{7} t^{\frac{7}{3}} + \frac{3}{4} t^{\frac{4}{3}} \right] + C \\
 &= \frac{1}{7} (x^3 - 1)^{\frac{7}{3}} + \frac{1}{4} (x^3 - 1)^{\frac{4}{3}} + C
 \end{aligned}$$

Question 13:

$$\frac{x^2}{(2+3x^3)^3}$$

Answer 13:Let $2 + 3x^3 = t$ $\therefore 9x^2 dx = dt$

$$\begin{aligned}\Rightarrow \int \frac{x^2}{(2+3x^3)^3} dx &= \frac{1}{9} \int \frac{dt}{t^3} \\ &= \frac{1}{9} \left[\frac{t^{-2}}{-2} \right] + C \\ &= \frac{-1}{18} \left(\frac{1}{t^2} \right) + C \\ &= \frac{-1}{18(2+3x^3)^2} + C\end{aligned}$$

Question 14:

$$\frac{1}{x(\log x)^m}, x > 0$$

Answer 14:Let $\log x = t$

$$\frac{1}{x} dx = dt$$

$$\begin{aligned}\Rightarrow \int \frac{1}{x(\log x)^m} dx &= \int \frac{dt}{t^m} \\ &= \left(\frac{t^{-m+1}}{1-m} \right) + C \\ &= \frac{(\log x)^{1-m}}{(1-m)} + C\end{aligned}$$

Question 15: $\frac{x}{9-4x^2}$

Answer 15:

Let $9 - 4x^2 = t$

$\therefore -8x \, dx = dt$

$$\begin{aligned}\Rightarrow \int \frac{x}{9-4x^2} dx &= \frac{-1}{8} \int \frac{1}{t} dt \\ &= \frac{-1}{8} \log|t| + C \\ &= \frac{-1}{8} \log|9-4x^2| + C\end{aligned}$$

Question 16: e^{2x+3}

Answer 16:

Let $2x + 3 = t$

$\therefore 2dx = dt$

$$\begin{aligned}\Rightarrow \int e^{2x+3} dx &= \frac{1}{2} \int e^t dt \\ &= \frac{1}{2} (e^t) + C \\ &= \frac{1}{2} e^{(2x+3)} + C\end{aligned}$$

Question 17:

$$\frac{x}{e^{x^2}}$$

Answer 17:Let $x^2 = t$

$$\therefore 2x dx = dt$$

$$\Rightarrow \int \frac{x}{e^{x^2}} dx = \frac{1}{2} \int \frac{1}{e^t} dt$$

$$= \frac{1}{2} \int e^{-t} dt$$

$$= \frac{1}{2} \left(\frac{e^{-t}}{-1} \right) + C$$

$$= -\frac{1}{2} e^{-x^2} + C$$

$$= \frac{-1}{2e^{x^2}} + C$$

Question 18:

$$\frac{e^{\tan^{-1} x}}{1+x^2}$$

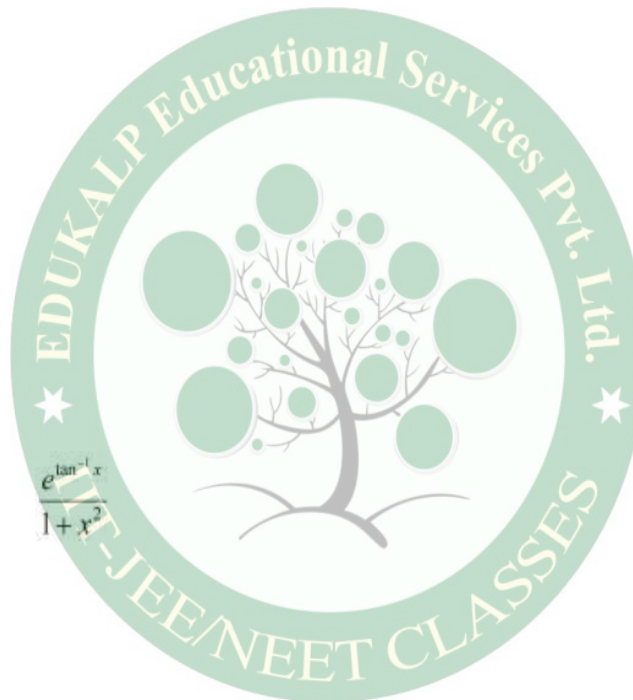
Answer 18:Let $\tan^{-1} x = t$

$$\therefore \frac{1}{1+x^2} dx = dt$$

$$\Rightarrow \int \frac{e^{\tan^{-1} x}}{1+x^2} dx = \int e^t dt$$

$$= e^t + C$$

$$= e^{\tan^{-1} x} + C$$



Question 19: $\frac{e^{2x}-1}{e^{2x}+1}$

Answer 19:

$$\frac{e^{2x}-1}{e^{2x}+1}$$

Dividing numerator and denominator by e^x , we obtain

$$\frac{\frac{(e^{2x}-1)}{e^x}}{\frac{(e^{2x}+1)}{e^x}} = \frac{e^x - e^{-x}}{e^x + e^{-x}}$$

Let $e^x + e^{-x} = t$

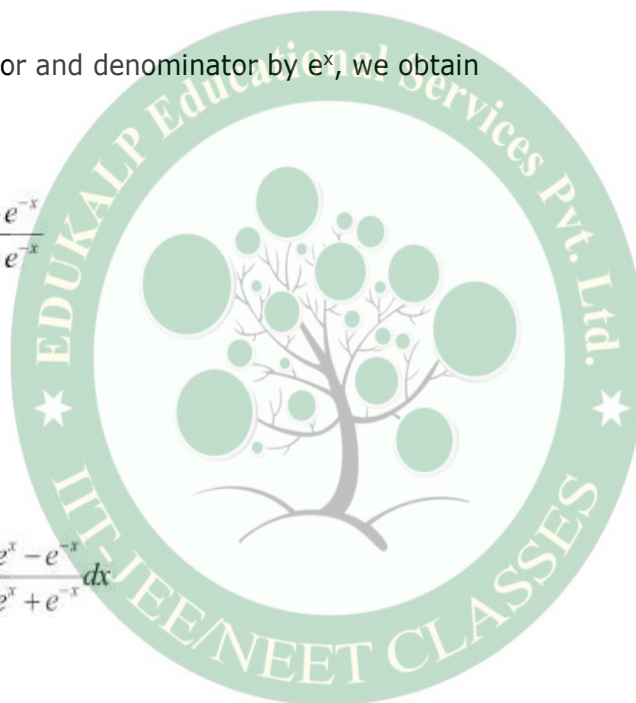
$$(e^x - e^{-x})dx = dt$$

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

$$= \int \frac{dt}{t}$$

$$= \log|t| + C$$

$$= \log|e^x + e^{-x}| + C$$



Question 20: $\frac{e^{2x} - e^{-2x}}{e^{2x} + e^{-2x}}$

Answer 20:

Let $e^{2x} + e^{-2x} = t$

$$(2e^{2x} - 2e^{-2x})dx = dt$$

$$\Rightarrow 2(e^{2x} - e^{-2x})dx = dt$$

$$\Rightarrow \int \left(\frac{e^{2x} - e^{-2x}}{e^{2x} + e^{-2x}} \right) dx = \int \frac{dt}{2t}$$

$$= \frac{1}{2} \int \frac{1}{t} dt$$

$$= \frac{1}{2} \log|t| + C$$

$$= \frac{1}{2} \log|e^{2x} + e^{-2x}| + C$$

Question 21:

$$\tan^2(2x-3)$$

Answer 21:

$$\tan^2(2x-3) = \sec^2(2x-3) - 1$$

Let $2x - 3 = t$

$\therefore 2dx = dt$

$$\Rightarrow \int \tan^2(2x-3) dx = \int \left[\sec^2(2x-3) - 1 \right] dx$$

$$= \frac{1}{2} \int (\sec^2 t) dt - \int 1 dx$$

$$= \frac{1}{2} \int \sec^2 t dt - \int 1 dx$$

$$= \frac{1}{2} \tan t - x + C$$

$$= \frac{1}{2} \tan(2x-3) - x + C$$

Question 22: $\sec^2(7 - 4x)$ **Answer 22:**Let $7 - 4x = t$ $\therefore -4dx = dt$

$$\begin{aligned}\therefore \int \sec^2(7 - 4x) dx &= \frac{-1}{4} \int \sec^2 t dt \\ &= \frac{-1}{4} (\tan t) + C \\ &= \frac{-1}{4} \tan(7 - 4x) + C\end{aligned}$$

Question 23:

$$\frac{\sin^{-1} x}{\sqrt{1-x^2}}$$

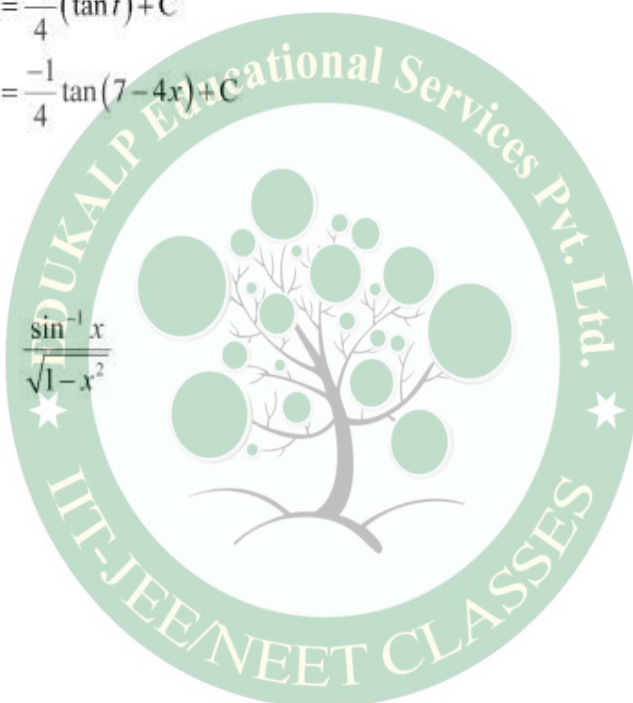
Answer 23:Let $\sin^{-1} x = t$

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

$$\Rightarrow \int \frac{\sin^{-1} x}{\sqrt{1-x^2}} dx = \int t dt$$

$$= \frac{t^2}{2} + C$$

$$= \frac{(\sin^{-1} x)^2}{2} + C$$



Question 24: $\frac{2 \cos x - 3 \sin x}{6 \cos x + 4 \sin x}$

Answer 24:

$$\frac{2 \cos x - 3 \sin x}{6 \cos x + 4 \sin x} = \frac{2 \cos x - 3 \sin x}{2(3 \cos x + 2 \sin x)}$$

Let $3 \cos x + 2 \sin x = t$

$$(-3 \sin x + 2 \cos x) dx = dt$$

$$\begin{aligned} \int \frac{2 \cos x - 3 \sin x}{6 \cos x + 4 \sin x} dx &= \int \frac{dt}{2t} \\ &= \frac{1}{2} \int \frac{1}{t} dt \\ &= \frac{1}{2} \log |t| + C \\ &= \frac{1}{2} \log |2 \sin x + 3 \cos x| + C \end{aligned}$$

Question 25:

Answer 25:

$$\frac{1}{\cos^2 x (1 - \tan x)^2} = \frac{\sec^2 x}{(1 - \tan x)^2}$$

Let $(1 - \tan x) = t$

$$-\sec^2 x dx = dt$$

$$\begin{aligned} \Rightarrow \int \frac{\sec^2 x}{(1 - \tan x)^2} dx &= \int \frac{-dt}{t^2} \\ &= -\int t^{-2} dt \\ &= +\frac{1}{t} + C \\ &= \frac{1}{(1 - \tan x)} + C \end{aligned}$$

Question 26: $\frac{\cos \sqrt{x}}{\sqrt{x}}$

Answer 26:

Let $\sqrt{x} = t$

$$\frac{1}{2\sqrt{x}} dx = dt$$

$$\begin{aligned} \Rightarrow \int \frac{\cos \sqrt{x}}{\sqrt{x}} dx &= 2 \int \cos t \, dt \\ &= 2 \sin t + C \\ &= 2 \sin \sqrt{x} + C \end{aligned}$$

Question 27: $\sqrt{\sin 2x} \cos 2x$

Answer 27:

Let $\sin 2x = t$

So, $2 \cos 2x \, dx = dt$

$$\begin{aligned} \Rightarrow \int \sqrt{\sin 2x} \cos 2x \, dx &= \frac{1}{2} \int \sqrt{t} \, dt \\ &= \frac{1}{2} \left(\frac{t^{\frac{3}{2}}}{\frac{3}{2}} \right) + C \\ &= \frac{1}{3} t^{\frac{3}{2}} + C \\ &= \frac{1}{3} (\sin 2x)^{\frac{3}{2}} + C \end{aligned}$$

Question 28: $\frac{\cos x}{\sqrt{1 + \sin x}}$

Answer 28:

Let $1 + \sin x = t$

$\therefore \cos x \, dx = dt$

$$\begin{aligned} \Rightarrow \int \frac{\cos x}{\sqrt{1 + \sin x}} \, dx &= \int \frac{dt}{\sqrt{t}} \\ &= \frac{t^{\frac{1}{2}}}{\frac{1}{2}} + C \\ &= 2\sqrt{t} + C \\ &= 2\sqrt{1 + \sin x} + C \end{aligned}$$

Question 29: $\cot x \log \sin x$

Answer 29:

Let $\log \sin x = t$

$$\Rightarrow \frac{1}{\sin x} \cdot \cos x \, dx = dt$$

$$\therefore \cot x \, dx = dt$$

$$\begin{aligned} \Rightarrow \int \cot x \log \sin x \, dx &= \int t \, dt \\ &= \frac{t^2}{2} + C \\ &= \frac{1}{2} (\log \sin x)^2 + C \end{aligned}$$

Question 30: $\frac{\sin x}{1 + \cos x}$

Answer 30:

Let $1 + \cos x = t$

$\therefore -\sin x \, dx = dt$

$$\begin{aligned}\Rightarrow \int \frac{\sin x}{1 + \cos x} \, dx &= \int -\frac{dt}{t} \\ &= -\log|t| + C \\ &= -\log|1 + \cos x| + C\end{aligned}$$

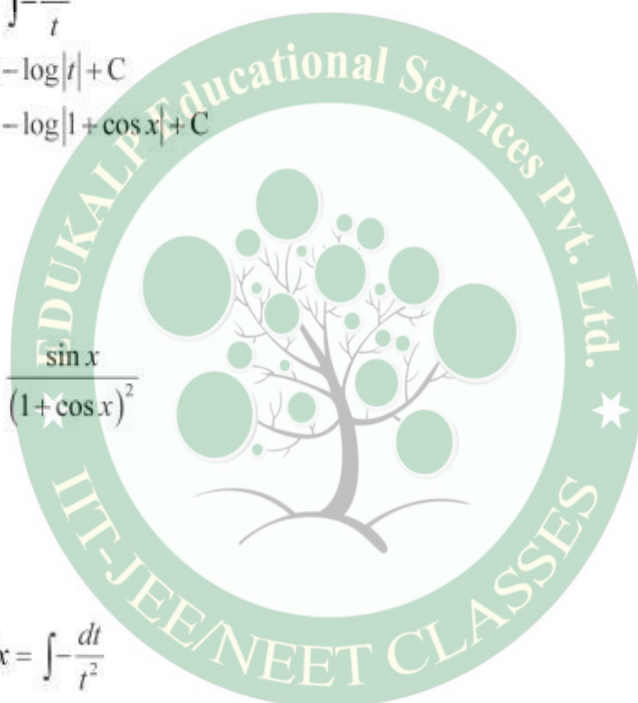
Question 31: $\frac{\sin x}{(1 + \cos x)^2}$

Answer 31:

Let $1 + \cos x = t$

$\therefore -\sin x \, dx = dt$

$$\begin{aligned}\Rightarrow \int \frac{\sin x}{(1 + \cos x)^2} \, dx &= \int -\frac{dt}{t^2} \\ &= -\int t^{-2} \, dt \\ &= \frac{1}{t} + C \\ &= \frac{1}{1 + \cos x} + C\end{aligned}$$



Question 32: $\frac{1}{1 + \cot x}$

Answer 32:

$$\begin{aligned}
 \text{Let } I &= \int \frac{1}{1 + \cot x} dx \\
 &= \int \frac{1}{1 + \frac{\cos x}{\sin x}} dx \\
 &= \int \frac{\sin x}{\sin x + \cos x} dx \\
 &= \frac{1}{2} \int \frac{2 \sin x}{\sin x + \cos x} dx \\
 &= \frac{1}{2} \int \frac{(\sin x + \cos x) + (\sin x - \cos x)}{(\sin x + \cos x)} dx \\
 &= \frac{1}{2} \int 1 dx + \frac{1}{2} \int \frac{\sin x - \cos x}{\sin x + \cos x} dx \\
 &= \frac{1}{2} (x) + \frac{1}{2} \int \frac{\sin x - \cos x}{\sin x + \cos x} dx
 \end{aligned}$$

Let $\sin x + \cos x = t \Rightarrow (\cos x - \sin x) dx = dt$

$$\begin{aligned}
 \therefore I &= \frac{x}{2} + \frac{1}{2} \int \frac{dt}{t} \\
 &= \frac{x}{2} - \frac{1}{2} \log |t| + C \\
 &= \frac{x}{2} - \frac{1}{2} \log |\sin x + \cos x| + C
 \end{aligned}$$

Question 33: $\frac{1}{1 - \tan x}$

Answer 33:

$$\begin{aligned}
 \text{Let } I &= \int \frac{1}{1 - \tan x} dx \\
 &= \int \frac{1}{1 - \frac{\sin x}{\cos x}} dx \\
 &= \int \frac{\cos x}{\cos x - \sin x} dx \\
 &= \frac{1}{2} \int \frac{2 \cos x}{\cos x - \sin x} dx \\
 &= \frac{1}{2} \int \frac{(\cos x - \sin x) + (\cos x + \sin x)}{(\cos x - \sin x)} dx \\
 &= \frac{1}{2} \int 1 dx + \frac{1}{2} \int \frac{\cos x + \sin x}{\cos x - \sin x} dx \\
 &= \frac{x}{2} + \frac{1}{2} \int \frac{\cos x + \sin x}{\cos x - \sin x} dx
 \end{aligned}$$

Put $\cos x - \sin x = t \Rightarrow (-\sin x - \cos x) dx = dt$

$$\begin{aligned}
 \therefore I &= \frac{x}{2} + \frac{1}{2} \int \frac{-(dt)}{t} \\
 &= \frac{x}{2} - \frac{1}{2} \log |t| + C \\
 &= \frac{x}{2} - \frac{1}{2} \log |\cos x - \sin x| + C
 \end{aligned}$$

Question 34: $\frac{\sqrt{\tan x}}{\sin x \cos x}$

Answer 34:

$$\begin{aligned} \text{Let } I &= \int \frac{\sqrt{\tan x}}{\sin x \cos x} dx \\ &= \int \frac{\sqrt{\tan x} \times \cos x}{\sin x \cos x \times \cos x} dx \\ &= \int \frac{\sqrt{\tan x}}{\tan x \cos^2 x} dx \\ &= \int \frac{\sec^2 x dx}{\sqrt{\tan x}} \end{aligned}$$

Let $\tan x = t \Rightarrow \sec^2 x dx = dt$

$$\begin{aligned} \therefore I &= \int \frac{dt}{\sqrt{t}} \\ &= 2\sqrt{t} + C \\ &= 2\sqrt{\tan x} + C \end{aligned}$$

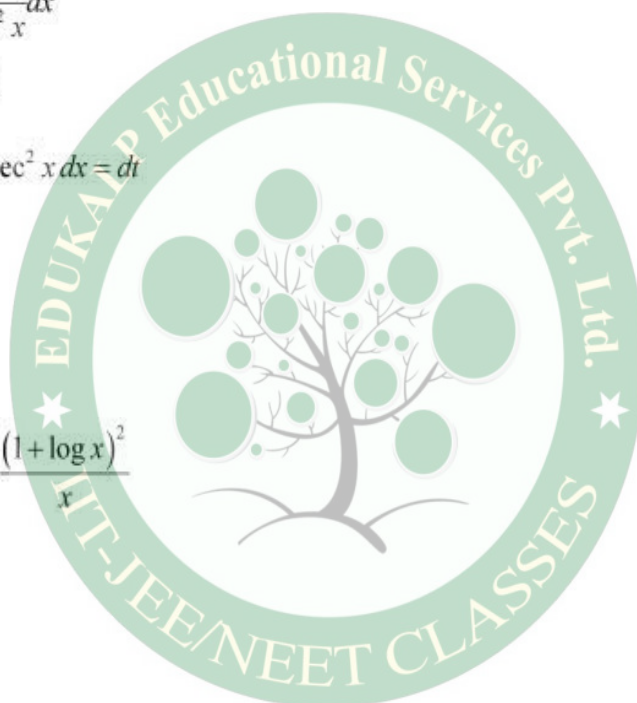
Question 35: $\frac{(1 + \log x)^2}{x}$

Answer 35:

Let $1 + \log x = t$

$$\frac{1}{x} dx = dt$$

$$\begin{aligned} \Rightarrow \int \frac{(1 + \log x)^2}{x} dx &= \int t^2 dt \\ &= \frac{t^3}{3} + C \\ &= \frac{(1 + \log x)^3}{3} + C \end{aligned}$$



Question 36: $\frac{(x+1)(x+\log x)^2}{x}$

Answer 36:

$$\frac{(x+1)(x+\log x)^2}{x} = \left(\frac{x+1}{x}\right)(x+\log x)^2 = \left(1+\frac{1}{x}\right)(x+\log x)^2$$

Let $(x+\log x) = t$

$$\therefore \left(1+\frac{1}{x}\right)dx = dt$$

$$\Rightarrow \int \left(1+\frac{1}{x}\right)(x+\log x)^2 dx = \int t^2 dt$$

$$= \frac{t^3}{3} + C$$

$$= \frac{1}{3}(x+\log x)^3 + C$$

Question 37: $\frac{x^3 \sin(\tan^{-1} x^4)}{1+x^8}$

Answer 37:

Let $x^4 = t$

$$\therefore 4x^3 dx = dt$$

$$\Rightarrow \int \frac{x^3 \sin(\tan^{-1} x^4)}{1+x^8} dx = \frac{1}{4} \int \frac{\sin(\tan^{-1} t)}{1+t^2} dt \quad \dots(1)$$

Let $\tan^{-1} t = u$

$$\therefore \frac{1}{1+t^2} dt = du$$

From (1), we obtain

$$\int \frac{x^3 \sin(\tan^{-1} x^4) dx}{1+x^8} = \frac{1}{4} \int \sin u du$$

$$= \frac{1}{4} (-\cos u) + C$$

$$= -\frac{1}{4} \cos(\tan^{-1} t) + C$$

$$= -\frac{1}{4} \cos(\tan^{-1} x^4) + C$$

Question 38:

$$\int \frac{10x^9 + 10^x \log_e 10}{x^{10} + 10^x} dx$$

equals

(A) $10^x - x^{10} + C$

(B) $10^x + x^{10} + C$

(C) $(10^x - x^{10})^{-1} + C$

(D) $\log(10^x + x^{10}) + C$

Answer 38:

Let $x^{10} + 10^x = t$

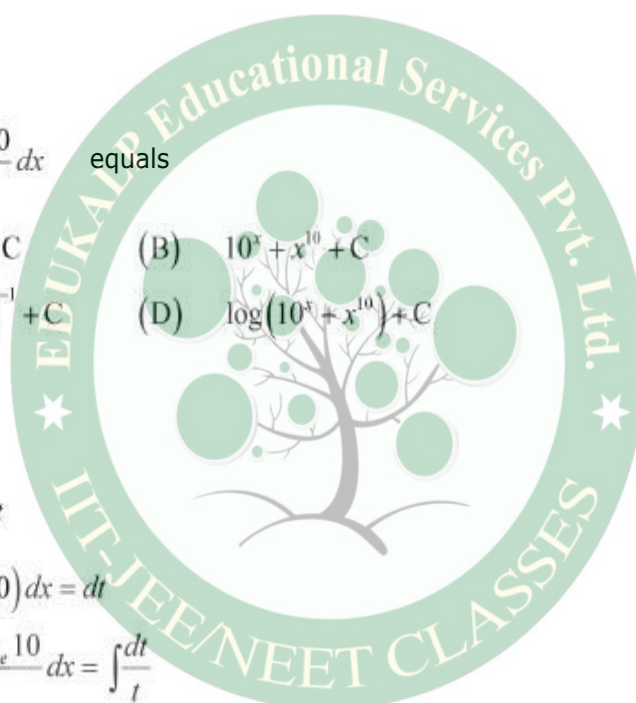
$$\therefore (10x^9 + 10^x \log_e 10) dx = dt$$

$$\Rightarrow \int \frac{10x^9 + 10^x \log_e 10}{x^{10} + 10^x} dx = \int \frac{dt}{t}$$

$$= \log t + C$$

$$= \log(10^x + x^{10}) + C$$

Hence, the correct Answer is D.



Question 39: $\int \frac{dx}{\sin^2 x \cos^2 x}$ equals

(A) $\tan x + \cot x + C$

(B) $\tan x - \cot x + C$

(C) $\tan x \cot x + C$

(D) $\tan x - \cot 2x + C$

Answer 39:

$$\begin{aligned}\text{Let } I &= \int \frac{dx}{\sin^2 x \cos^2 x} \\&= \int \frac{1}{\sin^2 x \cos^2 x} dx \\&= \int \frac{\sin^2 x + \cos^2 x}{\sin^2 x \cos^2 x} dx \\&= \int \frac{\sin^2 x}{\sin^2 x \cos^2 x} dx + \int \frac{\cos^2 x}{\sin^2 x \cos^2 x} dx \\&= \int \sec^2 x dx + \int \operatorname{cosec}^2 x dx \\&= \tan x - \cot x + C\end{aligned}$$

Hence, the correct Answer is B.