



Exercise 7.3 : Solutions of Questions on Page Number : 307

Q1 : $\sin^2(2x+5)$

Answer :

$$\begin{aligned}\sin^2(2x+5) &= \frac{1-\cos 2(2x+5)}{2} = \frac{1-\cos(4x+10)}{2} \\ \Rightarrow \int \sin^2(2x+5) dx &= \int \frac{1-\cos(4x+10)}{2} dx \\ &= \frac{1}{2} \int 1 dx - \frac{1}{2} \int \cos(4x+10) dx \\ &= \frac{1}{2} x - \frac{1}{2} \left(\frac{\sin(4x+10)}{4} \right) + C \\ &= \frac{1}{2} x - \frac{1}{8} \sin(4x+10) + C\end{aligned}$$

Answer needs Correction? [Click Here](#)

Q2 : $\sin 3x \cos 4x$

Answer :

It is known that, $\sin A \cos B = \frac{1}{2} \{ \sin(A+B) + \sin(A-B) \}$

$$\begin{aligned}\therefore \int \sin 3x \cos 4x dx &= \frac{1}{2} \int \{ \sin(3x+4x) + \sin(3x-4x) \} dx \\ &= \frac{1}{2} \int \{ \sin 7x + \sin(-x) \} dx \\ &= \frac{1}{2} \int \{ \sin 7x - \sin x \} dx \\ &= \frac{1}{2} \int \sin 7x dx - \frac{1}{2} \int \sin x dx \\ &= \frac{1}{2} \left(\frac{-\cos 7x}{7} \right) - \frac{1}{2} (-\cos x) + C \\ &= \frac{-\cos 7x}{14} + \frac{\cos x}{2} + C\end{aligned}$$

Answer needs Correction? [Click Here](#)

Q3 : $\cos 2x \cos 4x \cos 6x$

Answer :

It is known that, $\cos A \cos B = \frac{1}{2} \{ \cos(A+B) + \cos(A-B) \}$

$$\begin{aligned}\therefore \int \cos 2x (\cos 4x \cos 6x) dx &= \int \cos 2x \left[\frac{1}{2} \{ \cos(4x+6x) + \cos(4x-6x) \} \right] dx \\ &= \frac{1}{2} \int \{ \cos 2x \cos 10x + \cos 2x \cos(-2x) \} dx \\ &= \frac{1}{2} \int \{ \cos 2x \cos 10x + \cos^2 2x \} dx \\ &= \frac{1}{2} \int \left[\left(\frac{1}{2} \cos(2x+10x) + \cos(2x-10x) \right) + \left(\frac{1+\cos 4x}{2} \right) \right] dx \\ &= \frac{1}{4} \int (\cos 12x + \cos 8x + 1 + \cos 4x) dx \\ &= \frac{1}{4} \left[\frac{\sin 12x}{12} + \frac{\sin 8x}{8} + x + \frac{\sin 4x}{4} \right] + C\end{aligned}$$

Answer needs Correction? [Click Here](#)

Q4 : $\sin^3(2x+1)$

Answer :

Let $I = \int \sin^3(2x+1)$

$$\begin{aligned}\Rightarrow \int \sin^3(2x+1) dx &= \int \sin^2(2x+1) \cdot \sin(2x+1) dx \\ &= \int (1 - \cos^2(2x+1)) \sin(2x+1) dx\end{aligned}$$

Let $\cos(2x+1) = t$

$$\Rightarrow -2 \sin(2x+1) dx = dt$$

$$\Rightarrow \sin(2x+1) dx = \frac{-dt}{2}$$

$$\begin{aligned}
 \Rightarrow I &= \frac{-1}{2} \int (1-t^2) dt \\
 &= \frac{-1}{2} \left[t - \frac{t^3}{3} \right] \\
 &= \frac{-1}{2} \left\{ \cos(2x+1) - \frac{\cos^3(2x+1)}{3} \right\} \\
 &= \frac{-\cos(2x+1)}{2} + \frac{\cos^3(2x+1)}{6} + C
 \end{aligned}$$

Answer needs Correction? [Click Here](#)

Q5 : $\sin^3 x \cos^3 x$

Answer :

$$\begin{aligned}
 \text{Let } I &= \int \sin^3 x \cos^3 x \cdot dx \\
 &= \int \cos^3 x \cdot \sin^2 x \cdot \sin x \cdot dx \\
 &= \int \cos^3 x (1 - \cos^2 x) \sin x \cdot dx
 \end{aligned}$$

$$\text{Let } \cos x = t$$

$$\Rightarrow -\sin x \cdot dx = dt$$

$$\begin{aligned}
 \Rightarrow I &= - \int t^3 (1-t^2) dt \\
 &= - \int (t^3 - t^5) dt \\
 &= - \left[\frac{t^4}{4} - \frac{t^6}{6} \right] + C \\
 &= - \left[\frac{\cos^4 x}{4} - \frac{\cos^6 x}{6} \right] + C \\
 &= \frac{\cos^6 x}{6} - \frac{\cos^4 x}{4} + C
 \end{aligned}$$

Answer needs Correction? [Click Here](#)

Q6 : $\sin x \sin 2x \sin 3x$

Answer :

$$\text{It is known that, } \sin A \sin B = \frac{1}{2} \{ \cos(A-B) - \cos(A+B) \}$$

$$\begin{aligned}
 \therefore \int \sin x \sin 2x \sin 3x \, dx &= \int \left[\sin x \cdot \frac{1}{2} \{ \cos(2x-3x) - \cos(2x+3x) \} \right] dx \\
 &= \frac{1}{2} \int (\sin x \cos(-x) - \sin x \cos 5x) \, dx \\
 &= \frac{1}{2} \int (\sin x \cos x - \sin x \cos 5x) \, dx \\
 &= \frac{1}{2} \int \frac{\sin 2x}{2} \, dx - \frac{1}{2} \int \sin x \cos 5x \, dx \\
 &= \frac{1}{4} \left[\frac{-\cos 2x}{2} \right] - \frac{1}{2} \int \left\{ \frac{1}{2} \sin(x+5x) + \sin(x-5x) \right\} \, dx \\
 &= \frac{-\cos 2x}{8} - \frac{1}{4} \int (\sin 6x + \sin(-4x)) \, dx \\
 &= \frac{-\cos 2x}{8} - \frac{1}{4} \left[\frac{-\cos 6x}{3} + \frac{\cos 4x}{4} \right] + C \\
 &= \frac{-\cos 2x}{8} - \frac{1}{8} \left[\frac{-\cos 6x}{3} + \frac{\cos 4x}{2} \right] + C \\
 &= \frac{1}{8} \left[\frac{\cos 6x}{3} - \frac{\cos 4x}{2} - \cos 2x \right] + C
 \end{aligned}$$

Answer needs Correction? [Click Here](#)

Q7 : $\sin 4x \sin 8x$

Answer :

It is known that,

$$\sin A \sin B = \frac{1}{2} \cos(A-B) - \cos(A+B)$$

[Math Processing Error]

Answer needs Correction? [Click Here](#)

Q8 : $\frac{1-\cos x}{1+\cos x}$

Answer :

$$\begin{aligned}
 \frac{1-\cos x}{1+\cos x} &= \frac{2 \sin^2 \frac{x}{2}}{2 \cos^2 \frac{x}{2}} & \left[2 \sin^2 \frac{x}{2} = 1 - \cos x \text{ and } 2 \cos^2 \frac{x}{2} = 1 + \cos x \right] \\
 &= \tan^2 \frac{x}{2} \\
 &= \left(\sec^2 \frac{x}{2} - 1 \right) \\
 \therefore \int \frac{1-\cos x}{1+\cos x} dx &= \int \left(\sec^2 \frac{x}{2} - 1 \right) dx
 \end{aligned}$$

$$= \left[\frac{\tan \frac{x}{2}}{\frac{1}{2}} - x \right] + C$$

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

Answer needs Correction? [Click Here](#)

Q9 : $\frac{\cos x}{1 + \cos x}$

Answer :

$$\frac{\cos x}{1 + \cos x} = \frac{\cos^2 \frac{x}{2} - \sin^2 \frac{x}{2}}{2 \cos^2 \frac{x}{2}} \quad \left[\cos x = \cos^2 \frac{x}{2} - \sin^2 \frac{x}{2} \text{ and } \cos x = 2 \cos^2 \frac{x}{2} - 1 \right]$$

$$= \frac{1}{2} \left[1 - \tan^2 \frac{x}{2} \right]$$

$$\therefore \int \frac{\cos x}{1 + \cos x} dx = \frac{1}{2} \int \left(1 - \tan^2 \frac{x}{2} \right) dx$$

$$= \frac{1}{2} \int \left(1 - \sec^2 \frac{x}{2} + 1 \right) dx$$

$$= \frac{1}{2} \int \left(2 - \sec^2 \frac{x}{2} \right) dx$$

$$= \frac{1}{2} \left[2x - \frac{\tan \frac{x}{2}}{\frac{1}{2}} \right] + C$$

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

Answer needs Correction? [Click Here](#)

Q10 : $\sin^4 x$

Answer :

$$\sin^4 x = \sin^2 x \sin^2 x$$

$$= \left(\frac{1 - \cos 2x}{2} \right) \left(\frac{1 - \cos 2x}{2} \right)$$

$$= \frac{1}{4} (1 - \cos 2x)^2$$

$$= \frac{1}{4} [1 + \cos^2 2x - 2 \cos 2x]$$

$$= \frac{1}{4} \left[1 + \left(\frac{1 + \cos 4x}{2} \right) - 2 \cos 2x \right]$$

$$= \frac{1}{4} \left[1 + \frac{1}{2} + \frac{1}{2} \cos 4x - 2 \cos 2x \right]$$

$$= \frac{1}{4} \left[\frac{3}{2} + \frac{1}{2} \cos 4x - 2 \cos 2x \right]$$

$$\therefore \int \sin^4 x \, dx = \frac{1}{4} \int \left[\frac{3}{2} + \frac{1}{2} \cos 4x - 2 \cos 2x \right] dx$$

$$= \frac{1}{4} \left[\frac{3}{2} x + \frac{1}{2} \left(\frac{\sin 4x}{4} \right) - \frac{2 \sin 2x}{2} \right] + C$$

$$= \frac{1}{8} \left[3x + \frac{\sin 4x}{4} - 2 \sin 2x \right] + C$$

$$= \frac{3x}{8} - \frac{1}{4} \sin 2x + \frac{1}{32} \sin 4x + C$$

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Q11 : $\cos^4 2x$

Answer :

$$\cos^4 2x = (\cos^2 2x)^2$$

$$= \left(\frac{1 + \cos 4x}{2} \right)^2$$

$$= \frac{1}{4} [1 + \cos^2 4x + 2 \cos 4x]$$

$$= \frac{1}{4} \left[1 + \left(\frac{1 + \cos 8x}{2} \right) + 2 \cos 4x \right]$$

$$= \frac{1}{4} \left[1 + \frac{1}{2} + \frac{\cos 8x}{2} + 2 \cos 4x \right]$$

$$= \frac{1}{4} \left[\frac{3}{2} + \frac{\cos 8x}{2} + 2 \cos 4x \right]$$

$$\therefore \int \cos^4 2x \, dx = \int \left(\frac{3}{8} + \frac{\cos 8x}{8} + \frac{\cos 4x}{2} \right) dx$$

$$= \frac{3}{8} x + \frac{\sin 8x}{64} + \frac{\sin 4x}{8} + C$$

Answer needs Correction? [Click Here](#)

Q12 : $\sin^2 x$

$$\overline{1 + \cos x}$$

Answer :

$$\begin{aligned}\frac{\sin^2 x}{1 + \cos x} &= \frac{\left(2 \sin \frac{x}{2} \cos \frac{x}{2}\right)^2}{2 \cos^2 \frac{x}{2}} \left[\sin x = 2 \sin \frac{x}{2} \cos \frac{x}{2}; \cos x = 2 \cos^2 \frac{x}{2} - 1 \right] \\ &= \frac{4 \sin^2 \frac{x}{2} \cos^2 \frac{x}{2}}{2 \cos^2 \frac{x}{2}} \\ &= 2 \sin^2 \frac{x}{2} \\ &= 1 - \cos x \\ \therefore \int \frac{\sin^2 x}{1 + \cos x} dx &= \int (1 - \cos x) dx \\ &= x - \sin x + C\end{aligned}$$

Answer needs Correction? [Click Here](#)

Q13 : $\frac{\cos 2x - \cos 2\alpha}{\cos x - \cos \alpha}$

Answer :

$$\begin{aligned}\frac{\cos 2x - \cos 2\alpha}{\cos x - \cos \alpha} &= \frac{-2 \sin \frac{2x+2\alpha}{2} \sin \frac{2x-2\alpha}{2}}{-2 \sin \frac{x+\alpha}{2} \sin \frac{x-\alpha}{2}} \left[\cos C - \cos D = -2 \sin \frac{C+D}{2} \sin \frac{C-D}{2} \right] \\ &= \frac{\sin(x+\alpha) \sin(x-\alpha)}{\sin\left(\frac{x+\alpha}{2}\right) \sin\left(\frac{x-\alpha}{2}\right)} \\ &= \frac{\left[2 \sin\left(\frac{x+\alpha}{2}\right) \cos\left(\frac{x+\alpha}{2}\right)\right] \left[2 \sin\left(\frac{x-\alpha}{2}\right) \cos\left(\frac{x-\alpha}{2}\right)\right]}{\sin\left(\frac{x+\alpha}{2}\right) \sin\left(\frac{x-\alpha}{2}\right)} \\ &= 4 \cos\left(\frac{x+\alpha}{2}\right) \cos\left(\frac{x-\alpha}{2}\right) \\ &= 2 \left[\cos\left(\frac{x+\alpha}{2} + \frac{x-\alpha}{2}\right) + \cos\frac{x+\alpha}{2} - \frac{x-\alpha}{2} \right] \\ &= 2 [\cos(x) + \cos \alpha] \\ &= 2 \cos x + 2 \cos \alpha \\ \therefore \int \frac{\cos 2x - \cos 2\alpha}{\cos x - \cos \alpha} dx &= \int 2 \cos x + 2 \cos \alpha \\ &= 2 [\sin x + x \cos \alpha] + C\end{aligned}$$

Answer needs Correction? [Click Here](#)

Q14 : $\frac{\cos x - \sin x}{1 + \sin 2x}$

Answer :

$$\begin{aligned}\frac{\cos x - \sin x}{1 + \sin 2x} &= \frac{\cos x - \sin x}{(\sin^2 x + \cos^2 x) + 2 \sin x \cos x} \left[\sin^2 x + \cos^2 x = 1; \sin 2x = 2 \sin x \cos x \right] \\ &= \frac{\cos x - \sin x}{(\sin x + \cos x)^2} \\ \text{Let } \sin x + \cos x &= t \\ \therefore (\cos x - \sin x) dx &= dt \\ \Rightarrow \int \frac{\cos x - \sin x}{1 + \sin 2x} dx &= \int \frac{\cos x - \sin x}{(\sin x + \cos x)^2} dx \\ &= \int \frac{dt}{t^2} \\ &= \int t^{-2} dt \\ &= -t^{-1} + C \\ &= -\frac{1}{t} + C \\ &= \frac{-1}{\sin x + \cos x} + C\end{aligned}$$

Answer needs Correction? [Click Here](#)

Q15 : $\tan^3 2x \sec 2x$

Answer :

$$\begin{aligned}\tan^3 2x \sec 2x &= \tan^2 2x \tan 2x \sec 2x \\ &= (\sec^2 2x - 1) \tan 2x \sec 2x \\ &= \sec^2 2x \cdot \tan 2x \sec 2x - \tan 2x \sec 2x \\ \therefore \int \tan^3 2x \sec 2x dx &= \int \sec^2 2x \tan 2x \sec 2x dx - \int \tan 2x \sec 2x dx \\ &= \int \sec^2 2x \tan 2x \sec 2x dx - \frac{\sec 2x}{2} + C \\ \text{Let } \sec 2x &= t \\ \therefore 2 \sec 2x \tan 2x dx &= dt\end{aligned}$$

$$\begin{aligned}
 \therefore \int \tan^3 2x \sec 2x \, dx &= \frac{1}{2} \int t^2 dt - \frac{\sec 2x}{2} + C \\
 &= \frac{t^3}{6} - \frac{\sec 2x}{2} + C \\
 &= \frac{(\sec 2x)^3}{6} - \frac{\sec 2x}{2} + C
 \end{aligned}$$

Answer needs Correction? [Click Here](#)

Q16: $\tan^4 x$

Answer :

$$\begin{aligned}
 \tan^4 x &= \tan^2 x \cdot \tan^2 x \\
 &= (\sec^2 x - 1) \tan^2 x \\
 &= \sec^2 x \tan^2 x - \tan^2 x \\
 &= \sec^2 x \tan^2 x - (\sec^2 x - 1) \\
 &= \sec^2 x \tan^2 x - \sec^2 x + 1
 \end{aligned}$$

$$\begin{aligned}
 \therefore \int \tan^4 x \, dx &= \int \sec^2 x \tan^2 x \, dx - \int \sec^2 x \, dx + \int 1 \cdot dx \\
 &= \int \sec^2 x \tan^2 x \, dx - \tan x + x + C \quad \dots(1)
 \end{aligned}$$

Consider $\int \sec^2 x \tan^2 x \, dx$

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

$$\Rightarrow \int \sec^2 x \tan^2 x \, dx = \int t^2 dt = \frac{t^3}{3} = \frac{\tan^3 x}{3}$$

From equation (1), we obtain

$$\int \tan^4 x \, dx = \frac{1}{3} \tan^3 x - \tan x + x + C$$

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Q17: $\frac{\sin^3 x + \cos^3 x}{\sin^2 x \cos^2 x}$

Answer :

$$\begin{aligned}
 \frac{\sin^3 x + \cos^3 x}{\sin^2 x \cos^2 x} &= \frac{\sin^3 x}{\sin^2 x \cos^2 x} + \frac{\cos^3 x}{\sin^2 x \cos^2 x} \\
 &= \frac{\sin x}{\cos^2 x} + \frac{\cos x}{\sin^2 x} \\
 &= \tan x \sec x + \cot x \operatorname{cosec} x
 \end{aligned}$$

$$\begin{aligned}
 \therefore \int \frac{\sin^3 x + \cos^3 x}{\sin^2 x \cos^2 x} \, dx &= \int (\tan x \sec x + \cot x \operatorname{cosec} x) \, dx \\
 &= \sec x - \operatorname{cosec} x + C
 \end{aligned}$$

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Q18: $\frac{\cos 2x + 2 \sin^2 x}{\cos^2 x}$

Answer :

$$\begin{aligned}
 \frac{\cos 2x + 2 \sin^2 x}{\cos^2 x} &= \frac{\cos 2x + (1 - \cos 2x)}{\cos^2 x} \quad [\cos 2x = 1 - 2 \sin^2 x] \\
 &= \frac{1}{\cos^2 x} \\
 &= \sec^2 x
 \end{aligned}$$

$$\therefore \int \frac{\cos 2x + 2 \sin^2 x}{\cos^2 x} \, dx = \int \sec^2 x \, dx = \tan x + C$$

Answer needs Correction? [Click Here](#)

Q19: $\frac{1}{\sin x \cos^3 x}$

Answer :

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Q20: $\frac{\cos 2x}{(\cos x + \sin x)^2}$

Answer :

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

$$\begin{aligned}
 \therefore \int \frac{\cos 2x}{(\cos x + \sin x)^2} dx &= \int \frac{\cos 2x}{(1 + \sin 2x)} dx \\
 \text{Let } 1 + \sin 2x &= t \\
 \Rightarrow 2 \cos 2x dx &= dt \\
 \therefore \int \frac{\cos 2x}{(\cos x + \sin x)^2} dx &= \frac{1}{2} \int \frac{1}{t} dt \\
 &= \frac{1}{2} \log |t| + C \\
 &= \frac{1}{2} \log |1 + \sin 2x| + C \\
 &= \frac{1}{2} \log |(\sin x + \cos x)^2| + C \\
 &= \log |\sin x + \cos x| + C
 \end{aligned}$$

Answer needs Correction? [Click Here](#)

Q21 : $\sin^{-1}(\cos x)$

Answer :

$$\begin{aligned}
 \sin^{-1}(\cos x) \\
 \text{Let } \cos x &= t \\
 \text{Then, } \sin x &= \sqrt{1-t^2} \\
 \Rightarrow (-\sin x) dx &= dt \\
 dx &= \frac{-dt}{\sin x} \\
 dx &= \frac{-dt}{\sqrt{1-t^2}} \\
 \therefore \int \sin^{-1}(\cos x) dx &= \int \sin^{-1} t \left(\frac{-dt}{\sqrt{1-t^2}} \right) \\
 &= - \int \frac{\sin^{-1} t}{\sqrt{1-t^2}} dt \\
 \text{Let } \sin^{-1} t &= u \\
 \Rightarrow \frac{1}{\sqrt{1-t^2}} dt &= du \\
 \therefore \int \sin^{-1}(\cos x) dx &= \int u du \\
 &= -\frac{u^2}{2} + C \\
 &= -\frac{(\sin^{-1} t)^2}{2} + C \\
 &= -\frac{[\sin^{-1}(\cos x)]^2}{2} + C \quad \dots(1)
 \end{aligned}$$

It is known that,

$$\begin{aligned}
 \sin^{-1} x + \cos^{-1} x &= \frac{\pi}{2} \\
 \therefore \sin^{-1}(\cos x) &= \frac{\pi}{2} - \cos^{-1}(\cos x) = \left(\frac{\pi}{2} - x \right)
 \end{aligned}$$

Substituting in equation (1), we obtain

$$\begin{aligned}
 \int \sin^{-1}(\cos x) dx &= -\frac{\left[\frac{\pi}{2} - x \right]^2}{2} + C \\
 &= -\frac{1}{2} \left(\frac{\pi^2}{2} + x^2 - \pi x \right) + C \\
 &= -\frac{\pi^2}{8} - \frac{x^2}{2} + \frac{1}{2} \pi x + C \\
 &= \frac{\pi x}{2} - \frac{x^2}{2} + \left(C - \frac{\pi^2}{8} \right) \\
 &= \frac{\pi x}{2} - \frac{x^2}{2} + C_1
 \end{aligned}$$

Answer needs Correction? [Click Here](#)

Q22 : $\frac{1}{\cos(x-a)\cos(x-b)}$

Answer :

$$\begin{aligned}
 \frac{1}{\cos(x-a)\cos(x-b)} &= \frac{1}{\sin(a-b)} \left[\frac{\sin(a-b)}{\cos(x-a)\cos(x-b)} \right] \\
 &= \frac{1}{\sin(a-b)} \left[\frac{\sin[(x-b)-(x-a)]}{\cos(x-a)\cos(x-b)} \right] \\
 &= \frac{1}{\sin(a-b)} \left[\frac{\sin(x-b)\cos(x-a) - \cos(x-b)\sin(x-a)}{\cos(x-a)\cos(x-b)} \right] \\
 &= \frac{1}{\sin(a-b)} [\tan(x-b) - \tan(x-a)] \\
 \Rightarrow \int \frac{1}{\cos(x-a)\cos(x-b)} dx &= \frac{1}{\sin(a-b)} \int [\tan(x-b) - \tan(x-a)] dx \\
 &= \frac{1}{\sin(a-b)} [-\log|\cos(x-b)| + \log|\cos(x-a)|]
 \end{aligned}$$

$$= \frac{1}{\sin(a-b)} \left| \log \left| \frac{\cos(x-a)}{\cos(x-b)} \right| \right| + C$$

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Q23 : $\int \frac{\sin^2 x - \cos^2 x}{\sin^2 x \cos^2 x} dx$ is equal to

- A. $\tan x + \cot x + C$
- B. $\tan x + \operatorname{cosec} x + C$
- C. $-\tan x + \cot x + C$
- D. $\tan x + \sec x + C$

Answer :

$$\begin{aligned} \int \frac{\sin^2 x - \cos^2 x}{\sin^2 x \cos^2 x} dx &= \int \left(\frac{\sin^2 x}{\sin^2 x \cos^2 x} - \frac{\cos^2 x}{\sin^2 x \cos^2 x} \right) dx \\ &= \int (\sec^2 x - \operatorname{cosec}^2 x) dx \\ &= \tan x + \cot x + C \end{aligned}$$

Hence, the correct answer is A.

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Q24 : $\int \frac{e^x (1+x)}{\cos^2(e^x)} dx$ equals

- A. $-\cot(e^x) + C$
- B. $\tan(xe^x) + C$
- C. $\tan(e^x) + C$
- D. $\cot(e^x) + C$

Answer :

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

Let $e^x = t$

$$\Rightarrow (e^x \cdot x + e^x \cdot 1) dx = dt$$

$$e^x (x+1) dx = dt$$

$$\begin{aligned} \therefore \int \frac{e^x (1+x)}{\cos^2(e^x)} dx &= \int \frac{dt}{\cos^2 t} \\ &= \int \sec^2 t \, dt \\ &= \tan t + C \\ &= \tan(e^x \cdot x) + C \end{aligned}$$

Hence, the correct answer is B.

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