# Objective Questions

**Question 1.**
Mark (√) against the correct answer in each of the following:

$$\int x^6 dx = ?$$

A. $7x^7 + C$

B. $\frac{x^7}{7} + C$

C. $6x^5 + C$

D. $6x^7 + C$

**Answer:**
Given:

$\int x^6\, dx$,

$$\int x^n\, dx = \frac{x^{n+1}}{n+1} + c$$

$$\int x^6\, dx = \frac{x^{6+1}}{6+1} + c$$

$$= \frac{x^7}{7} + c$$

**Question 2.**
Mark (√) against the correct answer in each of the following:

$$\int x^{5/3} dx = ?$$

A. $\frac{3}{5} x^{2/3} + C$

B. $\frac{8}{3} x^{8/3} + C$

C. $\frac{3}{8}x^{8/3}+C$

D. $\frac{5}{3}x^{8/3}+C$

**Answer:**
Given:

$$\int x^{\frac{5}{3}}dx$$

$$\int x^n\,dx=\frac{x^{n+1}}{n+1}+c$$

$$\int x^{\frac{5}{3}}dx=\frac{x^{\frac{5}{3}+1}}{\frac{5}{3}+1}+c$$

$$=\frac{x^{\frac{8}{3}}}{\frac{8}{3}}+c$$

$$=\frac{3}{8}x^{\frac{8}{3}}+c$$

**Question 3.**
Mark (√) against the correct answer in each of the following:

$$\int\frac{1}{x^3}dx=?$$

A. $\frac{-3}{x^2}+C$

B. $\frac{-1}{2x^2}+C$

C. $\frac{-1}{3x^2}+C$

D. $\frac{x^{-2}}{2} + C$

**Answer:**
Given:

$$\int \frac{1}{x^3} dx$$

$$\int x^n dx = \frac{x^{n+1}}{n+1} + c$$

$$\int \frac{1}{x^3} dx = \frac{x^{-3+1}}{-3+1} + c$$

$$= -\frac{x^{-2}}{2} + c$$

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

**Question 4.**
Mark (√) against the correct answer in each of the following:

$$\int \sqrt[3]{x}\, dx = ?$$

A. $\frac{3}{4} x^{3/4} + C$

B. $\frac{4}{3} x^{3/4} + C$

C. $\frac{3}{4} x^{4/3} + C$

D. $\frac{4}{3} x^{4/3} + C$

**Answer:**

Given:

$$\int \sqrt[3]{x}\, dx$$

$$\int x^n\, dx = \frac{x^{n+1}}{n+1} + c$$

$$\int \sqrt[3]{x}\, dx = \frac{x^{\frac{1}{3}+1}}{\frac{1}{3}+1} + c$$

$$= \frac{x^{\frac{4}{3}}}{4} + c$$

$$= \frac{3}{4} x^{\frac{4}{3}} + c$$

**Question 5.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{1}{\sqrt[3]{x}} dx = ?$$

A. $\frac{3}{2} x^{2/3} + C$

B. $\frac{3}{2x^{2/3}} + C$

C. $\frac{2}{3x^{2/3}} + C$

D. $\frac{2}{3} x^{3/2} + C$

**Answer:**
Given:

$$\int \frac{1}{\sqrt[3]{x}} dx$$

$$\int x^n dx = \frac{x^{n+1}}{n+1} + c$$

$$\int \frac{1}{\sqrt[3]{x}} dx = \frac{x^{\frac{-1}{3}+1}}{\frac{-1}{3}+1} + c$$

$$= \frac{x^{\frac{2}{3}}}{\frac{2}{3}} + c$$

$$= \frac{3}{2} x^{\frac{2}{3}} + c$$

**Question 6.**
Mark (√) against the correct answer in each of the following:

$$\int \sqrt[3]{x^2}\, dx = ?$$

A. $\frac{5}{3} x^{5/3} + C$

B. $\frac{3}{5} x^{5/3} + C$

C. $\frac{5}{3} x^{3/5} + C$

D. $\frac{3}{5} x^{3/5} + C$

**Answer:**
Given:

$$\int \sqrt[3]{x^2} dx$$

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + c$$

$$\int \sqrt[3]{x^2}\,dx = \frac{x^{\frac{2}{3}+1}}{\frac{2}{3}+1} + c$$

$$= \frac{x^{\frac{5}{3}}}{\frac{5}{3}} + c$$

$$= \frac{3}{5}x^{\frac{5}{3}} + c$$

**Question 7.**
Mark (√) against the correct answer in each of the following:

$$\int 3^x\,dx = ?$$

A. $3^x\,(\log 3) + C$

B. $3^x + C$

C. $\frac{3^x}{\log 3} + C$

D. $\frac{\log 3}{3^x} + C$

**Answer:**
Given:

$$\int 3^x dx$$

$$\int a^x\,dx = \frac{a^x}{\ln a} + c$$

$$\int 3^x\,dx = \frac{3^x}{\ln 3} + c$$

**Question 8.**
Mark (√) against the correct answer in each of the following:

$$\int 2^{\log x}\,dx = ?$$

A. $\dfrac{2^{\log x+1}}{(\log x+1)}+C$

B. $\dfrac{x^{(\log 2+1)}}{(\log 2+1)}+C$

C. $\dfrac{2^{\log x}}{\log 2}+C$ 2adc

D. $\dfrac{2^{\log x}}{2}+C$

**Answer:**
Given:

$$\int 2^{log\,x}dx$$

As $2^{\log x} = x^{\log 2}$

$$I = \int x^{log\,2}dx$$

$$\int x^n dx = \frac{x^{n+1}}{n+1}+c$$

$$\int x^{\log 2}dx = \frac{x^{\log 2+1}}{\log 2+1}+c$$

**Question 9.**
Mark (√) against the correct answer in each of the following:

$$\int \text{cosec } x\,(\text{cosec } x+\cot x)\,dx = ?$$

A. cot x – cosec x + C

B. - cot x + cosec x + C

C. cot x + cosec x + C

D. - cot x – cosec x + C

**Answer:**
Given:

$$\int \text{cosec}x(\text{cosec}x + cot\ x)dx = \int (\csc x)^2 + \cot x \csc x\, dx$$

=-cot x-csc x+c

**Question 10.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{\sec x}{(\sec x + \tan x)} dx = ?$$

A. tan x + sec x + C

B. tan x – sec x + C

C. - tan x + sec x + C

D. - tan x – sec x + C

**Answer:**
Given:

$$\int \frac{sec\ x}{(sec\, x + tan\, x)} dx$$

Multiply and divide by (sec x-tan x )

$$= \int \frac{(\sec x)^2 - \tan x \sec x}{(\sec x)^2 - (\tan x)^2} dx$$

$=\int (\sec x)^2$ -tan x sec x dx

=tan x-sec x + c

**Question 11.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{(1-\cos 2x)}{(1+\cos 2x)} dx = ?$$

A. tan x + x + C

B. tan x – x + C

C. - tan x + x + C

D. - tan x – x + C

**Answer:**
Given:

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

$=\int (\tan x)^2$

$=\int ((\sec x)^2 - 1)\, dx$

$=\tan x - x + c$

**Question 12.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{1}{\sin^2 x \cos^2 x} dx = ?$$

A. tan x + cot x + C

B. - tan x + cot x + C

C. tan x – cot x + C

D. none of these

**Answer:**
Given:

$$\int \frac{1}{sin^2 x\, cos^2 x} dx$$

As we know $\sin^2 x + \cos^2 x = 1$

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

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

$=\int (\sec x)^2 + (\csc x)^2\, dx$

$=\tan x - \cot x + c$

**Question 13.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{\cos 2x}{\cos^2 x \sin^2 x} dx = ?$$

A. - cot x – tan x + C

B. - cot x + tan x + C

C. cot x – tan x + C

D. cot x + tan x + C

**Answer:**
Given:

$$\int \frac{cos\, 2x}{cos^2 x\, sin^2 x} dx = \int \frac{(\cos x)^2 - (\sin x)^2}{(\sin x)^2 (\cos x)^2} dx$$

$$= \int \frac{1}{(\sin x)^2} - \frac{1}{(\cos x)^2}\, dx$$

$=\int (\csc x)^2 - (\sec x)^2\, dx$

$=-\cot x - \tan x + c$

**Question 14.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{(\cos 2x - \cos 2\alpha)}{(\cos x - \cos \alpha)} dx = ?$$

A. 2 sin x + 2x cos α + C

B. 2 sin x – 2x cos α + C

C. - 2 sin x + 2x cos α + C

D. - 2 sin x – 2x cos α + C

**Answer:**
Given:

$$\int \frac{(cos\,2x - cos\,2\alpha)}{(cos\,x - cos\,\alpha)} dx = \int \frac{2\sin(x+\alpha)\sin(x-\alpha)}{2\sin\left(\frac{x+\alpha}{2}\right)\sin\left(\frac{x-\alpha}{2}\right)} dx$$

$$= \int 4\cos\left(\frac{x+\alpha}{2}\right)\cos\left(\frac{x-\alpha}{2}\right) dx$$

=2∫cos (x)+cos(α)dx

=2 sin x+2x cos α+c

**Question 15.**
Mark (√) against the correct answer in each of the following:

$$\int \sqrt{1+\cos 2x}\ dx = ?$$

A. $\sqrt{2}\cos x + C$

B. $\sqrt{2}\sin x + C$

C. $-\sqrt{2}\cos x + C$

D. $-\sqrt{2}\sin x + C$

**Answer:**

Given:

$$\int \sqrt{1+cos\,2\,x}\,dx = \int \sqrt{2(\cos x)^2}\,dx$$

=√2 ∫cos x dx

=√2 sin x+c

**Question 16.**
Mark (√) against the correct answer in each of the following:

$$\int \sqrt{1+\sin\ 2x}\ \mathrm{dx} = ?$$

A. sin x + cos x + C

B. - sin x + cos x + C

C. sin x – cos x + C

D. - sin x – cos x + C

**Answer:**
Given:

$$\int \sqrt{1+sin\,2x}\,dx = \int \sqrt{1+\frac{2\tan x}{1+(\tan x)^2}}\,dx$$

$$= \int \sqrt{\frac{(1+\tan x)^2}{(\sec x)^2}}\,dx$$

$$= \int \frac{1+\tan x}{\sec x}\,dx$$

=∫cos x + sin x dx

=sin x-cos x+c

**Question 17.**

Mark (√) against the correct answer in each of the following:

$$\int \frac{\cos 2x}{\sin^2 x \cos^2 x} dx = ?$$

A. cot x + tan x + C

B. - cot x + tan x + C

C. cot x – tan x + C

D. - cot x – tan x + C

**Answer:**
Given:

$$\int \frac{cos\ 2x}{sin^2\ x\ cos^2\ x} dx = \int \frac{(\cos x)^2 - (\sin x)^2}{(\sin x)^2 (\cos x)^2} dx$$

$$= \int \frac{1}{(\sin x)^2} - \frac{1}{(\cos x)^2}\ dx$$

$=\int (\csc x)^2 - (\sec x)^2\ dx$

$=-\cot x - \tan x + c$

**Question 18.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{dx}{(1 - \cos 2x)} = ?$$

A. $\frac{1}{2}\cot x + C$

B. 2 cot x + C

C. $-\frac{1}{2}\cot x + C$

D. -2 cot x + C

**Answer:**
Given:

$$\int \frac{dx}{(1-\cos 2x)} = \int \frac{1}{2(\sin x)^2} dx$$

$$= \frac{1}{2}\int (\csc x)^2 dx$$

$$= -\frac{1}{2}\cot x + c$$

**Question 19.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{\sin\ 2x}{\sin\ x} dx = ?$$

A. 2 sin x + C

B. $\frac{1}{2}\sin x + C$

C. 2 cos x + C

D. $\frac{1}{2}\cos x + C$

**Answer:**
Given:

$$\int \frac{\sin 2x}{\sin x} dx = \int \frac{2 \sin x \cos x}{\sin x} dx$$

=2∫cos x dx

=2 sin x+c

**Question 20.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{(1-\sin x)}{\cos^2 x} dx = ?$$

A. tan x + sec x + C

B. tan x – sec x + C

C. - tan x + sec x + C

D. - tan x – sec x + C

**Answer:**
Given:

$$\int \frac{(1-\sin x)}{\cos^2 x}dx = \int \frac{1}{(\cos x)^2} - \frac{\sin x}{(\cos x)^2}dx$$

$=\int(\sec x)^2$-tan x sec x dx

=tan x-sec x+c

**Question 21.**
Mark (√) against the correct answer in each of the following:

$$\int \cot^2 x \, dx = ?$$

A. - cot x – x + C

B. cot x – x + C

C. - cot x + x + C

D. cot x + x + C

**Answer:**
Given:

$\int\cot^2 x\,dx=\int((\csc x)^2-1)dx$

=-cot x-x+c

**Question 22.**
Mark (√) against the correct answer in each of the following:

$$\int \sec x(\sec x + \tan x)dx = ?$$

A. tan x - sec x + C

B. - tan x + sec x + C

C. tan x + sec x + C

D. - tan x – sec x + C

**Answer:**
Given:

$\int \sec x (\sec x + \tan x)\, dx = \int (\sec x)^2 + \sec x \tan x\, dx$

$= \tan x + \sec x + c$

**Question 23.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{\sec^2 x}{\text{cosec}^2 x} dx = ?$$

A. tan x + x + C

B. tan x – x + C

C. - tan x + x + C

D. - tan x - x + C

**Answer:**
Given:

$$\int \frac{sec^2 x}{\text{cosec}^2 x} dx = \int \frac{(\sin x)^2}{(\cos x)^2} dx$$

$= \int (\tan x)^2\, dx$

$= \int (\sec x)^2 - 1\, dx$

$= \tan x - x + c$

**Question 24.**
Mark (√) against the correct answer in each of the following:

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

A. x + sin x + C

B. x – sin x + C

C. sin x – x + C

D. - sin x – x + C

**Answer:**
Given:

$$\int \frac{sin^2 x}{(1+cos\, x)} dx = \int \frac{1-(\cos x)^2}{(1+\cos x)} dx$$

$$= \int \frac{(1+\cos x)(1-\cos x)}{(1+\cos x)} dx$$

$=\int(1-\cos x)dx$

$=x-\sin x+c$

**Question 25.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{\cot x}{(\text{cosec } x - \cot x)} dx = ?$$

A. - cosec x – cot x – x + C

B. cosec x – cot x – x + C

C. - cosec x + cot x – x + C

D. cosec x + cot x – x + C

**Answer:**
Given:

$$\int \frac{cot\, x}{(\mathbf{cosec} x - cot\, x)} dx = \int \frac{\cot x\,(\csc x + \cot x)}{((\csc x)^2 - (\cot x)^2)} dx$$

$=\int\cot x \csc x+(\csc x)^2\, dx$

$=-\csc x-\cot x+c$

**Question 26.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{\sin x}{(1+\sin x)} dx = ?$$

A. sec x + tan x + x + C

B. sec x – tan x + x + C

C. - sec x + tan x + x + C

D. None of these

**Answer:**
Given:

$$\int \frac{\sin x}{(1+\sin x)} dx$$

Multiply and divide by (1-sin x )

$$= \int \frac{\sin x - (\sin x)^2}{1-(\sin x)^2} dx$$

$$= \int \frac{\sin x - (\sin x)^2}{(\cos x)^2} dx$$

$= \int (\tan x \sec x - (\tan x)^2) dx$

$= \int (\tan x \sec x - (\sec x)^2 + 1) dx$

$= \sec x - \tan x + x + c$

**Question 27.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{(1+\sin x)}{(1-\sin x)} dx = ?$$

A. 2 tan x + 2 sec x + x + C

B. 2 tan x + 2 sec x – x + C

C. tan x + sec x – x + C

D. None of these

**Answer:**
Given:

$$\int \frac{(1+\sin x)}{(1-\sin x)} dx$$

Multiply and divide with (1 + sin x ) to get,

$$\int \frac{(1+\sin x)}{(1-\sin x)} dx$$

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

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

$=\int (\sec x)^2+(\tan x)^2+2 \tan x \sec x \, dx$

$=\int 2(\sec x)^2-1+2 \tan x \sec x \, dx$

$=2 \tan x-x+2 \sec x+c$

**Question 28.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{1}{(1+\cos x)} dx = ?$$

A. - cot x + cosec x + C

B. cot x – cosec x + C

C. cot x + cosec x + C

D. None of these

**Answer:**
Given:

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

Multiply and divide by (1-cos x)

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

$$= \int \frac{1-\cos x}{(\sin x)^2} dx$$

$=\int(\csc x)^2$-cot x csc x dx

=-cot x+csc x+c

**Question 29.**
Mark (√) against the correct answer in each of the following:

$$\int \sin^{-1}(\cos x) dx = ?$$

A. cosec x + C

B. $\frac{\pi x}{2} + \frac{x^2}{2} + C$

C. $\frac{\pi x}{2} - \frac{x^2}{2} + C$

D. $\frac{x^2}{2} - \frac{\pi x}{2} + C$

**Answer:**
Given:

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

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

$$=\int \frac{\pi}{2}-\cos^{-1}(\cos x)\,dx$$

$$=\int \frac{\pi}{2}-x\,dx$$

$$=\frac{\pi}{2}x-\frac{x^2}{2}+c$$

**Question 30.**
Mark (√) against the correct answer in each of the following:

$$\int \tan^{-1}\left\{\sqrt{\frac{1-\cos 2x}{1+\cos 2x}}\right\}dx=?$$

A. $\frac{-1}{\left(1+x^2\right)}+C$

B. $\frac{1}{\sqrt{1+x^2}}+C$

C. $\frac{1}{\sqrt{1-x^2}}+C$

D. $\frac{x^2}{2}+C$

**Answer:**
Given:

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

$=\int \tan^{-1}(\tan x)dx$

$=\int x\,dx$

$$=\frac{x^2}{2}+c$$

**Question 31.**
Mark (√) against the correct answer in each of the following:

$$\int \cot^{-1}\left(\frac{\sin 2x}{1-\cos 2x}\right)dx = ?$$

A. $\frac{-1}{\left(1+x^2\right)}+C$

B. $\frac{-1}{\left(1-x^2\right)}+C$

C. $\frac{x^2}{2}+C$

D. $2x^2+C$

**Answer:**
Given:

$$\int cot^{-1}\left(\frac{sin\,2x}{1-cos\,2x}\right)dx = \int \cot^{-1}\left(\frac{2\sin x\cos x}{1-1+2(\sin x)^2}\right)dx$$

$=\int \cot^{-1}(\cot x)\,dx$

$=\int x\,dx$

$$=\frac{x^2}{2}+c$$

**Question 32.**
Mark (√) against the correct answer in each of the following:

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

A. $-x^2+C$

B. $x^2+C$

C. $\frac{x^2}{2}+C$

D. $2x^2+C$

**Answer:**
Given:

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

$=\int 2x\,dx$

$=x^2+c$

**Question 33.**
Mark (√) against the correct answer in each of the following:

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

A. $x^2+C$

B. $-x^2+C$

C. $\frac{1}{\sqrt{1+x^2}}+C$

D. $\frac{1}{\sqrt{1-x^2}}+C$

**Answer:**
Given:

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

$=\int 2x\ dx$

$=x^2+c$

**Question 34.**
Mark (√) against the correct answer in each of the following:

$$\int \tan^{-1}(\operatorname{cosec} x - \cot x)\,dx = ?$$

A. $\frac{x^2}{4}+C$

B. $\frac{-x^2}{4}+C$

C. $\frac{x^2}{2}+C$

D. $\frac{-x^2}{2}+C$

**Answer:**
Given:

$$\int tan^{-1}(\mathbf{cosec}x - cot\,x)\,dx = \int \tan^{-1}\left(\frac{1-\cos x}{\sin x}\right)dx$$

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

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

$$= \int \frac{x}{2}dx$$

$$= \frac{x^2}{4} + c$$

**Question 35.**
Mark (√) against the correct answer in each of the following:

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

A. $\frac{x^3}{3} + x - \tan^{-1} x + C$

B. $\frac{x^3}{3} - x - 2\tan^{-1} x + C$

C. $\frac{x^3}{3} + x - 2\tan^{-1} x + C$

D. None of these

**Answer:**
Given:

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

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

$$= \int (x^2 + 1) dx - 2\{x - \tan^{-1} x\} + c$$

$$= \frac{x^3}{3} - x - 2\tan^{-1} x + c$$

**Question 36.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{(ax + b)}{(cx + d)} dx = ?$$

A. $\frac{ax}{c} + \log|cx + d| + C$

B. $\frac{a}{c} + \log|cx + d| + C$

C. $\frac{ax}{c} + \frac{(bc - ad)}{c^2}\log|cx + d| + C$

D. None of these

**Answer:**
Given:

$$\int \frac{(ax+b)}{(cx+d)}dx = \int \frac{ax}{cx+d} + \frac{b}{cx+d}dx$$

$$= a\int \frac{x}{cx+d} \times \frac{c}{c}dx + b\int \frac{1}{cx+d}dx$$

$$= \frac{a}{c}\left(\int \frac{cx+d}{cx+d}dx - \frac{d}{cx+d}\right) + b\ln|cx+d| + c$$

$$= \frac{a}{c}\left(x - \frac{d}{c}\ln|cx+d|\right) + \frac{b}{c}\ln|cx+d| + c$$

$$= \frac{a}{c}x + \frac{(bc-ad)}{c^2}\ln|cx+d| + c$$

**Question 37.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{\left(\sin^3 x + \cos^3 x\right)}{\sin^2 x \cos^2 x}dx = ?$$

A. sin x – cos x + C

B. tan x – cos x + C

C. sec x – cosec x + C

D. None of these

**Answer:**
Given:

$$\int \frac{(sin^3 x + cos^3 x)}{sin^2 x \, cos^2 x} dx = \int \frac{(\sin x)^3}{(\sin x)^2 (\cos x)^2} + \frac{(\sin x)^3}{(\sin x)^2 (\cos x)^2} dx$$

=∫(tan x sec x + csc x cot x )dx

=sec x-csc x+c

**Question 38.**
Mark (√) against the correct answer in each of the following:

$$\int \frac{\sin x}{\sin(x-\alpha)} dx = ?$$

A. $x \cos\alpha + (\sin\alpha) \log|\sin(x-\alpha)| + C$

B. $x \sin\alpha + (\sin\alpha) \log|\sin(x-\alpha)| + C$

C. $x \cos\alpha - (\sin\alpha) \log|\sin(x-\alpha)| + C$

D. $x \sin\alpha - (\sin\alpha) \log|\sin(x-\alpha)| + C$

**Answer:**
Given:

$$\int \frac{sin\, x}{sin(x-\alpha)} dx$$

Let x-α=t

dx=dt

$$I = \int \frac{\sin(t+\alpha)}{\sin t} dx$$

$$= \int \frac{\sin t \cos \alpha + \cos t \sin \alpha}{\sin t} dt$$

=∫cos α+sin α cot t dt

=t cos α+sin α ln|sin t |+c

=(x-α) cos α+(sinα)ln|sin(x-α) |+c

=x cos α+ (sin α)ln|sin(x-α) |+c

**Question 39.**
Mark (√) against the correct answer in each of the following:

$$\int \sin\ 3x\ \sin\ 2x\ dx = ?$$

A. $-\frac{1}{5}\cos\ 5x + C$

B. $\frac{1}{2}\sin\ x + \frac{1}{10}\sin\ 5x - C$

C. $\frac{1}{2}\sin\ x - \frac{1}{10}\sin\ 5x - C$

D. $-\frac{1}{3}\cos\ 3x - \frac{1}{2}\sin 2x + C$

**Answer:**
Given:

$$\int sin\,3x\,sin\,2x\,dx = \frac{1}{2}\int 2\sin 3x \sin 2x\,dx$$

$$= \frac{1}{2}\int \cos x - \cos 5x\,dx$$

$$= \frac{1}{2}\left\{\frac{\sin x}{1} - \frac{\sin 5x}{5}\right\} + c$$

$$= \frac{\sin x}{2} - \frac{\sin 5x}{10} + c$$

**Question 40.**
Mark (√) against the correct answer in each of the following:

$$\int \cos\ 3x\ \sin\ 2x\ dx = ?$$

A. $\frac{1}{2}\cos\ x - \frac{1}{10}\cos\ 5x + C$

B. $-\frac{1}{2}\sin\ x + \frac{1}{10}\sin\ 5x + C$

C. $-\frac{1}{2}\cos\ x + \frac{1}{10}\cos\ 5x + C$

D. None of these

**Answer:**
Given:

$$\int cos\,3x\,sin\,2x\,dx = \frac{1}{2}\int 2\cos 3x \sin 2x\,dx$$

$$= \frac{1}{2}\int \sin 5x + \cos x\,dx$$

$$= \frac{1}{2}\left\{\frac{-\cos 5x}{5} + \frac{\sin x}{1}\right\} + c$$

$$= -\frac{\cos 5x}{10} + \frac{\sin x}{2} + c$$

**Question 41.**
Mark (√) against the correct answer in each of the following:

$$\int \cos\ 4x\ \cos\ x\,dx = ?$$

A. $\frac{1}{5}\sin\ 5x + \frac{1}{3}\sin\ 3x + C$

B. $\frac{1}{5}\cos 5x - \frac{1}{3}\cos 3x + C$

C. $\frac{1}{10}\sin 5x + \frac{1}{6}\sin 3x + C$

D. None of these

**Answer:**
Given:

$$\int \cos 4x \cos x \, dx = \frac{1}{2}\int 2\cos 4x \cos x \, dx$$

$$= \frac{1}{2}\int \cos 5x + \cos 3x \, dx$$

$$= \frac{1}{2}\left\{\frac{\sin 5x}{5} + \frac{\sin 3x}{3}\right\} + c$$

$$= \frac{\sin 5x}{10} + \frac{\sin 3x}{6} + c$$