DPP – 05

Do Yourself (Questions From NCERT)

Q. Integrate following functions

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

Ans. $\log(1+x^2)+C$

Sol. $\int \frac{2x}{1+x^2}dx$

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

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

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

Ans. $\frac{1}{3}(\log|x|)^3+C$

Sol. $\int \frac{\log^2 x}{x}dx$

put $\log x=t$ .....(i)

Therefore, $\frac{1}{x}\cdot dx=dt$

$\Rightarrow \int t^2dt.$ $\quad \Rightarrow \frac{t^3}{3}+C$

Put value of t from eq. (1). we get,

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

3. $\frac{1}{x+x\log x}$

Ans. $\log|1+\log x|+C$

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

Let $1+\log x=t$

$\therefore \frac{1}{x}dx=dt$ $\quad \Rightarrow \int \frac{1}{x(1+\log x)}dx=\int_t^1 dt$

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

4. $\sin x\sin(\cos x)$

Ans. $\cos(\cos x)+C$

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

Let $\cos x=t$

$\therefore -\sin x dx=dt$

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

$=-[-\cos t]+C=\cos t+C=\cos(\cos x)+C$

5. $\sin(ax+b)\cos(ax+b)$

Ans. $-\frac{1}{4a}\cos 2(ax+b)+C$

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

Let $2(ax+b)=t$

$\therefore 2adx=dt$ $\quad \Rightarrow \int \frac{\sin 2(ax+b)}{2}dx=\frac{1}{2}\int \frac{\sin t dt}{2a}$

$=\frac{1}{4a}[-\cos t]+C$ $\quad =\frac{-1}{4a}\cos 2(ax+b)+C$

6. $\sqrt{ax+b}$

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

Sol. Let $ax+b=t$

$\Rightarrow adx=dt \qquad \therefore dx=\frac{1}{a}dt$

$\Rightarrow \int (ax+b)^{\frac{1}{2}}dx=\frac{1}{a}\int t^{\frac{1}{2}}dt \quad =\frac{1}{a}\left(\frac{t^{\frac{3}{2}}}{\frac{3}{2}}\right)+C$

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

7. $x\sqrt{x+2}$

Ans. $\frac{2}{5}(x+2)^{\frac{5}{2}}-\frac{4}{3}(x+2)^{\frac{3}{2}}+C$

Sol. Let $(x+2)=t$

$\therefore dx=dt \qquad \Rightarrow \int x\sqrt{x+2}dx=\int (t-2)\sqrt{t}dt$

$=\int \left(t^{\frac{3}{2}}-2t^{\frac{1}{2}}\right)dt \qquad =\int t^{\frac{3}{2}}dt-2\int t^{\frac{1}{2}}dt$

$=\frac{t^{\frac{5}{2}}}{\frac{5}{2}}-2\left(\frac{t^{\frac{3}{2}}}{\frac{3}{2}}\right)+C \qquad =\frac{2}{5}t^{\frac{5}{2}}-\frac{4}{3}t^{\frac{3}{2}}+C$

$=\frac{2}{5}(x+2)^{\frac{5}{2}}-\frac{4}{3}(x+2)^{\frac{3}{2}}+C$

8. $x\sqrt{1+2x^2}$

Ans. $\frac{1}{6}(1+2x^2)^{\frac{3}{2}}+C$

Sol. Let $1+2x^2=t$

$\therefore 4xdx=dt$

$\Rightarrow \int x\sqrt{1+2x^2}dx \qquad =\int \frac{\sqrt{t}dt}{4}$

$=\frac{1}{4}\int t^{\frac{1}{2}}dt \qquad =\frac{1}{4}\left(\frac{t^{\frac{3}{2}}}{\frac{3}{2}}\right)+C$

$=\frac{1}{6}(1+2x^2)^{\frac{3}{2}}+C$

9. $(4x+2)\sqrt{x^2+x+1}$

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

Sol. Let $x^2+x+1=t$

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

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

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

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

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

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

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

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

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

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

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

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

Ans. $\mathbf{\frac{2}{3}\sqrt{x+4}(x-8)+C}$

Sol. Let $x + 4 = t$

$\therefore dx = dt$

$\int \frac{x}{\sqrt{x+4}}dx$ $= \int \frac{(t-4)}{\sqrt{t}}dt$

$= \int \left(\sqrt{t} - \frac{4}{\sqrt{t}}\right)dt$ $= \frac{t^{\frac{3}{2}}}{\frac{3}{2}} - 4\left(\frac{t^{\frac{1}{2}}}{\frac{1}{2}}\right) + C$

$= \frac{2}{3}(t)^{\frac{3}{2}} - 8(t)^{\frac{1}{2}} + C$ $= \frac{2}{3}t \cdot t^{\frac{1}{2}} - 8t^{\frac{1}{2}} + C$

$= \frac{2}{3}t^{\frac{1}{2}}(t-12) + C$ $= \frac{2}{3}(x+4)^{\frac{1}{2}}(x+4-12) + C$

$= \frac{2}{3}\sqrt{x+4}(x-8) + C$

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

Ans. $\mathbf{\frac{1}{7}(x^3-1)^{\frac{7}{3}} + \frac{1}{4}(x^3-1)^{\frac{4}{3}} + C}$

Sol. Let $x^3 - 1 = t$

$\therefore 3x^2dx = dt$

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

$= \int t^{\frac{1}{3}}(t+1)\frac{dt}{3}$ $= \frac{1}{3}\int \left(t^{\frac{4}{3}} + t^{\frac{1}{3}}\right)dt$

$= \frac{1}{3}\left[\frac{t^{\frac{7}{3}}}{\frac{7}{3}} + \frac{t^{\frac{4}{3}}}{\frac{4}{3}}\right] + C$ $= \frac{1}{3}\left[\frac{3}{7}t^{\frac{7}{3}} + \frac{3}{4}t^{\frac{4}{3}}\right] + C$

$= \frac{1}{7}(x^3-1)^{\frac{7}{3}} + \frac{1}{4}(x^3-1)^{\frac{4}{3}} + C$

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

Ans. $\mathbf{-\frac{1}{18(2+3x^3)^2} + C}$

Sol. Let $2 + 3x^3 = t$

$\therefore 9x^2dx = dt$

$\Rightarrow \int \frac{x^2}{(2+3x^3)^3}dx = \frac{1}{9}\int \frac{dt}{(t)^3}$

$= \frac{1}{9}\left[\frac{t^{-2}}{-2}\right] + C$ $= \frac{-1}{18}\left(\frac{1}{t^2}\right) + C$

$= \frac{-1}{18(2+3x^3)^2} + C$

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

Ans. $\mathbf{\frac{(\log x)^{1-m}}{1-m} + C}$

Sol. Let $\log x = t$ $\therefore \frac{1}{x}dx = dt$

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

$= \left(\frac{t^{-m+1}}{1-m}\right) + C$ $= \frac{(\log x)^{1-m}}{(1-m)} + C$

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

Ans. $-\frac{1}{8}\log|9-4x^2| + C$

Sol. Let $9 - 4x^2 = t$

$\therefore -8xdx = dt \Rightarrow \int \frac{x}{9-4x^2}dx = \frac{-1}{8}\int_t^1 dt$

$= \frac{-1}{8}\log|t| + C$ $= \frac{-1}{8}\log|9-4x^2| + C$

16. e^{2x+3}

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

Sol. Let $2x + 3 = t$ $\therefore 2dx = dt$

$\Rightarrow \int e^{2x+3}dx$ $= \frac{1}{2}\int e^t dt$

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

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

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

Sol. Let $x^2 = t$ $\therefore 2xdx = dt$

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

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

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

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

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

Sol. Let $\tan^{-1} x = t$ $\therefore \frac{1}{1+x^2}dx = dt$

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

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

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

Ans. $\log(e^x + e^{-x}) + C$

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

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 $e^x + e^{-x} = t$ $\therefore (e^x - e^{-x})dx = dt$

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

$= \int \frac{dt}{t}$ $= \log|t| + C$

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

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

Ans. $\frac{1}{2}\log(e^{2x}+e^{-2x})+C$

Sol. Let $e^{2x}+e^{-2x}=t \quad \therefore (2e^{2x}-2e^{-2x})dx=dt$

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

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

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

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

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

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

Let $2x-3=t \quad \therefore 2dx=dt$

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

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

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

22. $\sec^2(7-4x)$

Ans. $-\frac{1}{4}\tan(7-4x)+C$

Sol. Let $7-4x=t$

$\therefore -4dx=dt$

$\therefore \int\sec^2(7-4x)dx=\frac{-1}{4}\int\sec^2 tdt$

$=\frac{-1}{4}(\tan t)+C \quad =\frac{-1}{4}\tan(7-4x)+C$

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

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

Sol. Let $\sin^{-1}x=t$

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

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

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

Ans. $\frac{1}{2}\log|2\sin x+3\cos x|+C$

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

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

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

$\int\frac{2\cos x-3\sin x}{6\cos x+4\sin x}dx=\int\frac{dt}{2t}$

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

$=\frac{1}{2}\log|2\sin x+3\cos x|+C$

25. $\frac{1}{\cos^2 x(1-\tan x)^2}$

Ans. $\frac{1}{(1-\tan x)}+C$

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

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

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

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

$= -\int t^{-2} dt \quad = +\frac{1}{t} + C$

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

26. $\frac{\cos\sqrt{x}}{\sqrt{x}}$

Ans. $\mathbf{2\sin\sqrt{x} + C}$

Sol. Let $\sqrt{x} = t \qquad \therefore \frac{1}{2\sqrt{x}} dx = dt$

$\Rightarrow \int \frac{\cos\sqrt{x}}{\sqrt{x}} dx \qquad = 2\int \cos t dt$

$= 2\sin t + C \qquad = 2\sin\sqrt{x} + C$

27. $\sqrt{\sin 2x}\cos 2x$

Ans. $\mathbf{\frac{1}{3}(\sin 2x)^{\frac{3}{2}} + C}$

Sol. Let $\sin 2x = t$

$\therefore 2\cos 2x dx = dt$

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

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

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

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

Ans. $\mathbf{2\sqrt{1+\sin x} + C}$

Sol. Let $1 + \sin x = t$

$\therefore \cos x dx = dt$

$\Rightarrow \int \frac{\cos x}{\sqrt{1+\sin x}} dx = \int \frac{dt}{\sqrt{t}}$

$= \frac{t^{\frac{1}{2}}}{\frac{1}{2}} + C \qquad = 2\sqrt{t} + C$

$= 2\sqrt{1+\sin x} + C$

29. $\cot x \log \sin x$

Ans. $\mathbf{\frac{1}{2}(\log \sin x)^2 + C}$

Sol. Let $\log \sin x = t$

$\Rightarrow \frac{1}{\sin x} \cdot \cos x dx = dt \qquad \therefore \cot x dx = dt$

$\Rightarrow \int \cot x \log \sin x dx = \int t dt$

$\therefore = \frac{t^2}{2} + C \qquad = \frac{1}{2}(\log \sin x)^2 + C$

30. $\frac{\sin x}{1+\cos x}$

Ans. $\mathbf{-\log|1+\cos x|+C}$

Sol. Let $1+\cos x = t$

$\therefore -\sin x dx = dt$

$\Rightarrow \int \frac{\sin x}{1+\cos x}dx = \int -\frac{dt}{t}$

$= -\log|t| + C \qquad = -\log|1+\cos x| + C$

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

Ans. $\mathbf{\frac{1}{1+\cos x}+C}$

Sol. Let $1+\cos x = t$

$\therefore -\sin x dx = dt$

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

$= -\int t^{-2}dt \qquad = \frac{1}{t}+C$

$= \frac{1}{1+\cos x}+C$

32. $\frac{1}{1+\cot x}$

Ans. $\mathbf{\frac{x}{2}-\frac{1}{2}\log|\cos x+\sin x|+C}$

Sol. $I = \int \frac{1}{1+\cot x}dx$

$= \int \frac{1}{1+\frac{\cos x}{\sin x}}dx \qquad = \int \frac{\sin x}{\sin x+\cos x}dx$

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

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

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

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

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

$\therefore I = \frac{x}{2}+\frac{1}{2}\int \frac{-(dt)}{t} \qquad = \frac{x}{2}-\frac{1}{2}\log|t|+C$

$= \frac{x}{2}-\frac{1}{2}\log|\sin x+\cos x|+C$

33. $\frac{1}{1-\tan x}$

Ans. $\mathbf{\frac{x}{2}-\frac{1}{2}\log|\cos x-\sin x|+C}$

Sol. Let $I = \int \frac{1}{1-\tan x}dx$

$= \int \frac{1}{1-\frac{\sin x}{\cos x}}dx \qquad = \int \frac{\cos x}{\cos x-\sin x}dx$

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

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

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

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

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

$\therefore I = \frac{x}{2}+\frac{1}{2}\int \frac{-(dt)}{t}$

$= \frac{x}{2}-\frac{1}{2}\log|t|+C \qquad = \frac{x}{2}-\frac{1}{2}\log|\cos x-\sin x|+C$

34. $\frac{\sqrt{\tan x}}{\sin x \cos x}$

Ans. $\mathbf{2\sqrt{\tan x} + C}$

Sol. Let $I = \int \frac{\sqrt{\tan x}}{\sin x \cos x} dx$

$= \int \frac{\sqrt{\tan x} \times \cos x}{\sin x \cos x \times \cos x} dx \qquad = \int \frac{\sqrt{\tan x}}{\tan x \cos^2 x} dx$

$= \int \frac{\sec^2 x dx}{\sqrt{\tan x}}$

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

$\therefore I = \int \frac{dt}{\sqrt{t}}$

$= 2\sqrt{t} + C \qquad = 2\sqrt{\tan x} + C$

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

Ans. $\mathbf{\frac{1}{3}(1 + \log x)^3 + C}$

Sol. Let $1 + \log x = t$

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

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

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

Ans. $\mathbf{\frac{1}{3}(x + \log x)^3 + C}$

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

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

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

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

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

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

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

Sol. Let $x^4 = t \qquad \therefore 4x^3 dx = dt$

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

Let $\tan^{-1} t = u \qquad \therefore \frac{1}{1+t^2} dt = du$

From (1), we obtain

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

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

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

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

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

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

Ans. **D**

Sol. 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.

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

Ans. **B**

Sol. $I = \int \frac{dx}{\sin^2 x \cos^2 x}$ $= \int \frac{1}{\sin^2 x \cos^2 x} dx$

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

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

$= \int \sec^2 x dx + \int \operatorname{cosec}^2 x dx$

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

Hence, the correct Answer is B.

Answer Key

1. $log(1+x^2)+C$

2. $\frac{1}{3}(log|x|)^3+C$

3. $log|1+logx|+C$

4. $cos(cosx)+C$

5. $-\frac{1}{4a}cos2(ax+b)+C$

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

7. $\frac{2}{5}(x+2)^{\frac{5}{2}}-\frac{4}{3}(x+2)^{\frac{3}{2}}+C$

8. $\frac{1}{6}(1+2x^2)^{\frac{3}{2}}+C$

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

10. $2log|\sqrt{x}-1|+C$

11. $\frac{2}{3}\sqrt{x+4}(x-8)+C$

12. $\frac{1}{7}(x^3-1)^{\frac{7}{3}}+\frac{1}{4}(x^3-1)^{\frac{4}{3}}+C$

13. $-\frac{1}{18(2+3x^3)^2}+C$

14. $\frac{(logx)^{1-m}}{1-m}+C$

15. $-\frac{1}{8}\log|9-4x^2|+C$

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

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

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

19. $\log(e^x+e^{-x})+C$

20. $\frac{1}{2}\log(e^{2x}+e^{-2x})+C$

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

22. $-\frac{1}{4}\tan(7-4x)+C$

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

24. $\frac{1}{2}\log|2\sin x+3\cos x|+C$

25. $\frac{1}{(1-\tan x)}+C$

26. $2\sin\sqrt{x}+C$

27. $\frac{1}{3}(\sin 2x)^{\frac{3}{2}}+C$

28. $2\sqrt{1+\sin x}+C$

29. $\frac{1}{2}(\log\sin x)^2+C$

30. $-\log|1+\cos x|+C$

31. $\frac{1}{1+\cos x}+C$

32. $\frac{x}{2}-\frac{1}{2}\log|\cos x+\sin x|+C$

33. $\frac{x}{2}-\frac{1}{2}\log|\cos x-\sin x|+C$

34. $2\sqrt{\tan x}+C$

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

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

37. $-\frac{1}{4}\cos(\tan^{-1}\chi^4)+C$

38. D

39. B