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MATRIC NO.: 19/MHS01/041
DEPARTMENT: MBBS

1. $\int \frac{2x}{\sqrt{4x^2-1}} dx$

soln:

$u = (4x^2-1)^{1/2}$

$du/dx = \frac{1}{2}(4x^2-1)^{-1/2}(8x)$

$du/dx = (4x^2-1)^{-1/2}(4x)$

$du/dx = \frac{4x}{(4x^2-1)^{1/2}} = \frac{4x}{u}$

$dx = \frac{u\,du}{4x}$

$\therefore \int \frac{2x\,dx}{\sqrt{4x^2-1}} = 2\int \frac{x\,dx}{du} = 2\int \frac{x\,u\,du}{4x\,du} = \frac{1}{2}u + C$

$\therefore \frac{1}{2}u + C = \frac{1}{2}(4x^2-1)^{1/2} + C = \frac{1}{2}\sqrt{4x^2-1} + C$

2. $\int \frac{\sin^{-1}x\,dx}{\sqrt{1-x^2}}$

soln.

$x = \sin\theta$

$dx/d\theta = \cos\theta$

$dx = \cos\theta\,d\theta$

$\therefore \int \frac{\sin^{-1}\sin\theta\cos\theta\,d\theta}{\sqrt{1-\sin^2\theta}} = \int \frac{\sin^{-1}\sin\theta\cos\theta\,d\theta}{\sqrt{\cos^2\theta}}$

$\therefore \int \frac{\sin^{-1}\sin\theta\cos\theta\,d\theta}{\cos\theta} = \int \theta\,d\theta = \frac{\theta^2}{2} + C$

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

3. $\int (\tan x)^6 \sec^2 x \, dx$

Soln

$u = \tan x$

$du/dx = \sec^2 x$

$du = \sec^2 x \, dx$

$\therefore \int u^6 \, du = \frac{u^7}{7} + c = \frac{(\tan x)^7}{7} + c$