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Quiz = 1

Semester : 1st

(Q No 1) $\int_2^3 t \sin t^2 \, dt$.

Sol:- let $t^2 = y$ Diff w.r.t "

$$2t = \frac{dy}{dt}$$

$$dt = \frac{dy}{9t}$$

$t^2 = y$
$(3)^2 = y$
$9 = y$

Now

As $t \to 3$ Then $y = 9$

As $t \to 2$ Then $y = 4$

So,

$$\int_2^3 t \sin t^2 \, dt \quad \int_4^9 \cancel{t} \sin y \frac{dy}{d\cancel{t}}$$

$$= \int_4^9 \sin y \, dy$$

$$= -\log y \Big|_4^9$$

$$= -[\log(9) - \log(4)]$$

$$= -[0.9876 - 0.9975$$

$$= -(-0.00987)$$

$$= \boxed{+0.00987} \text{ Ans}$$

Q No (2) $\displaystyle\int_0^1 \frac{4t^3 - 2t^2 + 3t^{-1}}{2t^2+1}\,dt$

Sol: $\displaystyle\int_0^1 \frac{4t^3 + 3t - 2t^2 - 1}{2t^2+1}\,dt$

$$= \int_0^1 \frac{t\,(4t^2+3) - (2t^2+1)}{2t^2+1}\,dt$$

$$= \int_0^1 \frac{t\,(4t^2+3)\,dt}{2t^2+1} - \int_0^1 \frac{\cancel{2t^2+1}}{\cancel{2t^2+1}}\,dt$$

$$= \int_0^1 \frac{t\,(4t^2+3)}{2t^2+1}\,dt - \int_0^1 1\,dt$$

$$= \int_0^1 \frac{t\,(4t^2+3)}{2t^2+1} - 1 \longrightarrow (1)$$

Now,

let $2t^2+1 = y$ $\Rightarrow 2t^2+1 = y$

As $t \to 1$ i.e $y = 3$ $\quad 2t^2 = y-1$

$t \to 0$ i.e $y = 1$ $\quad 4t^2 = 2y-2$

$4t^2 + 3 = 2y - 2 + 3$

Now Diff $\quad 4t^2 + 3 = 2y + 1$

$4t = \frac{dy}{dt}$

$dt = \frac{dy}{4t} \longrightarrow$ P.T.O

$$\Rightarrow = \int_1^3 \frac{t\ (2y+1)}{y} \cdot \frac{dy}{4t} - 1$$

$$= \int_1^3 \frac{2y+1}{4y}\, dy - 1$$

$$= \frac{1}{4}\left[\int_1^3 \frac{2\cancel{y}\, dy}{\cancel{y}} + \int_1^3 \frac{1}{y}\, dy\right] - 1$$

$$= \frac{1}{4}\left[\int_1^3 2\, dy + \int_1^3 dy\right] - 1$$

$$= \frac{1}{4}\left[2y\Big|_1^3 + \ln y\Big|_1^3\right] - 1$$

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

$$= \frac{1}{4}\left[6 - 2 + 1.0986\right] - 1$$

$$= \frac{1}{4}\left[5.0986\right] - 1$$

$$= 1.27465 - 1$$

$$= \boxed{0.2746}\ \text{Ans}$$

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