①

Sol:- $\int_2^3 t\sin t^2\,dt$

let $t^2 = y$

Diff w.r.t t

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

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

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

$t \to 2$ $y = 4$

so

$$\int_2^3 t\sin t^2\,dt = \int_4^9 t\cdot\sin y\,\frac{dy}{2t}$$

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

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

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

$$= -[0.9876 - 0.9975]$$

$$= (-0.00987)$$

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

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

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

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

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

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

$= \int_0^1 \frac{t(4t^3+3)}{2t^2+1}\,dt - t\Big|_0^1$

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

NOW

let

$2t^2+1=y$

As $t \to 1$ i.e $y=3$

$t \to 0$ i.e $y=1$

$2t^2+1=y$

$2t^2=y-1$

$4t^2=2y-2$

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

$4t^2+3=2y+1$

Now Diff

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

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

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

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

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

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

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

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

$$= \frac{1}{4}(6 - 2 + 1.0981) - 1$$

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$= \frac{1}{4}[5.0986) - 1$

$= 1.27465 - 1$

$= 0.2746$ Ans