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Dept BE/Electrical

Semester 2nd

Subject Calculas

Assignment Final Term

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$$\text{Q1: } \int_0^1 (4y - y^2 + 4y^3 + 1)^{-2/3} (12y^2 - 2y + 4) dy \quad (1)$$

$$\text{Sol: } \int_0^1 (4y - y^2 + 4y^3 + 1)^{-2/3} (12y^2 - 2y + 4) dy \quad (1)$$

By using Substitution method

$$\text{let } x = 4y - y^2 + 4y^3 + 1$$

$$\frac{dx}{dy} = 4 - 2y + 12y^2 \Rightarrow dx = (4 - 2y + 12y^2) dy$$

$$\int_0^1 x^{-2/3} dx$$

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

$$\frac{x^{1/3}}{1/3} + C$$

$$3x^{1/3} + C$$

$$\Rightarrow 3(4y - y^2 + 4y^3 + 1)^{1/3} + C$$

putting the final

$$3 \left(4(1) - (1)^2 + 4(1)^3 + 1 \right)^{1/3} + C$$

$$3 \left(4 - 1 + 4 + 1 \right)^{1/3} + C$$

$$3 (8)^{1/3} = C$$

$$3 (2)^{1/3} = C$$

$$= 6 \text{ Ans}$$

d ←

Q1 Simplify :

$$\int_0^{\pi/4} (1 - \sin t)^{3/2} \cos 2t \, dt$$

By parts

$$\cos^2 \theta = 1 - \sin^2 \theta$$

$$(1 - \sin t)^{3/2} \int \cos 2t \int \frac{d}{dt} (1 - \sin)^{3/2} \cos 2t (\cos 2t) dt$$

$$(1 - \sin t)^{3/2} \left(\frac{\sin 2t}{2} \right) + \int \frac{3}{2} (1 - \sin t)^{1/2} \left(\cos t \times \frac{\sin 2t}{2} \right) dt$$

$$\int (1 - \sin t)^{3/2} \left(\frac{\sin 2t}{2} \right) + \left(\frac{6}{4} \int (1 - \sin t)^{1/2} \sin^2 t \right)$$

$$u = 1 - \sin t$$

$$du = -\cos t$$

$$+ \frac{6}{4} \int (1 - u)^{1/2} u^2 \, du$$

$$t = (1 - u)^{-1}$$

$$dt = -du$$

$$- \frac{6}{4} \int (u)^{1/2} (1 - u)^2 \, du$$

$$-6/4 \int (t^{1/2}) (1 + t^2 - 2t) dt$$

$$-6/4 \int (t^{1/2}) (1 + t^2 - 2t) dt$$

$$-6/4 \int (t^{1/2} + t^{5/2} - 2t^{3/2}) dt$$

$$-6/4 \left[\frac{t^{3/2}}{3/2} + \frac{t^{7/2}}{7/2} - \frac{2t^{5/2}}{5/2} \right] + C$$

$$-6/4 \left[\frac{2}{3} t^{3/2} + \frac{2t^{7/2}}{7} - \frac{4t^{5/2}}{5} \right] + C$$

Substitution 't' and then u

and put limit.

$$-\frac{6}{4} \left[\frac{2}{3} (\sin t) \Big|_0^{\pi/4} + \frac{2}{7} (\sin t) \Big|_0^{\pi/4} - \frac{4}{5} (\sin t) \Big|_0^{\pi/4} \right]$$

$$-\frac{6}{4} \left(\frac{2}{3} (\sin 45)^{5/2} + \frac{2}{7} (\sin 45)^{7/2} \right)$$

$$-\frac{4}{5} (\sin 45)^{5/4}$$

$$-\frac{6}{4} (0.28 + 0.085 - 0.33)$$

$$-\frac{6}{4} (0.035)$$

$$\boxed{0.0525 \text{ Ans}}$$