

NAME: OLASOJI. OLUWABORI. C
 PLATE NO: 19/ENAD7/D16.
 DEPT: PETROLEUM ENGINEERING.

1. A particle moves along a curve, $X=t^2$, $Y=-5t^2+t$, $Z=t+7$, where t is time. Find its acceleration.

$$X=t^2, Y=-5t^2+t, Z=t+7$$

$$\frac{dA}{dt} = 2ti + -10t + 1j + 1k$$

$$\frac{d^2A}{dt^2} = 2i - 10j + k$$

$$\frac{d^2A}{dt^2} = 2i - 10j + k$$

2. If $P = i - 9j - 4k$, $Q = 8i - 3j + 6k$, $R = i - 4j - 3k$, find $(P \times Q) \cdot (R \times P)$.

$$(P \times Q) = \begin{vmatrix} i & j & k \\ 1 & -9 & -4 \\ 8 & -3 & 6 \end{vmatrix}$$

$$= i \begin{vmatrix} -9 & -4 \\ -3 & 6 \end{vmatrix} - j \begin{vmatrix} 1 & -4 \\ 8 & 6 \end{vmatrix} + k \begin{vmatrix} 1 & -9 \\ 8 & -3 \end{vmatrix}$$

$$= i(-54 - 12) - j(6 + 32) + k(-3 + 72)$$

$$= -66i - 38j + 69k$$

$$(P \times Q) = -66i - 38j + 69k$$

$$(R \times P) = \begin{vmatrix} i & j & k \\ 1 & -4 & -3 \\ 1 & -9 & -4 \end{vmatrix}$$

$$= i \begin{vmatrix} -4 & -3 \\ -9 & -4 \end{vmatrix} - j \begin{vmatrix} 1 & -3 \\ 1 & -4 \end{vmatrix} + k \begin{vmatrix} 1 & -4 \\ 1 & -9 \end{vmatrix}$$

$$= i(16 - 27) - j(-4 + 3) + k(-9 + 4)$$

$$= -11i + j - 5k$$

$$(R \times P) = -11i + j - 5k$$

$$\therefore (P \times Q) \cdot (R \times P) = (-66i - 38j + 69k) \cdot (-11i + j - 5k)$$

$$(P \times Q) \cdot (R \times P) = +726i - 38j - 345k$$

$$(P \times Q)(R \times P) = \underline{\underline{-109}} = 343$$

3. Given $F = 5 \cos 7t i - 2e^{3t} j - 4t^3 k$, find the integral of F with respect to t

$$\int F dt = 5(7 \sin 7t) i - 2\left(\frac{1}{3} e^{3t}\right) j - 4\left(\frac{t^4}{4}\right) k + C$$

$$\int F dt = 35 \sin 7t i - \frac{2}{3} e^{3t} j - t^4 k + C$$

$$\therefore \int F dt = 35 \sin 7t i - \frac{2}{3} e^{3t} j - t^4 k + C$$