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MATRIC NO:- 19/Sc.01/011 MAT102

Assignment

2) if $P = i - 9j - 4k$
$Q = 8i - 3j + 6k$ Find $(P \times Q) \cdot (R \times P)$
$R = i - 4j - 3k$

Soln

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

$i\begin{bmatrix} -9 & -4 \\ -3 & 6 \end{bmatrix} - j\begin{bmatrix} 1 & -4 \\ 8 & 6 \end{bmatrix} \quad k\begin{bmatrix} 1 & -9 \\ 8 & -3 \end{bmatrix}$

$i[-54-12] - j[6-(-32)] \quad k(-3-(-72)$
$i(-66) \quad - j(38) \quad k(69)$
$-66i - 38j + 69k$

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

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

$i(16-27) - j[-4-(-3)] + k(-9-(-6)$
$-11i + j - 5k = 11i + j - 5k$

$\therefore [P \times Q] \cdot [R \times P]$
$(-66i - 38j + 69k) \cdot (11i + j - 5k)$
$(-66i \times 11i) - (-38j \times j) + (69k \times -5k)$
$-726i - 38j - 345k$

3) $F = 5\cos 7t\, i - 2e^{3t} j - 4t^3 k$
$\int F\,dt = \int (5\cos 7t\, i - 2e^{3t} j - 4t^3 k)\,dt$
$\int 5\cos 7t\, i\,dt - \int 2e^{3t} j\,dt - \int 4t^3 k\,dt$

$\int f\,dt = \frac{5}{7}\sin 7t\, i - \frac{2}{3}e^{3t} j - \frac{4t^4}{4} k + c$

33] A particle moves along a curve,

$x = t^2$

$y = -5t^2 + t$ where t = time

$z = t + 7$

Find its Acceleration

Soln:

Given $r = t^2 i + (-5t^2 + t)_J + (t + 7)_K$

velocity vector $\vec{v} = \frac{dr}{dt} = 2t\,i + (-10t^{-1})_J\,[+]_K$

$= 2t\,i + (-10t - 1)_J + K$

then For Acceleration

$\vec{a} = \frac{dv}{dt} = \frac{d}{dt}\left[2t\,i + (-10t - 1)_J + K\right]$

$\Rightarrow 2\,i + (-10 - 0)_J + 0$

$\Rightarrow 2\,i + (-10)_J$

$\Rightarrow 2\,i - 10_J$