Sofa Albert Kaboshio
MAT 102
Architecture
19/SC118/013

1. A Particle moves along a curve $x = 7t^2$, $y = 6t^2 - 4t$, $z = t - 5$ where t is time. find it velocity

Solu

velosity $= \frac{d}{t}$

let $P(x, y, z)$ be any point on the given curve and $\bar{r}^2 = x\hat{i} + y\hat{j} + z\hat{k}$ be the position vector of P relative to O as the origin

Substituting x, y, z in $\bar{r}^2$

We have $\vec{r} = (7t^2)\hat{i} + (6t^2 - 4t)\hat{j} + (t - 6)\hat{k}$

So velocity vector $\vec{v}$

Will be the differential of $\vec{r}$ in respect to t

Diffrentiating

Vector $\vec{v} = \frac{d\vec{r}}{dt} = 14t^{2-1}\hat{i} + (2 \times 6t^{2-1} - 4t^{1-1})\hat{j} + 1t^{1-1}$

$\vec{v} = \frac{d\vec{r}}{dt} = 14t\hat{i} + (12t - 4)\hat{j} + K$

(2)

$A = i + 2j - 4k$

$B = 2i + 3j + k$

$c = 4j - 3k$

$A \, (B \times c)$

$i + 2j - 4K \times [(2i - 3j + K) \times (4i - 3K)]$

$\cdot i + 2j - 4k \times [2i - 12j - 3k]$

$2i - 24j + 12K$

(3) $R = 4 \sin 3t\, i + 4e^{2t} j + 7t^3 k$

$\int R\,dt = \frac{-4}{3} \cos 3t\, i + \frac{4}{3} e^{3t} j + 7t^3 k$

4. $A = 7i + 2j - k$

$B = 2i + 3 + 4h$

$C = i + j + k$

$(A + C) , (B - A)$

$[(7i + 2j - k) + (i + j + k)]$

$(8i + 3j)$

$[(2i + j + 4k) - (7i + 2j - k)]$

$[-5i - j + 5k]$

$(8i + 3j) \times (-5i - j + 5k)$

$= -46i - 3j$

5. $x = t \quad y = t^2 \quad z = t^3$

$r = xi + yi + zk$

$\frac{dr}{dt} / = (1) \quad r = ti + t^2 j + t^3 k$

$\frac{dr}{dt} = i + 2tj + 3t^2 k$

$At \ t = 1 \quad \frac{dr}{dt} i + 2(1) j + 3(1^2) k$

$\frac{dr}{dt} = i + 2j + 3k$

$|dr/dt| = \sqrt{1^2 + 2^2 + 3^2}$

$= \sqrt{1 + 4 + 9} = \sqrt{14}$

$T = \frac{dr/dt}{|dr/dt|} = \frac{i + 2j + 3k}{\sqrt{14}}$