

Q/ Find the unit tangent vector to the space curve described by:-

$$r(t) = (-t^3 + t)i + (\ln(t^2))j + (\cos(\pi t))k$$

at the point $t=1$.

Sol :-

tangent vector is:-

$$y = \ln(x)$$

$$j = \frac{1}{x}$$

$$y = \ln(f(x))$$

$$j = \frac{f'(x)}{f(x)}$$

$$\bar{r}(t) = (-3t^2 + 1)i + (2 \cdot \frac{1}{t})j + (-\sin(\pi t) \cdot \pi)k$$

$$\therefore \bar{r}(1) = (-3 + 1)i + (2 \cdot \frac{1}{1})j + (-\pi \sin(\pi))k$$

$$= (-2)i + (2)j + 0k = \langle -2, 2, 0 \rangle = V$$

where unit tangent vector = $\frac{V}{|V|}$

$$|V| = \sqrt{(-2)^2 + (2)^2 + (0)^2} = \sqrt{8} = 2\sqrt{2}$$

$$\therefore = \left\langle \frac{-2}{2\sqrt{2}}, \frac{2}{2\sqrt{2}}, \frac{0}{2\sqrt{2}} \right\rangle$$

$$= \left\langle \frac{-1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 0 \right\rangle$$

$$= \left\langle \frac{-\sqrt{2}}{2}, \frac{\sqrt{2}}{2}, 0 \right\rangle \} \text{Unit tangent vector}$$

الحل
 (1)
 (2)
 (3)
 (4)

منته

تقريباً

Magnitude |V|

القيمة