VECTORS

12th Maths - EXERCISE-10.3

1. Find the angle between the vectors
   $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$ and $\vec{b} = 3\hat{i} - 2\hat{j} + \hat{k}$

solution

Given points are

$$\mathbf{a} = \begin{pmatrix} 1 \\ -2 \\ 3 \end{pmatrix}, \mathbf{b} = \begin{pmatrix} 3 \\ -2 \\ 1 \end{pmatrix}, \tag{1}$$

$$\cos\theta = \frac{\mathbf{a}^\top \mathbf{b}}{\|\mathbf{a}\| \, \|\mathbf{b}\|} \tag{2}$$

$$\mathbf{a}^\top \mathbf{b} = 10 \tag{3}$$

$$\|\mathbf{a}\| = \sqrt{14} \tag{4}$$

$$\|\mathbf{b}\| = \sqrt{14} \tag{5}$$

by substituting the values of (3),(4),(5) in (2) then we get $\cos\theta$

$$\cos\theta = \frac{5}{7} \tag{6}$$

$$\implies \theta = cos^{-1}\frac{5}{7} \tag{7}$$

The angle between the vectors $\mathbf{a}$ and $\mathbf{b}$ is $cos^{-1}\frac{5}{7}$