

Q. No. 2: Find the unit vector in the direction of the sum of the vectors $\vec{a} = 2\hat{i} - \hat{j} + 2\hat{k}$ and $\vec{b} = -\hat{i} + \hat{j} + 3\hat{k}$.

Solution:

Let \vec{c} be the sum of \vec{a} and \vec{b} .

$$\vec{c} = (2\hat{i} - \hat{j} + 2\hat{k}) + (-\hat{i} + \hat{j} + 3\hat{k}) = \hat{i} + 5\hat{k}$$

$$|\vec{c}| = \sqrt{1^2 + 5^2} = \sqrt{26}$$

The unit vector is:

$$\hat{c} = \frac{\vec{c}}{|\vec{c}|} = \frac{\hat{i} + 5\hat{k}}{\sqrt{26}} = \frac{1}{\sqrt{26}}\hat{i} + \frac{5}{\sqrt{26}}\hat{k}$$