

**Q. No. 4:** Find a vector in the direction of a vector  $5\hat{i} - \hat{j} + 2\hat{k}$

which has a magnitude of 8 units.

**Solution:**

Let  $\vec{a} = 5\hat{i} - \hat{j} + 2\hat{k}$

$$|\vec{a}| = \sqrt{5^2 + (-1)^2 + 2^2} = \sqrt{25 + 1 + 4} = \sqrt{30}$$

$$\therefore \hat{a} = \frac{\vec{a}}{|\vec{a}|} = \frac{5\hat{i} - \hat{j} + 2\hat{k}}{\sqrt{30}}$$

Hence, the vector in the direction of vector  $5\hat{i} - \hat{j} + 2\hat{k}$  which has a magnitude of 8 units is given by

$$\begin{aligned} 8\hat{a} &= 8 \left( \frac{5\hat{i} - \hat{j} + 2\hat{k}}{\sqrt{30}} \right) \\ &= \frac{40}{\sqrt{30}}\hat{i} - \frac{8}{\sqrt{30}}\hat{j} + \frac{16}{\sqrt{30}}\hat{k} \end{aligned}$$