Vectors - Class XII

Past Year JEE Questions

Questions

Quetion: 01

Let $\vec{a} = \hat{i} - \alpha\hat{j} + \beta\hat{k}$, $\vec{b} = 3\hat{i} + \beta\hat{j} - \alpha\hat{k}$ and $\vec{c} = \alpha\hat{i} - 2\hat{j} + \hat{k}$, where α and β are integers. If $\vec{a} \cdot \vec{b} = -1$ and $\vec{b} \cdot \vec{c} = 10$, then $\left(\vec{a} \times \vec{b}\right) \cdot \vec{c}$ is equal to _____.

Solutions

Solution: 01

Answer

Correct Answer is **9**

Explanation

$\vec{a} = (1, -\alpha, \beta)$

$\vec{b} = (3, \beta, -\alpha)$

$\vec{c} = (-\alpha, -2, 1); \alpha, \beta \in I$

$\vec{a} \cdot \vec{b} = -1 \Rightarrow 3 - \alpha\beta - \alpha\beta = -1$

$\Rightarrow \alpha\beta = 2$

Possible value of
α and β

$$\begin{matrix} 1 & 2 \\ 2 & 1 \\ -1 & -2 \\ -2 & -1 \end{matrix}$$

$\vec{b} \cdot \vec{c} = 10$

$\Rightarrow -3\alpha - 2\beta - \alpha = 10$

$\Rightarrow 2\alpha + \beta + 5 = 0$

$\therefore \alpha = -2; \beta = -1$

$$[\vec{a}\ \vec{b}\ \vec{c}] = \begin{vmatrix} 1 & 2 & -1 \\ 3 & -1 & 2 \\ 2 & -2 & 1 \end{vmatrix}$$

$= 1(-1 + 4) - 2(3 - 4) - 1(-6 + 2)$

$= 3 + 2 + 4 = 9$