Vectors - Class XII

Related Questions with Solutions

Questions

Quetion: 01

Given three vectors $\overrightarrow{\mathrm{U}} = 2\hat{\mathbf{i}} + 3\hat{\mathbf{j}} - 6\hat{\mathrm{k}}; \quad \overrightarrow{\mathrm{V}} = 6\hat{\mathbf{i}} + 2\hat{\mathbf{j}} + 3\hat{\mathbf{k}}; \quad \overrightarrow{\mathrm{W}} = 3\hat{\mathbf{i}} - 6\hat{\mathbf{j}} - 2\hat{\mathbf{k}}$
Which of the following hold good for the vectors $\vec{U}, \vec{V}$ and $\vec{W}$?

A. $\overrightarrow{\mathrm{U}}, \overrightarrow{\mathrm{V}}$ and $\overrightarrow{\mathrm{W}}$ are linearly dependent

B. $(\overrightarrow{\mathrm{U}} \times \overrightarrow{\mathrm{V}}) \times \overrightarrow{\mathrm{W}} = \overrightarrow{0}$

C. $\overrightarrow{\mathrm{U}}, \overrightarrow{\mathrm{V}}$ and $\overrightarrow{\mathrm{W}}$ form a triplet of mutually perpendicular vectors

D. $\overrightarrow{\mathrm{U}} \times (\overrightarrow{\mathrm{V}} \times \overrightarrow{\mathrm{W}}) = \overrightarrow{0}$

Solutions

Solution: 01

$$\left[\begin{array}{ccc} \overrightarrow{\mathrm{U}} & \overrightarrow{\mathrm{V}} & \overrightarrow{\mathrm{W}} \end{array}\right] = \begin{vmatrix} 2 & 3 & -6 \\ 6 & 2 & 3 \\ 3 & -6 & -2 \end{vmatrix} = 28 + 63 + 252$$

$\neq 0$

Linearly independent

$(\overrightarrow{\mathrm{U}} \times \overrightarrow{\mathrm{V}}) \times \overrightarrow{\mathrm{W}} = (\overrightarrow{\mathrm{U}} \cdot \overrightarrow{\mathrm{W}})\overrightarrow{\mathrm{V}} - (\overrightarrow{\mathrm{V}} \cdot \overrightarrow{\mathrm{W}})\overrightarrow{\mathrm{U}}$

= 0 – 0 = 0

$\overrightarrow{\mathrm{U}} \perp \overrightarrow{\mathrm{W}}$ and $\overrightarrow{\mathrm{V}} \perp \overrightarrow{\mathrm{W}}$ and $\overrightarrow{\mathrm{U}} \perp \overrightarrow{\mathrm{V}}$

$\overrightarrow{\mathrm{U}}, \overrightarrow{\mathrm{V}}$ and $\overrightarrow{\mathrm{W}}$ triplet of mutually perpendicular vectors

$\overrightarrow{\mathrm{U}} \times (\overrightarrow{\mathrm{V}} \times \overrightarrow{\mathrm{W}}) = 0$

Correct Options

Answer:01

Correct Options: B, C, D