

Physics / Sem-1 / MJC-1 / Unit - ②
By VRS

Topic: Vector ^{triple} Products :-

A vector triple product of is defined as the cross product of one vector with the cross product of the others two. It is denoted as $\vec{a} \times (\vec{b} \times \vec{c})$ or $(\vec{a} \times \vec{b}) \times \vec{c}$.

Properties of vector triple Product:-

① It is always a vector quantity

② Unit vector coplanar with $\vec{a} \times \vec{b}$ perpendicular $\vec{c}$ is
 $\pm [(\vec{a} \times \vec{b}) \times \vec{c}]$

③ $\vec{a} \times \vec{b} \times \vec{c} \neq (\vec{a} \times \vec{b}) \times \vec{c}$

④ $[\vec{a} \times \vec{b} \quad \vec{b} \times \vec{c} \quad \vec{c} \times \vec{a}] = \vec{a} \times \vec{b} \times \vec{c} \begin{bmatrix} \vec{a} \cdot \vec{a} & \vec{a} \cdot \vec{b} & \vec{a} \cdot \vec{c} \\ \vec{b} \cdot \vec{a} & \vec{b} \cdot \vec{b} & \vec{b} \cdot \vec{c} \\ \vec{c} \cdot \vec{a} & \vec{c} \cdot \vec{b} & \vec{c} \cdot \vec{c} \end{bmatrix}$

⑤ If $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar vectors then $\vec{a} \times \vec{b}$, $\vec{b} \times \vec{c}$, and $\vec{c} \times \vec{a}$ are also non-coplanar.