UARY 24

4 THURSDAY

MJC - Physics
Sem - I
Unit - II

Divergence of curl of a vector →
Since curl $\vec{A}$ is a vector function, We may consider taking its divergence.

$$\therefore \text{div curl } \vec{A} = \vec{\nabla} \cdot (\vec{\nabla} \times \vec{A})$$

$$= \left(\vec{i}\frac{\partial}{\partial x} + \vec{j}\frac{\partial}{\partial y} + \vec{k}\frac{\partial}{\partial z}\right) \cdot \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ A_x & A_y & A_z \end{vmatrix} = \begin{vmatrix} \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ A_x & A_y & A_z \end{vmatrix} = 0$$

Since the two rows of the determinant are identical.

For any vector function $\vec{A}$

$$\boxed{\vec{\nabla} \cdot (\vec{\nabla} \times \vec{A}) = \text{div. Curl } \vec{A} = 0}$$

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