

SILVER JUBILEE DEGREE COLLEGE

HABSIGUDA, HYDERABAD

B. Sc. (MPC) I Year I. Semester

Unit Test: I. Subject: PHYSICS

I. Long Answers Questions

1. State and Prove Gauss Divergence Theorem.
2. State and Prove Stoke's Theorem.
3. Define Torque and Angular Momentum. Explain conservation of angular momentum.

II. Short Answers Questions

1. Show that $\nabla\phi$ is a vector perpendicular to the surface $\phi(x, y, z) = C$ where C is a constant.

[Hint $\phi(x, y, z) = \text{constant}$ so that $d\phi = 0$]

2. Calculate $\text{div. } \mathbf{A}$ where $\mathbf{A} = \mathbf{i}\frac{x}{r} + \mathbf{j}\frac{y}{r} + \mathbf{k}\frac{z}{r}$, where $x^2 + y^2 + z^2 = r^2$
3. If \mathcal{S} is any closed surface enclosing a volume V and

$$\mathbf{F} = x\mathbf{i} + 3y\mathbf{j} + 2z\mathbf{k}, \text{ show that } \iint_{\mathcal{S}} \mathbf{F} \cdot d\mathbf{S} = 6V$$