

Prabhu Jagatbandhu College
Department of Mathematics
Semester-1, assignment

Answer all questions

Time:2hr

1. Prove that the vector field \vec{F} given $\vec{F} = (y \sin z)\hat{i} + x\hat{j} + x \cos z\hat{k}$ is conservative. Find its scalar potential.
2. Show that $\phi = x^2 - y^2$ is a harmonic function.
3. Show that gradient of $x^2y + 2xy + z^2$ is irrotational.
4. Show that curl of $x^2y\hat{i} + xz\hat{j} + 2yz\hat{k}$ is solenoidal.
5. Determine a, b, c so that $\vec{F} = (x + 2y + 4z)\hat{i} + (bx - 3y - z)\hat{j} + (4x + cy + 2z)\hat{k}$ is irrotational.