DELHI TECHNICAL CAMPUS

B.TECH I SEM(Assignment No. 4)

APPLIED MATHEMATICS-I Paper Code: BS- 111

1. Find the directional derivative of $\vec{v} = xy^2\,\hat{i} + zy^2\,\hat{j} + xz^2\,\hat{k}$ at the point (2,0,3) in the direction of the outward normal to the sphere $x^2+y^2+z^2=14$ at the point (3,2,1)

2. Verify divergence theorem for $\vec{F} = (x^3 - yz)\,\hat{i} - 2x^2y\,\hat{j} + 2\,\hat{k}$ taken over the cube bounded by the planes x=0, x=a, y=0, y=a, z=0, z=a.

3. Verify stokes theorem for $\vec{F} = y\,\hat{i} + z\,\hat{j} + x\,\hat{k}$ and the surface S is the portion of the sphere $x^2+y^2+z^2=1$ above the xy plane.

4. Verify Green's theorem to evaluate $\int_C (2y^2dx + 3xdy)$, where C is the boundary of the closed region bounded by y=x,and $y=x^2$.

5. find the work done in moving a particle in the force field $\vec{F} = 3x^2\,\hat{i} + (2xz - y)\,\hat{j} + z\,\hat{k}$ along the curve defined by $x^2 = 4y$, $3x^3 = 8z$ from x = 0,to x = 2.

6. Use greens theorem to evaluate $\int_C (x^2 + xy)dx + (x^2 + y^2)dy$ where C is the square formed by the lines $y = \pm 1, x = \pm 1$.

7. Find the value of m if $\vec{F} = mx\,\hat{i} - 5y\,\hat{j} + 2z\,\hat{k}$ is a solenoidal vector.

8. Show that the vector field $F^{\rightarrow} = 2xi^{\wedge} + 4yj^{\wedge} + 8zk^{\wedge}$ is irrotational and finds its velocity potential φ.