

EMF  
Assignment I

1. Give the spherical coordinates of the point whose cartesian coordinates are  $x = -1, y = 3$  &  $z = 5$
2. Give the cartesian coordinates of the point whose cylindrical coordinates are  $r = 2, \phi = 45^\circ, z = -1$
3. The vector field  $\vec{D} = \frac{5r^2}{4} \vec{a}_r$  is given in spherical coordinate system. Evaluate both sides of divergence theorem for the volume is enclosed between
  - i)  $r = 1$  &  $r = 2$
  - ii)  $\phi = 0$  to  $\pi/4$  &  $r = 4$
4. calculate the curl of gradient of the scalar field,  $v = 3xy - yz$ .
5. Find the divergence  $D$  at the point  $P(2, 3, -1)$  if  $\vec{D} = (2xy - y^2)\vec{a}_x + (x^2z - 2xy)\vec{a}_y + x^2y\vec{a}_z$
6. Given,  $A = (\sin 2\phi)\vec{a}_\phi$  in cylindrical co-ordinates. Find curl of  $A$  at  $(2, \pi/4, 0)$
7. Verify whether the vector field  $\vec{E} = yz\vec{a}_x + xz\vec{a}_y + xy\vec{a}_z$  is both solenoidal and irrotational