

2K21 ECE Batch
Problem Set. 1
ECT 302 ELECTROMAGNETIC THEORY
 (Assignment 1A)

1. Express the point $P(3, 45^\circ, 210^\circ)$ in Cartesian coordinate system
2. Express the point $P(1, -4, -3)$ in cylindrical and in Spherical coordinate system
3. Find the distance between $A(5, \frac{3\pi}{2}, 0)$ and $B(5, \frac{\pi}{2}, 10)$
4. Determine the divergence of the vector field

$$\vec{E} = (a^3 \cos \theta / r^2) \hat{a}_r - (a^3 \sin \theta / r^2) \hat{a}_\theta$$

at $(a/2, 0, \pi/2)$

5. For a vector field $\vec{A} = \rho^2 \hat{a}_\rho + 2z \hat{a}_z$, verify divergence theorem for the circular cylindrical region enclosed by $\rho = 5, z = 0, z = 4$
6. Determine the gradient of the field $T = 5\rho e^{-2z} \sin \phi$ at $(2, \frac{\pi}{3}, 0)$
7. Assume a vector function $\vec{F} = 5\rho \sin \phi \hat{a}_\rho + \rho^2 \cos \phi \hat{a}_\phi$. For the contour shown in figure below, Verify Stokes theorem.

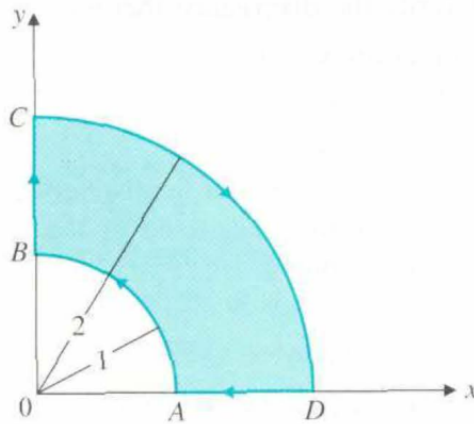


Figure 1: 1

8. Find \vec{E} at $(0, 0, 5)$ m due to $Q_1 = 0.35\mu C$ at $(0, 4, 0)$ m and $Q_2 = -0.55\mu C$ at $(3, 0, 0)$ m