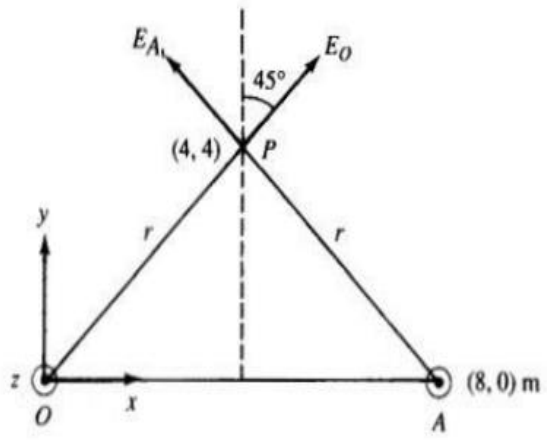
UNIVERSITY OF PETROLEUM & ENERGY STUDIES, DEHRADUN

Program	**B. Tech CS : (All Batches)**	**Semester**	**I**
Course	**ENGINEERING PHYSICS**	**Course Code**	**PHYS1023**
Session	**Sept - Dec, 2021**	**Topic**	**ELECTROSTATICS**

(All bold notations represent vector quantities)

1. The surfaces $\rho = 3, \phi = 100°, z = 3$ and $\rho = 5, \phi = 130°, z = 4.5$ define a closed surface.
   (a) Find the enclosed volume and
   (b) Find the total area of the enclosing surface.

2. Two straight non-conducting wires, parallel to the z-axis, pass through points O and A, as shown in the figure below. The wires carry equal and uniform charge density $0.4\ \mu C/m$. Determine the electric field at point P.



3. In a slab of dielectric material for which $\epsilon = 2.4\epsilon_o$ and $V = 300\ z^2$ volt.
   Find (a) $\boldsymbol{D}$ and ρ_v and (b) $\boldsymbol{P}$ and ρ_{pv}

4. Determine the total current in a wire of radius 1.6 mm if $\boldsymbol{J} = 500\ \rho\ \boldsymbol{a_z}\ A/m^2$

5. Derive a relation between the electric field and electric potential.