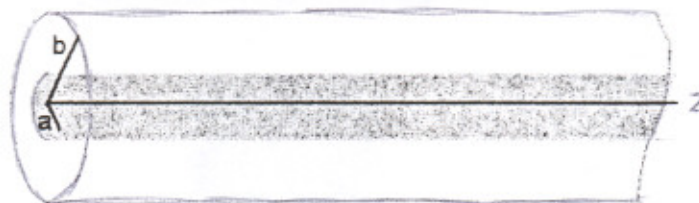


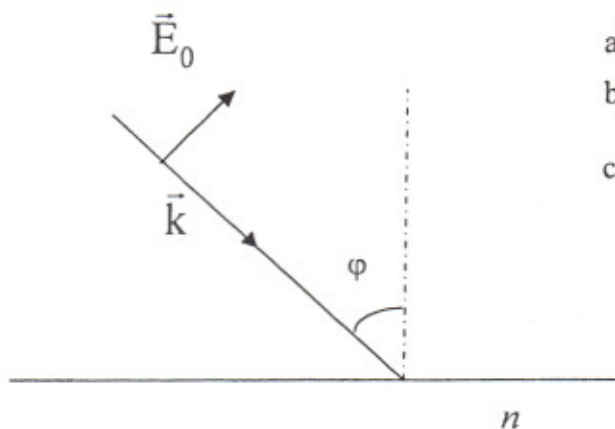
Electricity & Magnetism

- (30) 1. A Geiger tube is constructed of a long grounded cylindrical conductor and a thin, hollow cylindrical conductor along the large cylinder's axis. If the inner cylinder is held at potential V , calculate



- a. The electric field inside the inner cylinder.
 - b. The electric field between the cylinders.
 - c. The charge per unit length on the outer cylinder.
 - d. The capacitance per unit length.
- (40) 2. An electromagnetic plane wave is incident on a dielectric media of refractive index n at angle ϕ relative to the normal and polarized in the plane of incidence.

Find:



- a) the angle of refraction,
- b) the amplitude and polarization of the reflected and refracted waves,
- c) the condition under which there is no reflected wave.

- (30) 3. A thin metal plate having conductivity σ and thickness t translates uniformly at speed v . The plate is placed between the poles of a small magnet which produces a uniform field of strength B over a small region of the plate having area A . Estimate the magnitude and direction of the force on the plate. Make any additional assumptions required to get an estimate, but explicitly state those you make.

Note: Include a sketch showing magnetic field and electric currents.