

1. Write down the SI unit for (a) electric flux density, (b) magnetic flux density, and Give the value and SI unit in free space for (c) intrinsic impedance, (d) permeability, and (e) permittivity. (10%)
2. Determine the electrostatic field intensity at the point (1, 1, 1) for (a) $V = V_0 \exp(-2x) \cos(\pi y/4)$, and (b) $V = V_0 R \sin(\theta)$. (20%)
3. (a) Write down the Biot-Savart law and describe the variables, and (b) find the magnetic flux density at a point P shown in Fig. 1 using Bio-Sarvart law. (20%)
4. A microwave oven works with the sinusoidal electric intensity of amplitude 250 (V/m) and frequency 2.5 GHz. For a beef steak with a dielectric constant of about 40, and a loss tangent of 0.35, find the average power dissipated in the beef steak per cubic meter. (20%)
5. A parallel-plate capacitor consists of two parallel conducting plates of area S separated by a uniform distance d . The space between the plates is filled with a dielectric of a constant permittivity ϵ . Prove the capacitance $C = \epsilon S / d$. (10%)
6. A positive point charge Q is located at distances d_1 and d_2 , respectively, from two grounded perpendicular conducting half-planes, as shown in Fig. 2. Determine the force on Q . (20%)

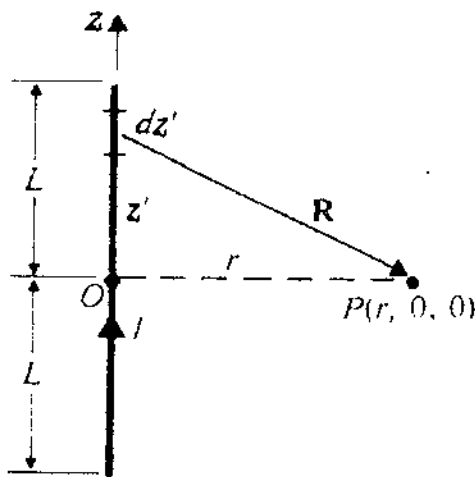


Fig. 1

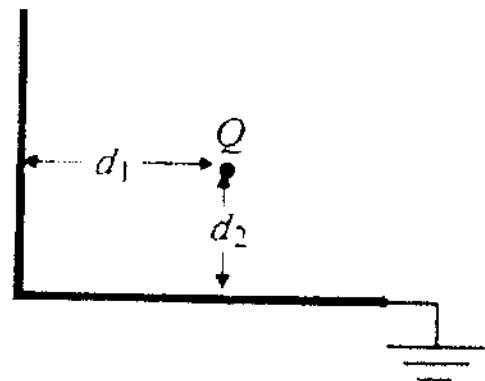


Fig. 2