1. A charged ring of radius a carries a uniform charge distribution. Determine

   (a) the potential and (10 points)

   (b) the electric field intensity at any point on the axis of the ring. (10 points)

2. Two parallel conducting plates, each of area A, and separated by a distance d, form a parallel-plate capacitor. The charge on the top is $+Q$ and that on the other plate is $-Q$.

   (a) What is its capacitance? (10 points)

   (b) Also express the energy stored in the medium in terms of the capacitance of the system. (10 points)

3. A point charge q is placed at a distance d from the center of a grounded conducting sphere of radius a. Calculate the surface charge density on the sphere. (20 points)

4. A filamentary wire of finite length extends from $z = a$ to $z = b$ $(a < b)$.

   (a) Determine the magnetic flux density at a point P in the xy plane. (10 points)

   (b) What is the magnetic flux density at P if $a \to -\infty$ and $b \to \infty$? (10 points)

5. The magnetic field intensity in free space is given as $\vec{H} = H_0 \sin\theta \vec{a}_y$ V/m, where $\theta = \omega t - \beta z$, and β is a constant quantity. Determine

   (a) the displacement current density and (10 points)

   (b) the electric field intensity. (10 points)