1. For $V = E_0 R \cos\theta$, determine the field at the point $(1,1,0)$. (10%)

2. Determine the electric field intensity of an infinite planar charge with a uniform surface charge density ρ_s. (10%)

3. Two point charges, Q_1 and Q_2, are located at $(1,2,0)$ and $(2,0,0)$, respectively. Find the relation between Q_1 and Q_2 such that the total force on a test charge at the point $P(-1,1,0)$ will have zero x-component. (10%)

4. Verify that $V_1 = C_1/R$ and $V_2 = C_2 z/(x^2+y^2+z^2)^{3/2}$, where C_1 and C_2 are arbitrary constants, are solutions of Laplace's equation. (20%)

5. Find the leakage resistance per unit length between the inner and outer conductors of a coaxial cable that has an inner conductor of radius a, an outer conductor of inner radius b, and a medium with conductivity σ. (20%)

6. A direct current I flows in a straight wire of length $2L$. Find the magnetic flux density at a point located at a distance r from the wire in the bisecting plan. (20%)

7. Explain the *Hall effect*. (10%)