所別：地球物理研究所碩士班 一般生 科目：電磁學
　　　　　　　　　　　　　　學位在職生

1. The Maxwell's equations can be used to explain and predict all macroscopic electromagnetic phenomena. Please write the Maxwell's equations, and identify each equation with the proper experimental law. (10%)

2. A positive point charge Q is located at distance d_1 and d_2, respectively, from two grounded perpendicular conducting half-planes. Determine the potential change caused by the planes. (10%)

3. A homogeneous half space material of uniform conductivity σ is injected a point current source I. Find the potential V at a distance r from this point current source. (10%)

4. In many applications, we are interested in determining the magnetic field due to a current-carrying circuit. Please find the magnetic flux density B at the center of a square loop, with side w carrying a direct current I. (10%)

5. The moist ground is a relatively good conductor, however, at high frequency (~ GHz) it behaves more like an insulator. Why? Please define a good conductor and an insulator in a time-varying situation. (10%)

6. For all practical purposes, we need to know the depth of penetration of fields and currents. Please define the depth of penetration of electromagnetic wave. How does it depend on conductivity? On frequency? (10%)

7. When a permanent magnet is heated above its Curie temperature it loses its magnetization. What is Curie temperature? What is the Curie temperature of iron? Can it apply to Geophysics? (10%)

8. Can a static magnetic field exist in the interior of a perfect conductor? Can a time-varying magnetic field? Explain. (10%)

9. In solving problems with multiple dielectric interfaces, the concept of total-field wave impedance is very useful. What is meant by the wave impedance of the total field? When is this impedance equal to the intrinsic impedance of the medium? (10%)

10. Thin dielectric coating is sprayed on optical instruments to reduce glare. What factors determine the thickness of the coating? (10%)