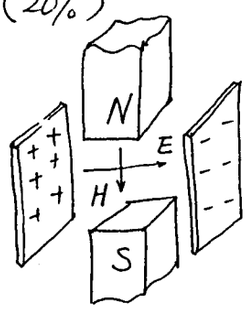
(乙)

國立成功大學 79 學年度醫工所考試(電磁學 試題) 共 1 頁 第 1 頁

1. A positive point charge Q is at the center of a spherical conducting shell of an inner radius a and an outer radius b. Determine the potential V and electric field $\vec{E}$ as functions of the radial distance r. (20%)
2. Two spherical conductors with radii a and b (b>a) are connected by a conducting wire. The distance of separation between the conductors is assumed to be very large compared to b so that the charge on the spherical conductors may be considered as uniformly distributed. A total charge Q is deposited on the spheres. Find (a) the charges on the two spheres, and (b) the electric field intensities at the sphere surfaces. (20%)
3. How can wave equation be derived from Maxwell's equations? Assume the medium is lossless and source-free. Can you write a diffusion equation? (20%)
4. State Poynting theorem. What is Poynting vector? An electric field $\vec{E}$ is produced by two parallel plates and a magnetic field H is produced by a permanent magnet as shown in the right figure. Does Poynting vector exist in this case? Why? (20%)



5. An electron is moving in a circular orbit of radius 3.5×10^{-11} m in the presence of a uniform magnetic field $B = 4\times10^{-2}$ T. If the electron experiences a torque of magnitude 7.85×10^{-26} N-m, determine the electron's angular velocity and magnetic moment. (10%)
6. How to make electric shielding and magnetic shielding? Please give brief explanations. (10%)

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