

國立成功大學

113學年度碩士班招生考試試題

編 號： 111

系 所： 工程科學系

科 目： 電磁學

日 期： 0202

節 次： 第 2 節

備 註： 不可使用計算機

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. The electromagnetic model. (20%)
 - (1) Describe the four fundamental field quantities in the electromagnetic model. (10%)
 - (2) What are the units of the four fundamental field quantities? (10%)

2. Given a very long coaxial cable that has an inner conductor of radius r_i and an outer conductor of inner radius r_o , the space between the conductors is filled with two coaxial layers of dielectrics. The dielectric constants of the dielectrics are ϵ_1 for $r_i < r < a$ and ϵ_2 for $a < r < r_o$. (30%)
 - (1) Determine the electric field intensity in the coaxial cable. (15%)
 - (2) Find the capacitance per unit length of the coaxial cable. (15%)

3. Suppose the space between two parallel conducting plates each having an area S is filled with an inhomogeneous ohmic medium whose conductivity varies linearly from σ_a at one plate ($z = 0$) to σ_b at the other plate ($z = d$). A d-c voltage V_0 is applied across the plates. (30%)
 - (1) Determine the total resistance between the plates. (15%)
 - (2) Determine the surface charge densities on the plates. (15%)

4. Given an air coaxial transmission line that has a solid inner conductor of radius r_i and a very thin outer conductor of inner radius r_o , determine the inductance per unit length of the transmission line. (20%)