

※ 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) What are the four fundamental field quantities in the electromagnetic model? (10%)
- (2) What are the units of the four fundamental field quantities? (10%)

2. For 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 e_1 for $R_i < R < a$ and e_2 for $a < R < R_o$. Determine the capacitance per unit length of the coaxial cable. (30%)

3. Determine the force per unit length on each of three equidistant, infinitely long, parallel wires 10 (cm) apart, each carrying a current 20 (A) in the same direction. (25%)

4. Given a rectangular loop in the xy -plane with sides l_1 and l_2 carrying a current I . It lies in a uniform magnetic field $\mathbf{B} = \mathbf{a}_x B_x + \mathbf{a}_y B_y + \mathbf{a}_z B_z$. (25%)

- (1) Determine the force on the loop. (10%)
- (2) Determine the torque on the loop. (15%)