

國立臺北科技大學
101 學年度研究所碩士在職專班招生

電腦與通訊研究所
丙組：電磁學試題

填准考證號碼

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注意事項：

1. 本試題共【七】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。

1. List the boundary conditions for the electric and magnetic fields at the interface between two media. (16%)
2. Draw a simple Smith Chart with constant- r ($r = 0, 1, \text{ and } \infty$) and constant- x ($x = 0, 1, \text{ and } \infty$) curves on it, where r is the normalized resistance and x is the normalized reactance. (18%)
3. Consider a homogeneous conductor of conductivity σ , length ℓ , and uniform cross-section S , as shown in Fig. 1. Use the point form of Ohm's law, $\mathbf{J} = \sigma \mathbf{E}$, to derive the expression for its resistance for steady current (d.c.). (15%)

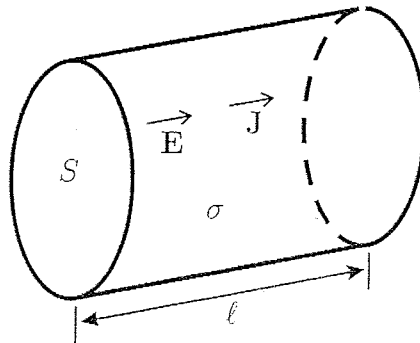


Fig. 1. Homogeneous conductor with a constant cross section.

4. Consider the case of a positive point charge, Q , located at a distance d above a large grounded conducting plane, as shown in Fig. 2. Find the potential at every point above the conducting plane ($y > 0$). (15%)

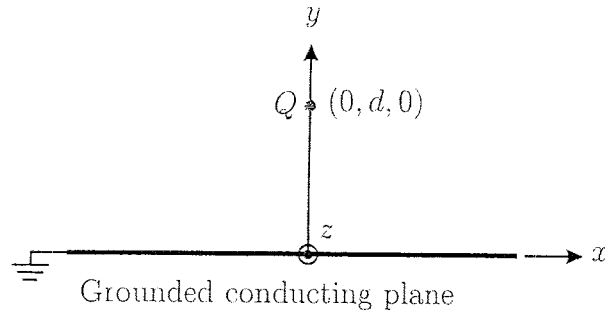


Fig. 2. A point charge above a grounded conducting plane.

5. Find the inductance per unit length of a very long solenoid with air core having n turns per unit length and uniform cross-section S , as shown in Fig. 3. (15%)

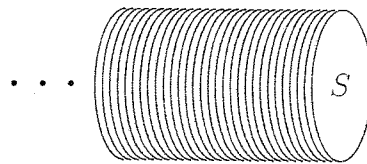


Fig. 3. A very long solenoid.

6. State *Snell's law of reflection* and *Snell's law of refraction*. (10%)
7. Define *critical angle* and *Brewster angle*. (11%)