

國立臺北科技大學
九十七學年度研究所碩士在職專班(含 EMBA)入學考試

電腦與通訊研究所
丙組：電磁學試題

填准考證號碼

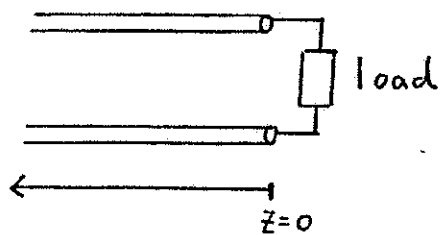
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注意事項：

1. 本試題共 4 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. For an air-filled TEM transmission line (characteristic impedance 50Ω) with a load as shown below. (a) Find the maximum and minimum input impedances and their minimum locations, when the load is a 20Ω resistance and the frequency is 1 GHz. (15%). (b) Find the minimum length of the transmission line where the input impedance of the loaded transmission line is $50j$. The load is a 0.02pF capacitance and the frequency is $\frac{10^{12}}{2\pi}$ Hz. (15%) (Note: using the concept of Smith chart).



2. The load impedance $Z_L = \frac{50\sqrt{2} + 50}{\sqrt{2} - 1}$ is sequentially connected to a 50Ω transmission line. Find the reflection coefficient in dB (10 %) and the SWR (10 %).

3. A static charge distribution produces a radial electric field $\vec{E} = A \frac{e^{-br}}{r} \hat{r}$, where A and b are constants. What is the total charge Q? (25%)

4. A cylindrical soft iron rod of length L and diameter d is bent into a circular shape of radius R leaving a gap where the two ends of the rod almost meet. The gap spacing s is constant over the face of the ends of the rod. Assume $s \ll d$, $d \ll R$. N turns of wire are wrapped tightly around the iron rod and a current I is passed through the wire. The relative permeability of the iron is μ_r . Neglecting fringing, what is the magnetic field B in the gap? (25%)