

國立彰化師範大學 98 學年度碩士班招生考試試題

系所：電子工程學系

組別：甲組

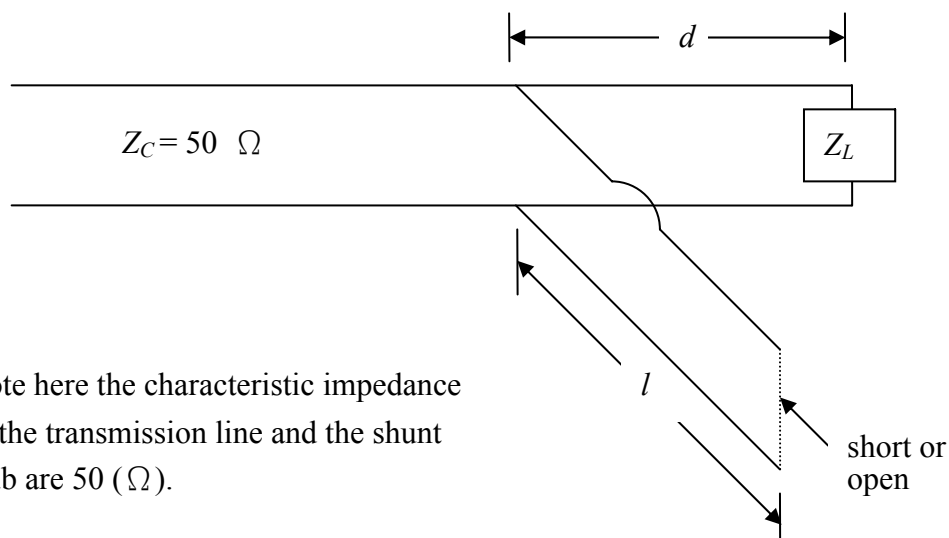
科目：電磁學

☆☆請在答案紙上作答☆☆

共 3 頁，第 1 頁

Problem weighting: 1 (20%), 2. (20%), 3 (25%), 4 (20%), 5 (15%)

- It is known that the electric field intensity of a spherical wave in free space is (in spherical coordinate system) $\vec{E}(R, \theta; t) = \hat{a}_\rho \frac{10^{-3}}{R} \sin \theta \cos(2\pi 10^9 t - kR)$ (V/m), determine the magnetic field intensity $\vec{H}(R, \theta; t)$ and the value of k . (Please show all your work)
- A uniform plane wave in air with $\vec{E}_i(x, t) = \hat{a}_y 50 \sin(10^9 t - \beta x)$ (V/m) is incident normally on a lossless medium (with $\epsilon_r = 2.25$, $\mu_r = 1.0$, and $\sigma = 0$) in the region $x \geq 0$. Find
 - \vec{E}_r and \vec{H}_r (reflected fields)
 - Γ (reflection coefficient), T (transmission coefficient), and S (standing wave ratio)
 - \vec{E}_t and \vec{H}_t (transmitted fields)
- A $50 (\Omega)$ transmission line is connected to a load impedance $Z_L = 40 - j25 (\Omega)$. Using the smith chart to find the position and length of a short-circuited (or open-circuited) stub required to match the line in term of wavelength. (turn in your smith chart as part of your answer)



- Find the expression of the input impedance, Z_{in} , for a cascaded transmission line shown in figure. If R_L is a pure real value and the λ is the guided wavelength of the wave propagated in all the

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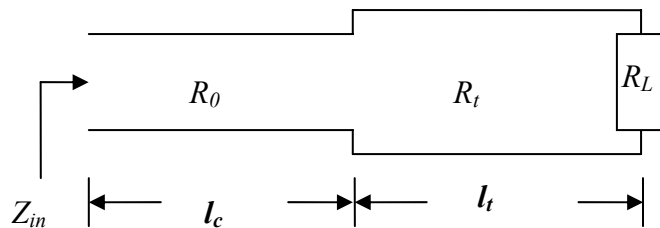
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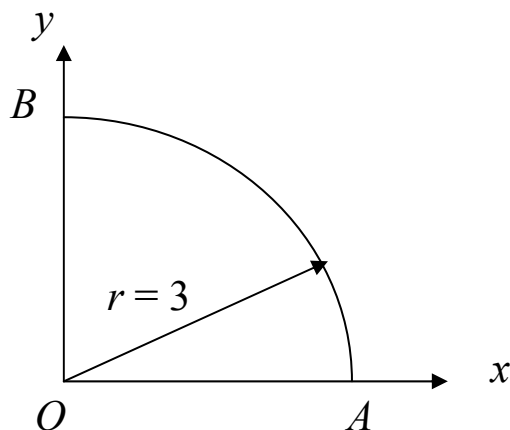
共 3 頁，第 2 頁

transmission lines, (a) find the values of R_t and l_t for the matching condition (no reflection), (b) find the expression of Z_{in} and if $R_L = \infty$ and $l_t = l_c$ find the value of l_t such that $Z_{in} = \infty$.



5. Find the integral in cylindrical coordinate along the close loop OABO

$$\oint (\hat{a}_x xy - \hat{a}_y 2x) \cdot d\vec{l}$$



The Complete Smith Chart

Black Magic Design

