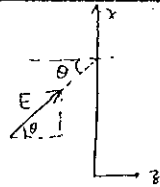


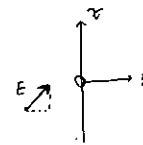
國立中山大學八十九學年度碩博士班招生考試試題

科 目：光電所 (電磁學)

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$$\nabla \cdot \vec{J} - \rho = 0$$

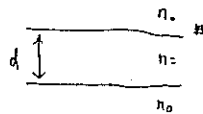


1. Write down and explain the equation of continuity. Also explain how this equation is related to the time-dependent Maxwell equations. (20%)

2. For plane electromagnetic waves travelling in a plane layered medium, how that there are two independent solution groups: namely a TE and a TM group. Please assume that both geometry and the fields are invariant along the y -axis. In other words, waves are travelling in the x - z plane while material constants are function of z only. (20%)

3. Derive the input impedance formula for a finite transmission line of a length l terminated with a load impedance Z_L . Assume that the characteristic impedance and the propagation constant of transmission line to be Z_0 and β respectively. You must show detail work to get full credit. (30%)

4. A dielectric slab waveguide can be made of a dielectric slab exposed in air. The slab has an index of refraction n and a thickness d . Such a waveguide supports non-attenuative guiding waves which are suitable for communication applications. For this problem, please write down the functional forms of such a waveguide mode in each region and the conditions needed to solve for the solution. Please specify for either TE case or TM case but not both. (30%)



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