※ 考生請注意：本試題不可使用計算機

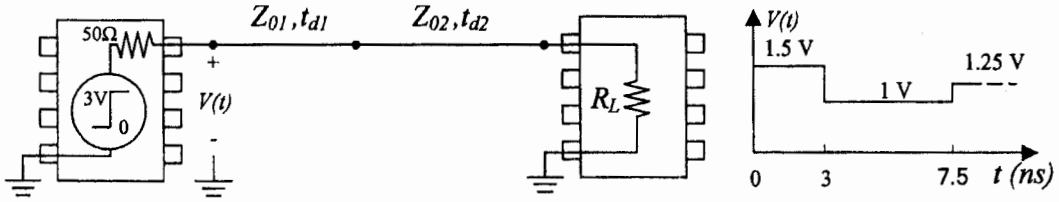
Problem 1: (20 Points)

(a) Write down the Maxwell's equations in differential form.

(b) Prove that electromagnetic power cannot penetrate a perfect conductor.

Problem 2: (20 Points)

Two *ICs* are connected together with two sections of transmission lines. The voltage at the output of the driver *IC* is as shown in the figure. Find the characteristic impedance (Z_{01} and Z_{02}) and time delays (t_{d1} and t_{d2}) of both lines, and the unknown load R_L.



Problem 3: (20 points)

The wavelength of a propagating mode along an air-filled parallel-plate waveguide at 15 GHz is found to be 2.5 cm. Find the cutoff frequency of this mode.

Problem 4: (20 Points)

The E field radiated by an antenna has only a θ component and is given by $E_\theta = \frac{E_0 \sin\theta}{r} e^{-j\beta r}$. Find the beam solid angle, directivity and effective aperture for this antenna.

Problem 5: (20 Points)

A load of $100+j150\ \Omega$ is connected to a $75\ \Omega$ lossless line. Use a Smith chart to find (a) Γ, (b) VSWR, (c) the load admittance, (d) Z_{in} of 0.4λ from the load. (Note: You MUST use a Smith chart to find all the answers. Write down every step of your reasoning and the result on a simplified Smith chart sketched on your answer sheet. Otherwise it cannot be graded.)

(背面仍有題目，請繼續作答)

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Problem 5: (continued)