THE INTERNATINONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY – HCMC

Final Examination

Date: June 20th , 2009.

Duration: 120 minutes

SUBJECT: Electromagnetic Theory	
Dean of School of Electronics & Telecommunications Engineering Signature: Full name:	Lecturer: Tran Van Su, M.Eng. Signature: Full name:

INTRODUCTIONS:

1. This is a CLOSED-BOOK examination.
2. Answer all questions

Question 1 (20 Marks)

For each of the following electric fields, find $\vec{B}$ that satisfies Faraday's law in differential form. Given that any constant vector which is added by integrating is removed.

a. $\vec{E} = E_o \cos(3\pi z)\cos(9\pi.10^8 t)\hat{x}$ **(10 Marks)**

b. $\vec{E} = E_o \cos[3\pi \times 10^8 t + 0.2\pi(4x + 3z)]\hat{y}$ **(10 Marks)**

Question 2 (15 Marks)

The magnetic field of a uniform plane wave in free space is given by

$$\vec{H} = H_o \cos(6\pi \times 10^8 t + 2\pi y)\hat{x}$$

Find unit vectors along the following:

a. the direction of propagation of the wave **(5 Marks)**

b. the direction of the magnetic field at t = 0, y = 0. **(5 Marks)**

c. The direction of the electric field at t = 0, y = 0. **(5 Marks)**

Question 3 (35 Marks)

For each of the following values of the displacement flux density at a point on the surface of a perfect conductor (no electric field inside and hence E_t = 0 on the surface), find the surface charge density at points:

a. $\vec{D} = D_o(\hat{x} + 2\hat{y} + 2\hat{z})$ and pointing away from the surface. **(10 Marks)**

b. $\vec{D} = D_o(\hat{x} - \sqrt{3}\hat{z})$ and pointing toward the surface. **(10 Marks)**

c. $\vec{D} = D_o(0.8\hat{x} - 0.6\hat{y})$ and pointing away from the surface. **(10 Marks)**

d. If the surface charge density at a point on the surface is zero, find D_o. **(5 Marks)**

Assume D_o to be positive for questions a, b, and c.

Question 4 (30 Marks)

For the transmission line of the following Figure

a. Calculate and sketch the bounce diagram of voltages for 0 < t < 6μs. **(10 Marks)**

b. Sketch the voltage versus time at two ends of Transmission line for 0 < t < 6μs. **(5 Marks)**

c. Calculate and sketch the bounce diagram of currents for 0 < t < 6μs. **(10 Marks)**

d. Sketch the current versus time at two ends of Transmission line for $0 < t < 6\mu s$. **(5 Marks)**