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

**Final Examination**

**Date:** January 21, 2018

**Duration:** 120 minutes

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| **SUBJECT: Electromagnetic Theory** | |
| Dean of School of Electrical Engineering  Signature:  Full name: Tran Van Su | Lecturer  Signature:  Full name: Tran Van Su |

**INTRODUCTIONS:**

1. One sheet, A4-size paper, with your own hand-writing characters is allowed (Books are prohibited)
2. Laptop and communications devices are not allowed except calculators
3. Answer all questions

**Question 1 (20 Marks)**

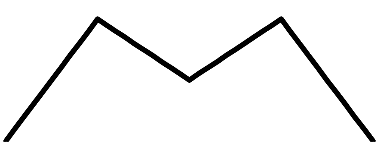
An infinite plane sheet of current density  (A/m), where is as shown in *Figure* below, lie in the z = 0 in free space. Find and sketch:

1. versus t in the z = 300m plane **(10 Marks)**
2. versus z for t = 1µs **(10 Marks)**

0.2

0.1

0 1 2 3 4



JS (A/m)

t (µs)

(Note: Students must give calculations and explanations to support the answers)

**Question 2 (15 Marks)**

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

1. Find the unit vector along the direction of propagation of the wave **(5 Marks)**
2. Find β **(5 Marks)**
3. What is the electric field at t = 0, y = 1/8 m? **(5 Marks)**

**Question 3 (15 Marks)**

For each of the following values of the displacement flux density at a point on the surface of a perfect conductor, find the surface charge density at points:

1. and pointing away from the surface **(5 Marks)**
2. and pointing toward the surface **(5 Marks)**
3. If the surface charge density at a point on the surface is zero, find **(5 Marks)**

Assume to be positive for questions *a*, b and c

**Question 4 (20 Marks)**

The parameters of the medium are given as follows:

S/m, , and Hz (x F/m, x H/m)

1. Compute the attenuation constant, phase constant and intrinsic impedance **(5 Marks)**
2. If the magnitude of the electric field is , what is the magnitude of the magnetic field?

**(5 Marks)**

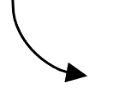
1. What is the phase different between electric and magnetic fields? **(5 Marks)**
2. Compute the expression of the magnetic field

**(5 Marks)**

**Question 5 (25 Marks)**

For the Transmission line of the following *Figure*

1. Calculate and sketch the bounce diagram of the voltages for 0 < t < 4µs **(10 Marks)**
2. Find if the voltage at the middle of the line at 2.8µs is 52/9 (V) **(10 Marks)**



E = 12 V

Rg = 100 Ω

t = 0

Zo = 50 Ω

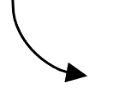
vp = 108 m/s

RL = 200 Ω

100m

**Question 6 (10 Marks)**

Find at t = 1µs and at t = 2µs



E = 12 V

Rg = 50 Ω

IB

Zo = 50 Ω, vp = 108 m/s

RL = 200 Ω

100m

100m

RB = 50 Ω

IL