INTERNATINONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY – HCMC

**Mid-term Examination**

**Date: Nov. 6th, 2015**

**Duration:** 90 minutes

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| **SUBJECT: Electronic Devices** | |
| Dean of School of Electrical Engineering  Signature:  Full name: Tran Van Su | Lecturer: Tran Van Su, Msc.  Signature:  Full name: Tran Van Su |

**INTRODUCTIONS:**

1. Only one NOTE of A4-PAPER and calculators allowed during the exam. Books, other materials, and computers are prohibited.
2. Answer all questions.

**Question 1 (15 Marks)**

An op-amp has the frequency response of the voltage gain depicted in Fig. 1

100

0

100

107

Frequency, [Hz]

Voltage gain, [dB]

Fig. 1

3dB

1. Determine the frequency response of an open-loop op amp approximated by STC form. (5 Marks)
2. What is unity gain-bandwidth? (5 Marks)
3. What is the bandwidth for the application with gain of 60dB? (5 Marks)

**Question 2 (10 Marks)**

An ideal op-amp is connected with resistance R and diode D shown in Fig. 2. The current of the diode is (A). Find relationship between V0 and Vin. (15 Marks)

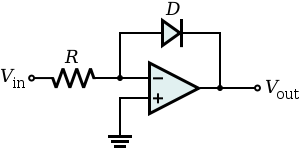


Fig. 2

**Question 3 (10 Marks)**

You are provided with an ideal op amp and three 10-kΩ resistors. Using series and parallel resistor combinations, how many different inverting amplifier circuit topologies are possible? Plot all possible circuit topologies. What is the largest (noninfinite) available voltage gain? What is the smallest (nozero) available gain?

**Question 4 (20 Marks)**

R = 1kΩ

+

-

Fig. 3

VAC = 0.01cos(100πt) (V)

D

VDC = 6V

The constant-voltage-drop model is used for the diode (D) in Fig. 3. The ideality factor

n = 1.

1. Find the current iD. (10 Marks)
2. Find the voltage vD. (10 Marks)

**Question 5 (20 Marks)**

A zener diode exhibits a constant voltage of 5.1 V for current not less than 5 mA. It is to be used in the design of a shunt regulator fed from a power supply (VS) shown in Fig. 4. The load current varies over the range 5mA to 10 mA.

1. Find minimum voltage VSmin. (10 Marks)
2. If VS = 25V, compute the maximum power dissipation of the zener diode? (10 Marks)

VS

R = 1kΩ

Vz

iL = 5mA to 10 mA

Fig. 4

**Question 6 (20 Marks)**

VCC = +10 V

RC

VC

Fig. 5

The pnp transistor in Fig. 5 has IS = 10-14A, and n= 1.

1. If IC = 8mA find VEB (10 Marks)
2. Find the value RC to obtain VC = +7V (10 Marks).

**Question 7 (5 Marks)**

Find the maximum VB can be raised while the transistor remains in the active mode (). Assume α = 1 and VBE = 0.7V.

+10V

RC= 4.7KΩ

VC

Fig. 6

VB

RE= 3.3KΩ