Mid-term Examination
Date: March 30th , 2016
**Duration:** 90 minutes

SUBJECT: Electronic Devices	
Dean of School of Electrical Engineering Signature:	Lecturer: Tran Van Su, Msc. Signature:
Full name: Tran Van Su	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.
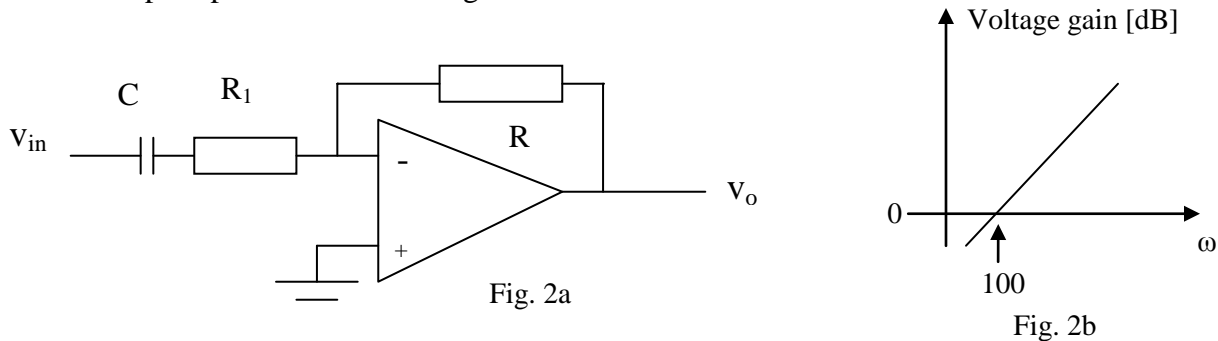
Question 1 (25 Marks)

The Op-Amp used for the design has the approximated frequency response of the voltage gain shown in Fig. 1

Fig. 1
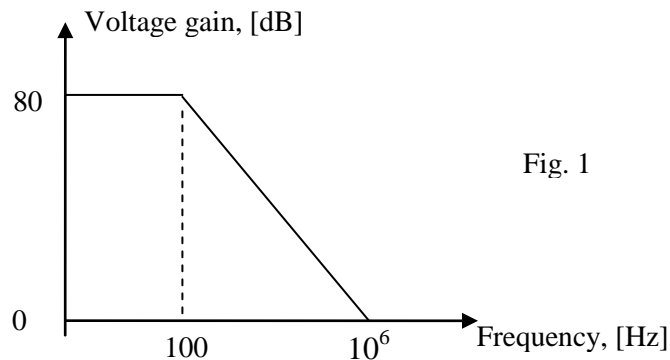
a. Design and plot the inverting amplifier with input resistance of $4K\Omega$ and the 3-dB frequency of 20KHz. (10 Marks)
b. Design and plot the circuit with the bandwidth of 10^6 Hz. (10 Marks)
c. Find the bandwidth of the amplifier if the voltage gain is 25dB. (5 Marks)

Question 2 (25 Marks)

An ideal op-amp is connected as Fig. 2a.

Fig. 2a

Fig. 2b

a. If $R_1 = 0$, design R to obtain the differentiator shown in Fig. 2b with $C = 0.01\mu F$. (10 Marks)
b. What is the amplitude and phase of the voltage gain at $\omega = 10$ rad/s and at 1000rad/s for question a ($R_1 = 0$). (5 Marks)
c. Determine R_1 to limit the absolute of the high frequency gain $|A_v| \approx 100$ with the value of R obtained from question 1. (10 Marks)

Question 3 (25 Marks)
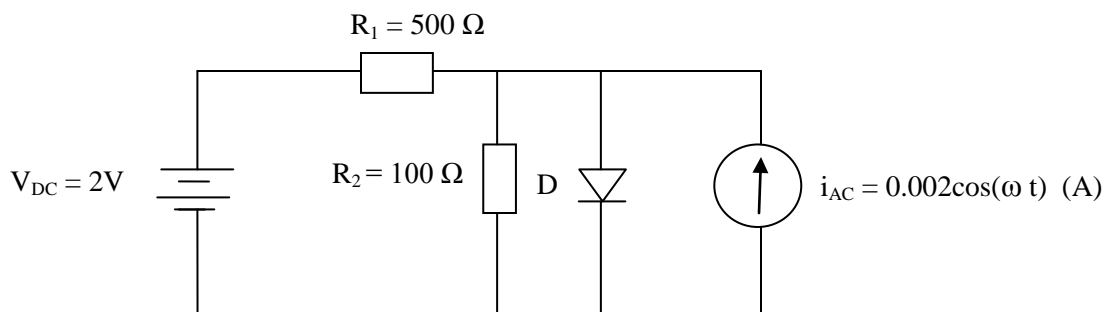
Fig. 3

The constant-voltage-drop model is used for the diode (D) in Fig. 3 with $V_{Do} = 0.65V$. The ideality factor $n = 1$.

    a) Find the current i_D. (10 Marks)
    b) Find the voltage v_D. (10 Marks)
    c) Compute the DC and AC power dissipated on Diode. (5 Marks)

Question 4 (25 Marks)
A zener diode exhibits a constant voltage of 7.5 V for current not less than 6 mA. It is to be used in the design of a shunt regulator shown in Fig. 4. The load current varies over the range 0 to I_{Lmax}.

    a) Find I_{Lmax}. (10 Marks)
    b) If $I_L = 10$ mA, compute the maximum power dissipation of the zener diode? (5 Marks)
    c) Compute the power dissipated on R if $i_L = 0$. (5 Marks)
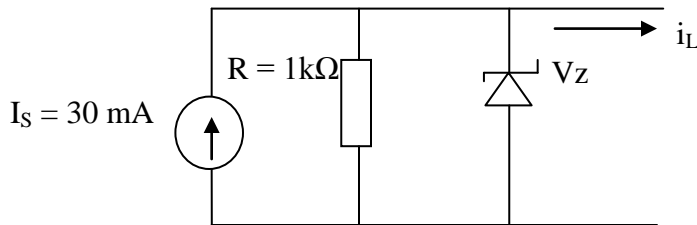   d) If I_S varies from 20mA to 30 mA and I_L varies from 5mA to 20mA. Determine R. (5 marks).

Fig. 4