INTERNATINONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY – HCMC

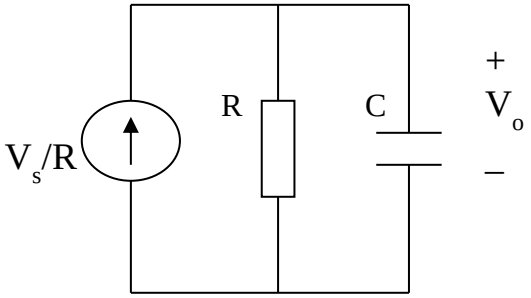
Mid-term Examination Replacement
Begin: April 20th , 2020
Submit: April 27th, 2020
Question Code: 35

SUBJECT: Electronic Devices	
Dean of School of Electrical Engineering Signature: Full name: Mai Linh	Lecturer Signature: Full name: Tran Van Su

INTRODUCTIONS:

1. Exam questions are available on Blackboard
2. Answers must be typed and submitted on Blackboard in .PDF file.
3. Do not copy other materials because your answer files will be checked with Turnitin
4. Please write down your name, student ID and question code.

Question 1(15pts)



a) Find the transfer function V_o/V_s in terms of R, C, and jω.
b) If **R** = 5.8kΩ, find C to obtain $\mathbf{f_{3dB}}$ = 11.4 kHz.
c) Find the magnitude in dB of the transfer function V_o/V_s at **f** = 15.4kHz.

Question 2(10pts)

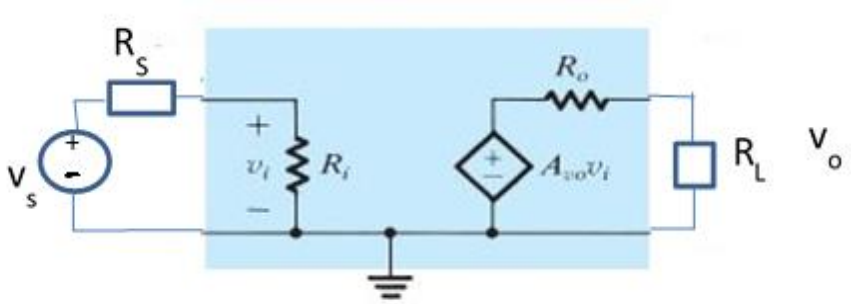


Figure shows an amplifier circuit with **Vs** = 0.35sin(ωt) V, **Rs** = 460 Ω, **Ri** = 850Ω, $\mathbf{A_{vo}}$ = 50, $\mathbf{R_o}$ = 110Ω and $\mathbf{R_L}$ = 550Ω.

a. Determine V_o.
b. What is the value of R_L to deliver maximum power to R_L.

Question 3(15pts)

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

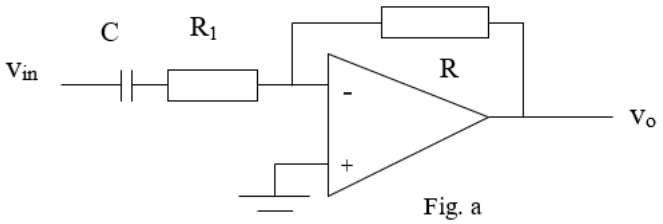


Fig. a

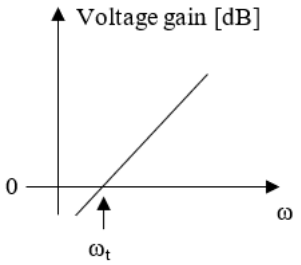
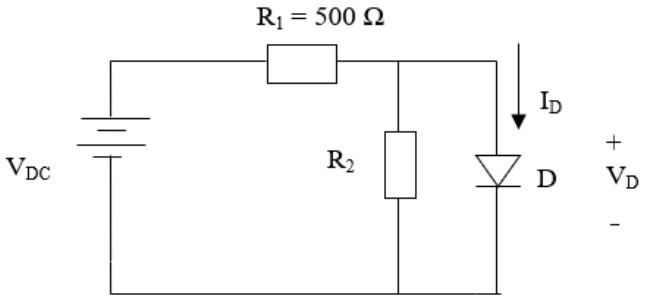


Fig. b

a. If R_1 = 0, design R to obtain the differentiator shown in Fig. b with C = 0.01μF and $\boldsymbol{\omega_t}$ = 135 rad/s
b. What is the amplitude and phase of the voltage gain at ω = 10 rad/s and at 1000rad/s for question a (R_1=0)?
c. Determine R_1 to limit the absolute of the high frequency gain $|\boldsymbol{A_v}| \approx 85$ with the value of R obtained from question a.

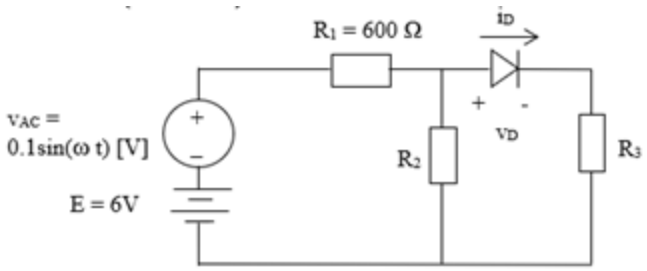
Question 4(15pts)



A silicon diode with ideality factor n = 1 has $\mathbf{I}_D$ = 3.1mA and Is = 10^{-14}A shown in the figure.

a. If $R_2 = \infty$, find V_D and V_{DC}.
b. If $\mathbf{R}_2$ = 350 Ω, find V_{DC}

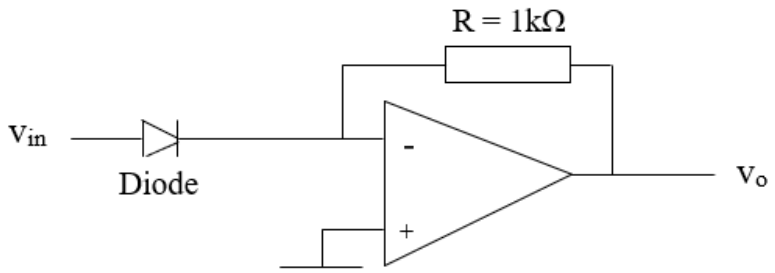
Question 5(15pts)



The constant-voltage-drop model is used for the diode in Figure with V_{Do} = 0.7V. The ideality factor n = 2.
$\boldsymbol{R}_2 = 820\ \Omega, \boldsymbol{R}_3 = 950\ \Omega$

a. Find the total current i_D.
b. Find the total voltage v_D.

Question 6(15pts)

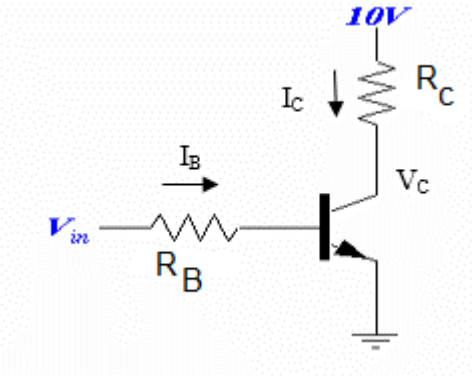


Figure

An ideal op-amp is shown in Figure.

a. Find relationship between V_0 and V_{in}.
b. Determine v_o if $\mathbf{v}_{in}$ = 0.42V, Is = 0.5x10^{-9} (A), n = 1, and V_T = 25mV

Question 7(15pts)



A transistor circuit is given in the Figure with V_{CC} = 10V, $\mathbf{R_C}$ = 1.8 kΩ, $\mathbf{R_B}$ = 15.5 kΩ, V_{BE} = 0.7V and β = 100.

a. If Vin = 1V, compute I_B and I_C and V_C in active mode.

b. Find V_{in} to obtain transistor in saturation mode (V_{CE} = 0.2V)