ECE 2020 Autumn 2019

Midterm 2

First Name: _____ Last Name: _____
(Please Print) (Please Print)

Lad day/time: _____ Student ID: _____

Instructions:

DO NOT OPEN THE EXAM UNTIL 11:30PM

- You are allowed 55 minutes for this midterm. There are 5 questions. Please pace yourself accordingly.
- You may use a calculator and 1 pages of notes back and front.
- Phones, laptop, tablet, or any other type of electronic device other than a calculator is **NOT allowed**.
- There is space provided for each question. If you need additional space, use the backs of the pages and indicate to the grader that you have done so.
- In order to receive full credit, you must show your work and carefully justify your answers. The correct answer without any work will receive little or no credit.
- **Please write neatly**. Illegible answers will be assumed to be incorrect.
- Avoid seeing anyone else's work or allowing yours to be seen.
- Do not communicate with anyone but an exam proctor.
- If you have a question, raise your hand.

Good Luck!

Time Started: _____

Time Finished: _____

Signature: _____

Question	Points	Score
1	20	
2	10	
3	10	
4	10	
Total	50	

3. [10 points] A load impedance, $Z_L = 2 + j8\Omega$, is connected to a source with line resistance equal to 2Ω, calculate the following values:
   A. The average power delivered to the load.
   B. The reactive power delivered to the load.
   C. The complex power delivered to the load.
   D. The apparent power supplied by the load.
   E. The power factor of the load.

Write your final answers here:

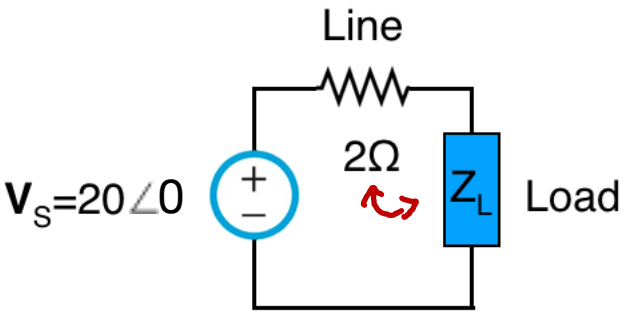
A: $P = 5.02\,W$

B: $Q = 20.07\,VAR$

C: $S = 5.02 + 20.07j\,VA$

D: $|S| = 20.69$

E: $PF = 0.24$



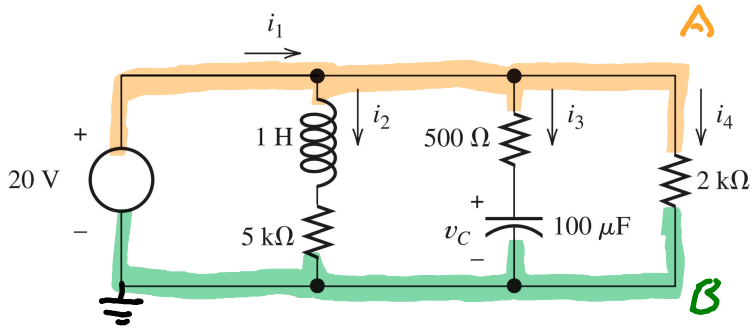
$Z_{tot} = 4 + 8j\ \Omega$

Complex Pow: $\frac{VI^*}{2}$

$$I = \frac{V_S}{Z_{eq}} = \frac{20}{4+8j} = 1.84153 - 1.26838j$$

$$\frac{20(1.84153 + 1.26838j)}{2} =$$

1. [10 points] Find the currents and the i_1, i_2, i_3, i_4, and the voltage v_c.



Write your final answer here:

i_1 = 14mA

i_2 = 4mA

i_3 = 0A

i_4 = 10mA

v_c = 20V

NVA

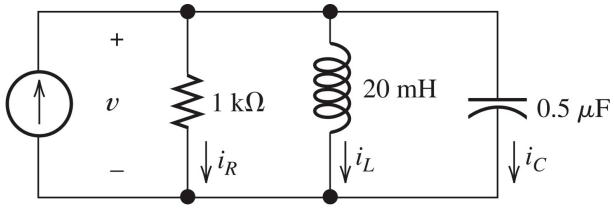
$V_A = 20 \quad V_B = 0V$

KCL@ A

$V_1 = V_2 + V_3 + V_4$

i_1

2. [12 points] Assume that is(t) = 0.01sin(10^4t - 90). Find the currents $i_R(t)$, $i_L(t)$, $i_C(t)$ and the voltage v(t).



Write your final answer here:

$i_R(t)$ = 0.01cos(10^4t-180)

$i_L(t)$ = 0.05cos(10^4t+90)

$i_C(t)$ = 0.05cos(10^4t-90)

v(t) = 10cos(10^4t-180)

$\omega = 10^4$

$i_s = .01e^{90j}$

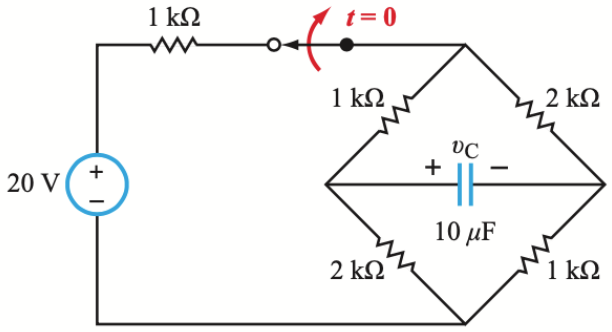
1) **[12 points]** The switch is closed for a long time, and open at $t = 0$. Determine:

a) $v_c(0)$

b) $v_c(\infty)$

c) $v_c(t)$ for $t > 0$

d) $i_c(t)$ for $t > 0$



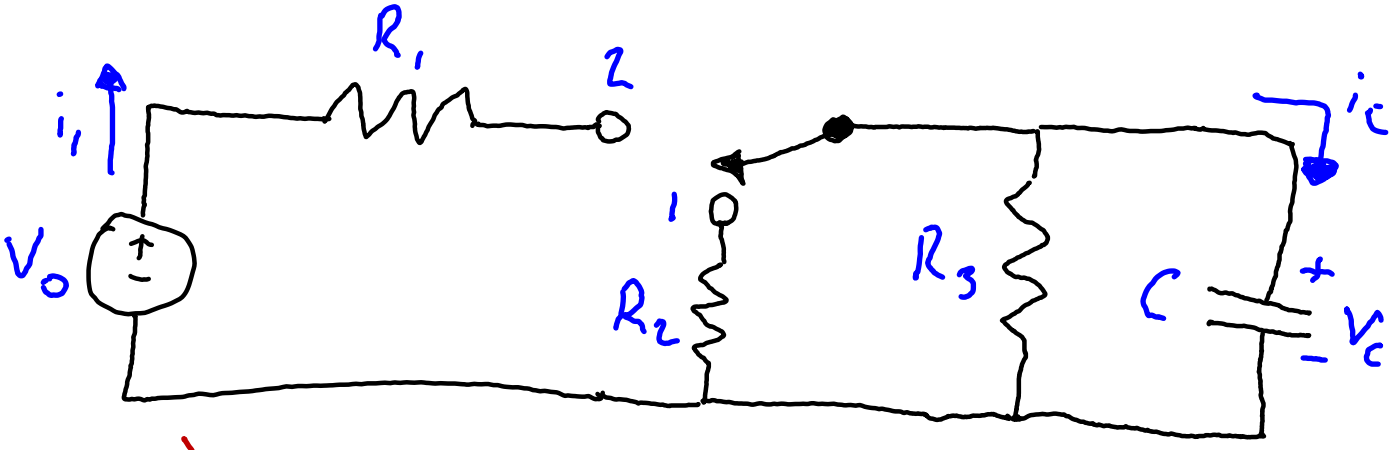
Write your final answers here:

A: 4V

B: 0V

C: 4e^(-66.67t)

D: -2.67e^(-66.67t)mA



$V_c(0)$

$V_c(\infty)$

$V_c(t)$ for $t \geq 0$

$i_c(t)$ for $t \geq 0$