

Midterm 2First Name: _____
(Please Print)Last Name: _____
(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: _____

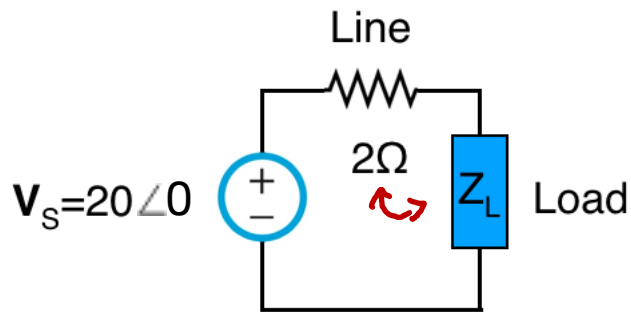
Time Finished: _____

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:

- The average power delivered to the load.
- The reactive power delivered to the load.
- The complex power delivered to the load.
- The apparent power supplied by the load.
- The power factor of the load.



Write your final answers here:

A: $P = 5.02 \text{ W}$

B: $Q = 20.07 \text{ VAR}$

C: $S = 5.02 + 20.07j \text{ VA}$

D: $|S| = 20.69$

E: $\text{PF} = 0.24$

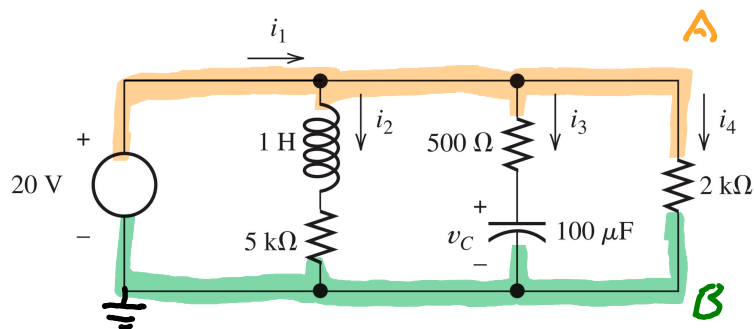
$$Z_{\text{tot}} = 4 + 8j \Omega$$

$$\text{Complex Power: } \frac{VI^*}{2}$$

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

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

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



NVA

$$V_A = 20 \quad V_B = 0V$$

KCL @ A

$$V_1 = V_2 + V_3 + V_4$$

i_1

Write your final answer here:

$$i_1 = \underline{14mA}$$

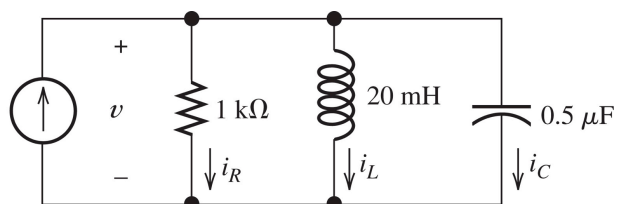
$$i_2 = \underline{4mA}$$

$$i_3 = \underline{0A}$$

$$i_4 = \underline{10mA}$$

$$v_C = \underline{20V}$$

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



$$\omega = 10^4$$

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

Write your final answer here:

$$i_R(t) = \underline{0.01\cos(10^4t-180)}$$

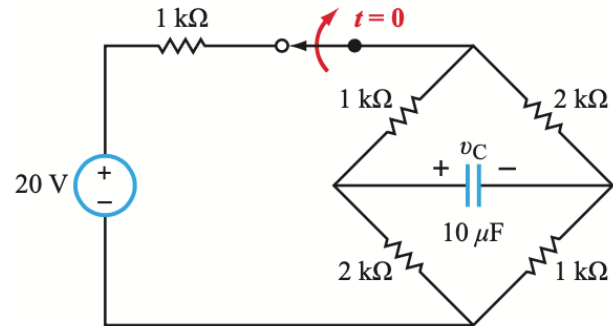
$$i_L(t) = \underline{0.05\cos(10^4t+90)}$$

$$i_C(t) = \underline{0.05\cos(10^4t-90)}$$

$$v(t) = \underline{10\cos(10^4t-180)}$$

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: $-2.67e^{(-66.67t)}\text{mA}$