United International University **(UIU)**

Dept. of Computer Science & Engineering **(CSE)**

Final Exam, Trimester: Spring 2024

Course Code: CSE 113/EEE 2113**; Course Title:** Electrical Circuits

Total Marks: 40**; Duration:** 2 hours

Any examinee found adopting unfair means would be expelled from the trimester/ program as per UIU disciplinary rules.

Question 1: Answer all the questions. (10 Marks)

Use the superposition theorem to **determine** the value of V_x for the circuit shown in **Figure 1**. Also, the 8-ohm resistor absorbs power from both independent sources. **Analyze** the circuit and **determine** which independent source in this circuit supplies most of the power to the 8-ohm resistor. [8+2] **CO3**

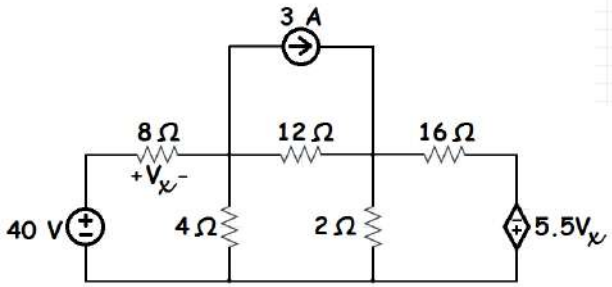

Figure 1

Question 2: Answer all the questions. (10 Marks)

For the circuit shown in **Figure 2**, answer the following questions: [4+3+3] **CO3**

i) **Determine** the **Thevenin equivalent** circuit at the **a-b** terminal.

ii) Suppose, your friend suggests that if you connect a **20V-40W** bulb across **a-b** terminal, then you will get maximum bulb intensity. Is he right? If not, then **calculate** the resistance of the bulb that would get maximum intensity.

iii) **Determine** the maximum power delivered to the bulb that would be connected across the **a-b** terminal.

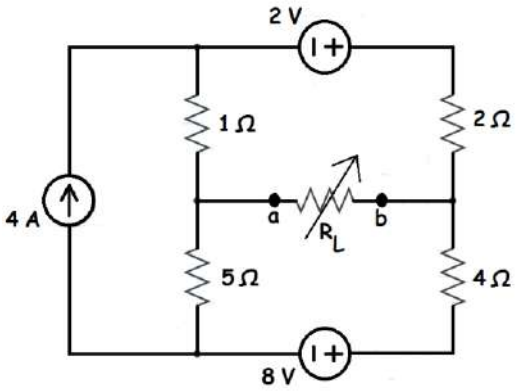

Figure 2

Question 3: Answer all the questions **(10 Marks)**

For the circuit shown in **Figure 3**, where $v_g(t) = 247.49 \cos(1000t + \pi/4)$ [3+3+2+2]
i) **Determine** the total impedance of the circuit.
ii) **Determine** the current through the 100Ω resistor using the current division rule. **CO4**
iii) **Determine** the voltage $V_{ab}(t)$ using VDR.
iv) **Determine** by how much degree the voltage, $V_{ab}(t)$ is leading the source voltage, $v_g(t)$.

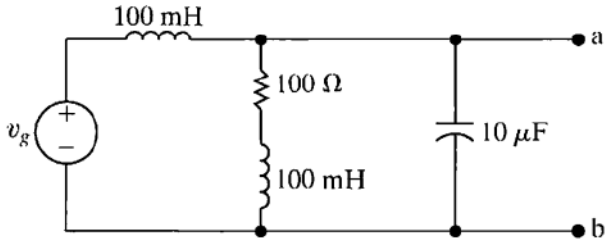

Figure 3

Question 4: Answer all the questions. **(10 Marks)**

Answer the following questions for the circuit shown in **Figure 4 (a-b)**: [5+5]
i) **Calculate** the rms value of the periodic voltage shown in **Figure 4a**. **CO4**

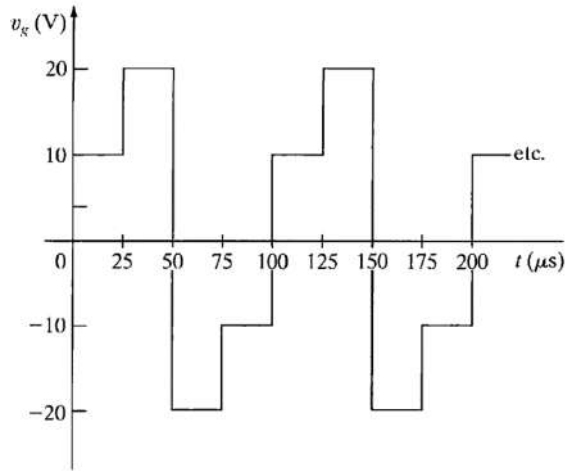

Figure 4a

ii) Now, **use** this rms value as the maximum amplitude of the sinusoidal voltage source in the circuit shown in Figure 4b. **Determine** $I_0(t)$ and average real power absorbed by the 2-ohm resistor in the circuit. The angular frequency is 100 rad/s in the circuit.

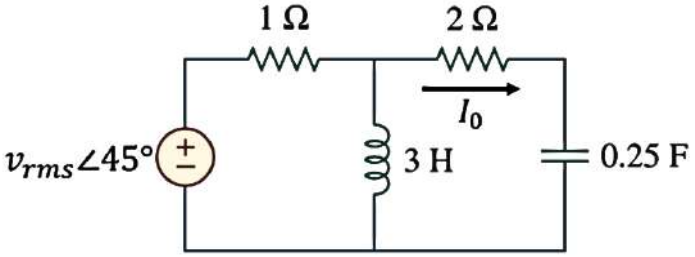

Figure 4b