United International University **(UIU)**

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

Final Exam, Trimester: Summer 2024

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

Total Marks: 50**; 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. (12 Marks)

Your friend just built a circuit and connected a 300Ω bulb between a-b points as shown in **Figure 1**. Answer the following questions: [6+2+2+2] CO3

i) Determine the Thevenin equivalent circuit for the following circuit your friend has built.

ii) Determine the power absorbed by this bulb. Is the power the maximum power that can be achieved for this circuit? If not, then what should you do?

iii) Now, your friend connected another bulb with a different resistance instead of the 300Ω bulb and got the same absorbed power. Determine the new resistance of this bulb.

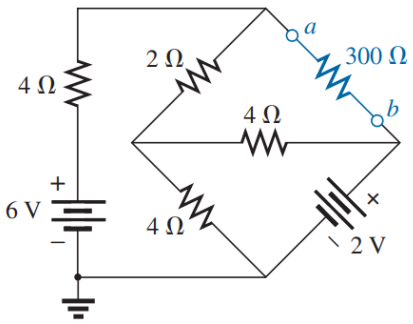

Figure 1

Question 2: Answer all the questions. (13 Marks)

Determine the value of $\mathbf{V_o}$ using the Superposition theorem for the circuit shown in **Figure 2**. Additionally, find the power delivered by the **10V** voltage source. [10+3] CO3

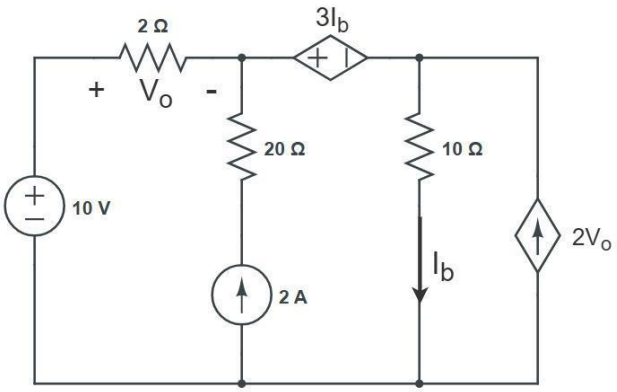

Figure 2

Question 3: Answer all the questions (12 Marks)

An AC current source, $i_s(t)$ **[Figure 3(a)]** is used in the following circuit shown in **Figure 3(b)**. Answer the following questions: [2+5+5] CO4

i) Determine the equation of $i_s(t)$.

ii) Determine the equivalent impedance of this circuit.

iii) Determine $i_o(t)$ and also by how many degrees is $i_o(t)$, leading $i_s(t)$?

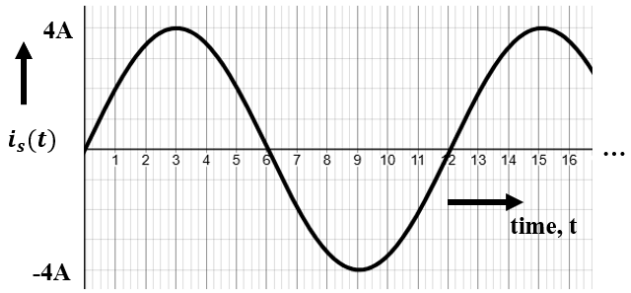

Figure 3(a)

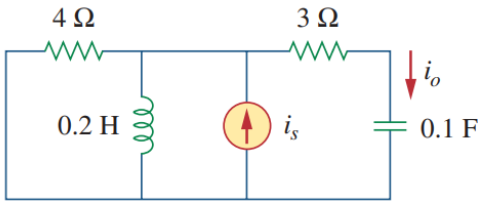

Figure 3(b)

Question 4: Answer all the questions. (13 Marks)

When the voltage waveform of **Figure 4(a)** is applied across a 2-Ω resistor, the average power absorbed by the resistor is 4.267 W. Another AC circuit is shown in **Figure 4(b)**. Now answer the following questions: [3+5+5] CO4

i) Find the rms value, v_{rms} of the voltage waveform shown in **Figure 4(a)**.

ii) Find the peak value of the voltage waveform, V_m.

iii) Use this rms **[from (i)]** value as the maximum amplitude of the sinusoidal voltage source in the circuit shown in **Figure 4(b)**. Determine $I_0(t)$, and average power absorbed by the 30Ω resistor in the circuit.

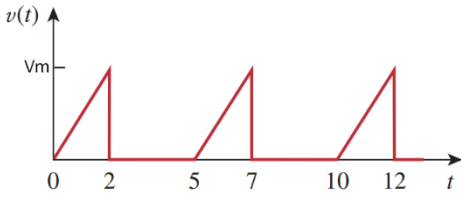

Figure 4(a)

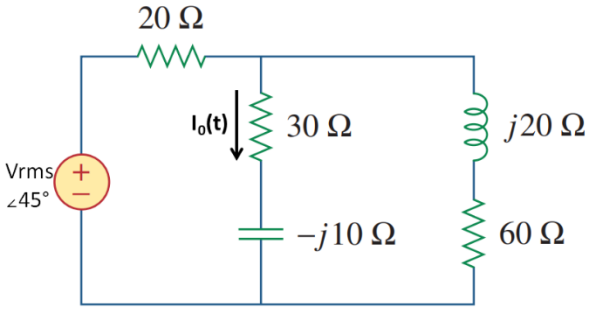

Figure 4(b)