United International University **(UIU)**

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

Mid-Term Exam: Trimester: Summer 2023

Course Code: EEE 2113**; Course Title:** Electrical Circuits

Total Marks: 30**; Duration:** 1 hour 45 minutes

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

Question 1: Answer all the questions. **(6 Marks)**

The charge flowing in a wire having 20 Ω resistance is shown in **Figure 1**. Answer the following questions: [4+2]

i) **Clearly** sketch the corresponding current and find current at $t = 2.5$ sec and $t = 5.5$ sec.

ii) **Determine** the time when maximum power is delivered to the element. Also, **find** the maximum power.
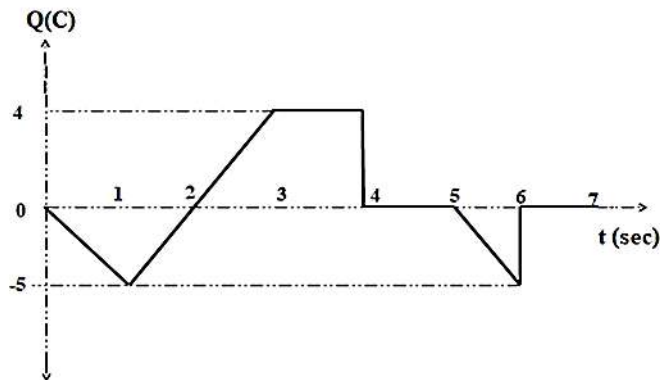

Figure 1.

Question 2: Answer all the questions. **(6 Marks)**

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

i) Find the equivalent resistance across the terminals **a-b**.

ii) A **30 V** voltage source is connected to the terminals **a-b**, the **positive** terminal of the source is connected to **a** and the **negative** terminal is connected to **b**. Find the currents I_{ce} and I_{eb} using **current division rule**.
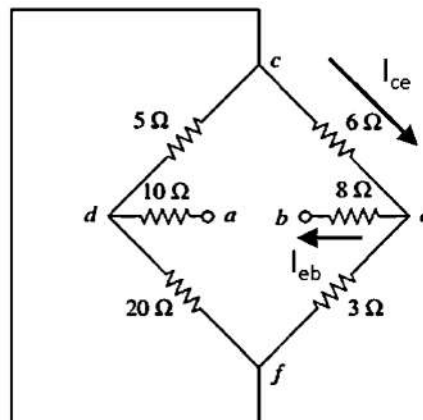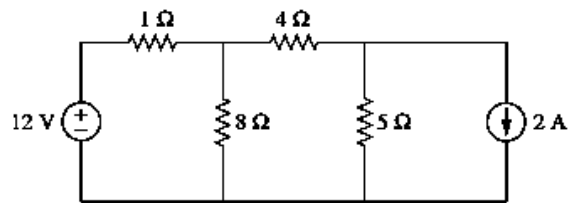

Figure 2.

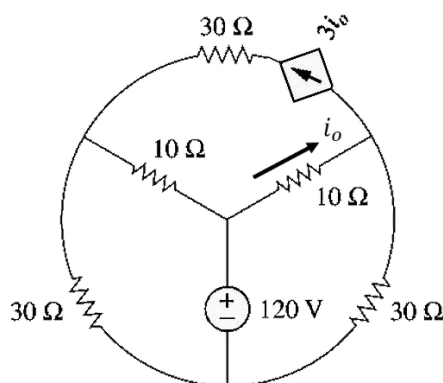## Question 3: Answer all the questions   (6 Marks)
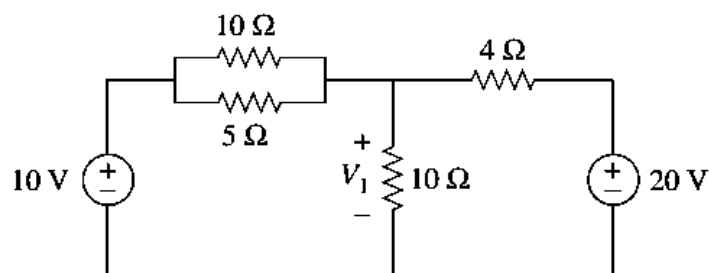

Figure 3.

[6]

Use Kirchoff's Current Law (**KCL**) and Kirchoff's Voltage Law (**KVL**) to find **all the branch currents and node voltages** of the above circuit in **Figure 3**.

Question 4: Answer all the questions.   (6 Marks)

For the circuit shown in **Figure 4**, determine i_o and current through the battery using **mesh analysis**.   [3+3]

Figure 4.

Question 5: Answer all the questions.   (6 Marks)

Figure 5.

[3+3]

For the circuit shown in **Figure 5**, answer the followings using **node analysis**:
  i)   **Determine** the current through the 5Ω resistor and V_1.
  ii)   **Evaluate** which voltage source is supplying power to the circuit.