United International University

Department of Computer Science and Engineering

EEE 2113: Electrical Circuits

Mid-Term Exam: Spring 2023 Time: 1 hour 45 minutes Marks: 30

There are five questions here. Answer all of them

1. Determine the followings for the circuit shown in Figure 1:

   (a) Equivalent Resistance of the circuit across the voltage source. [2]

   (b) Voltage across 3 Ω and 2 Ω resistors with appropriate polarities using VDR. [2]

   (c) Current through 50 Ω and 12 Ω resistors with proper directions using CDR. [2]

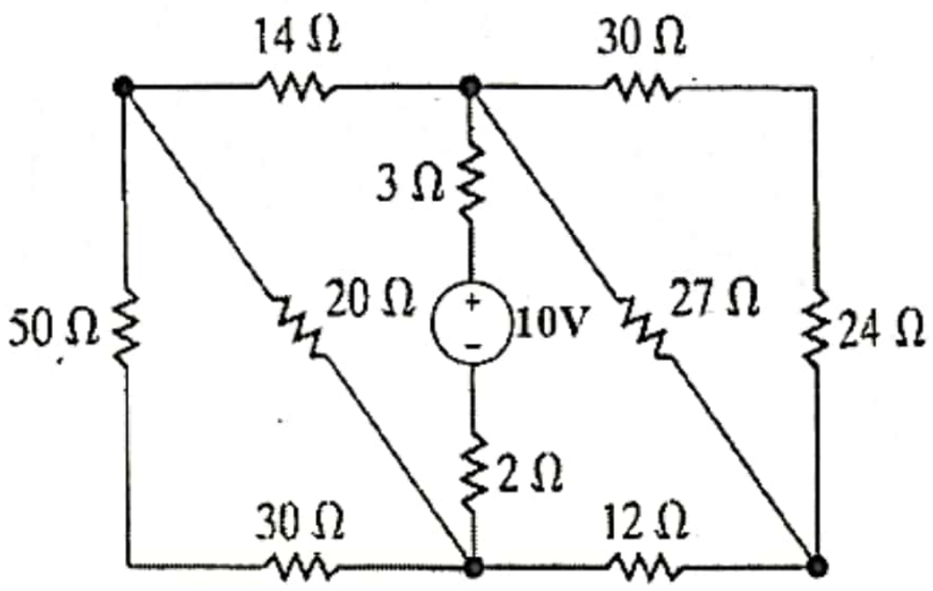

Figure 1: Circuit for Q-1

2. The charge flowing through a 10 Ω resistor is given below:

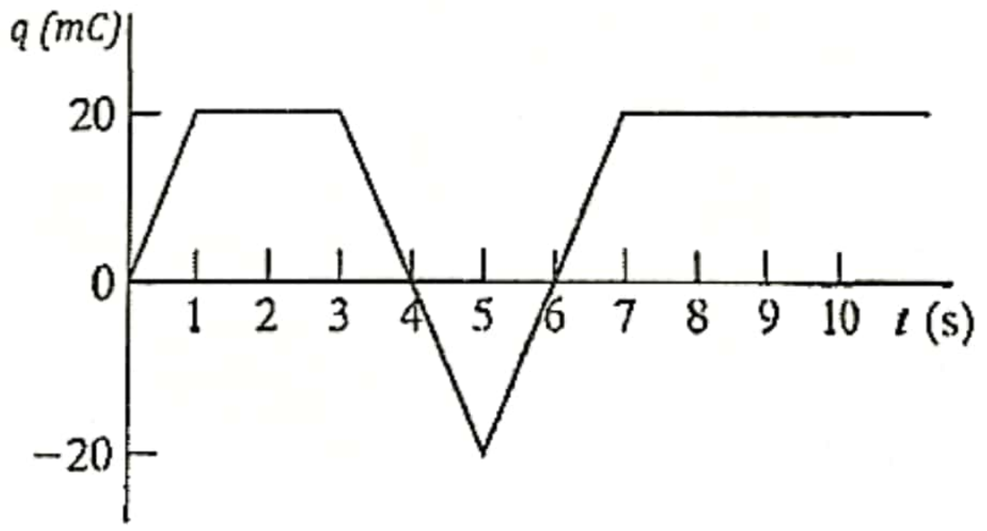

Figure 2: Charge distribution for Q-2

   (a) Derive the equation of current of this resistor and sketch it as a function of time. [4]

   (b) Calculate the total energy delivered between 0 sec and 6 sec. [2]

3. For the circuit shown in Figure 3,

   (a) Use Kirchoff's laws to determine all branch currents and node voltages. [4]

   (b) Calculate the power dissipated through all the elements of the circuit. Determine which elements are supplying power to the circuit and which elements are absorbing power. [2]

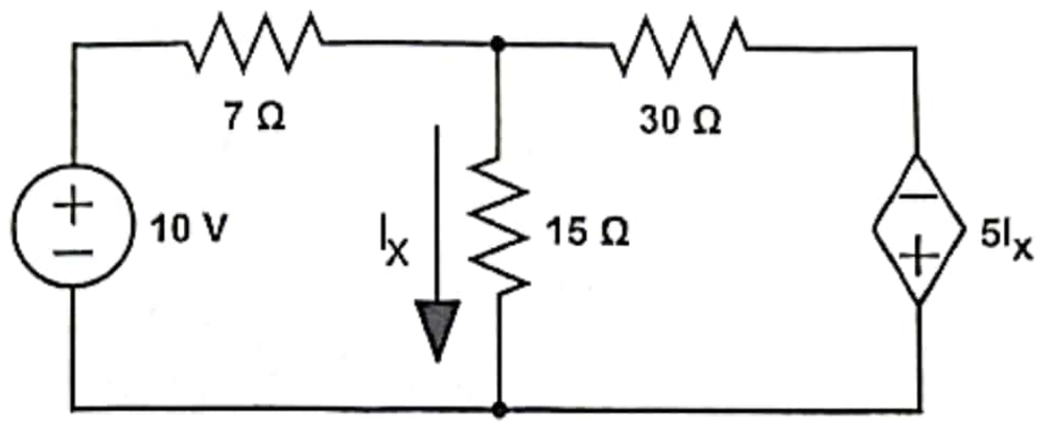

Figure 3: Circuit for Q-3

4. (a) Use the mesh analysis method to determine mesh currents in the circuit. [4]
   (b) Find the power dissipated in 1 Ω resistor. [2]

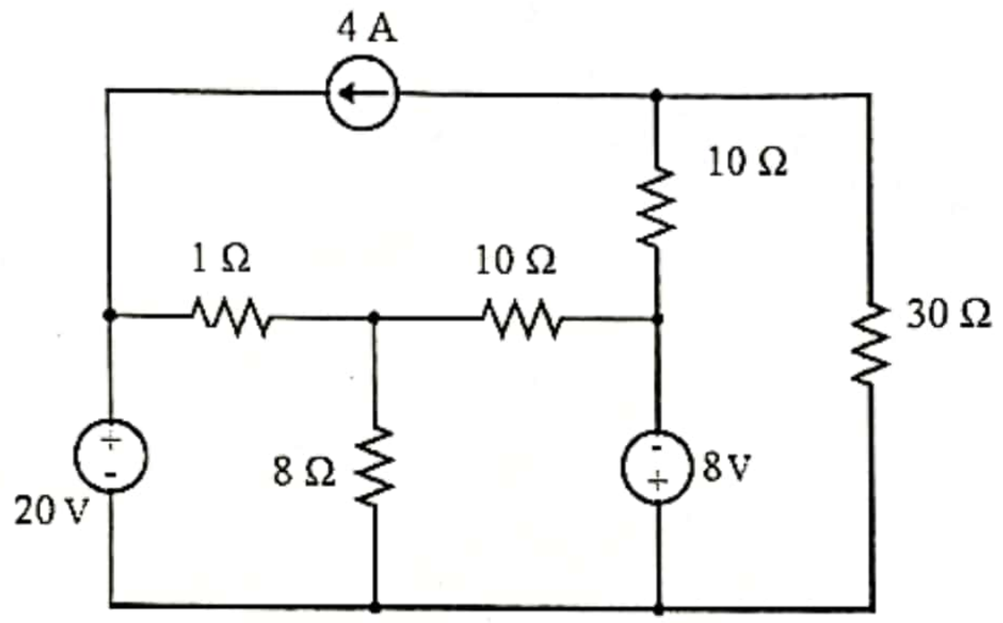

Figure 4: Circuit for Q-4

5. Consider the following circuit:

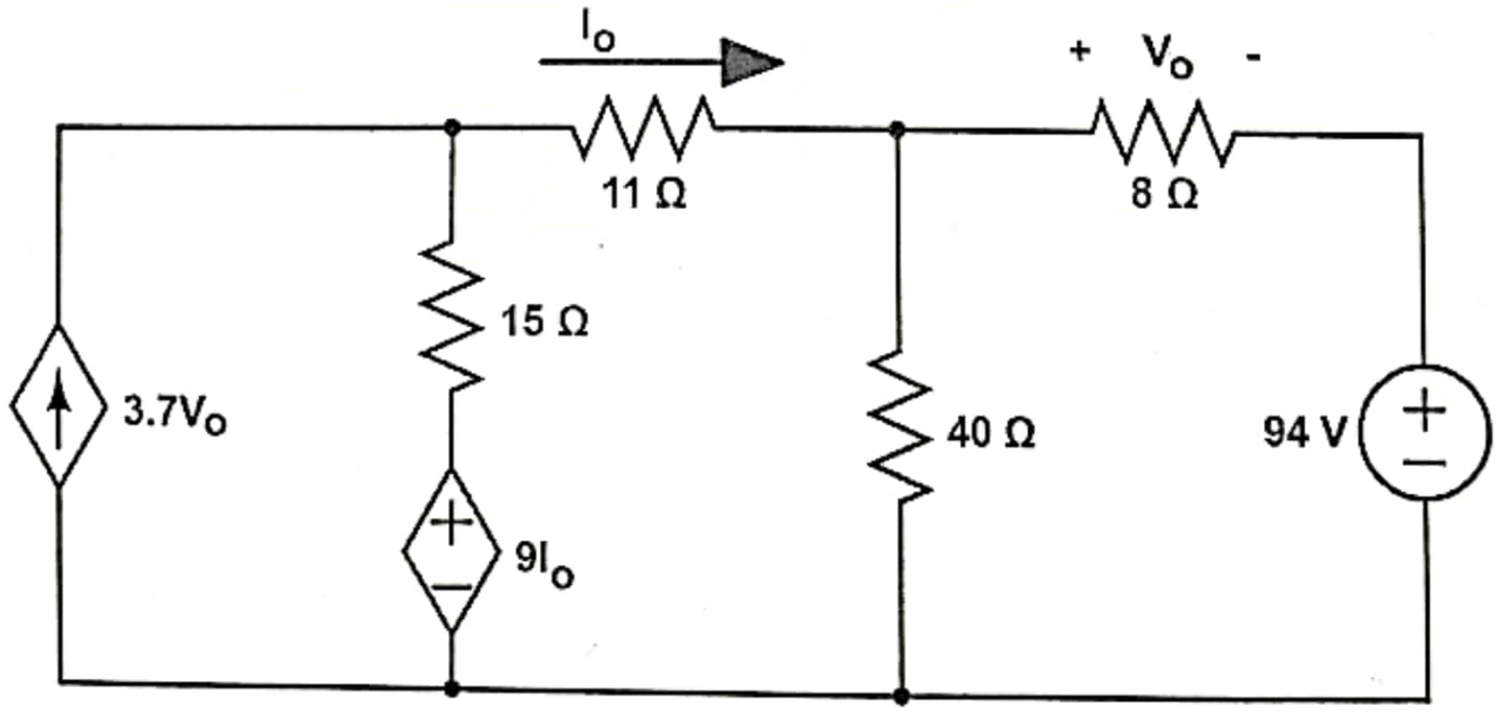

Figure 5: Circuit for Q-5

(a) Find all node voltages in the above circuit using Nodal Analysis method. [4]
(b) Calculate V_0 and I_0 in the circuit. [2]