ADAMA SCIENCE AND TECHNOLOGY UNIVERSITY

SCHOOL OF ELECTRICAL ENGINEERING&COMPUTING

DEPARTMENT OF ELECTRICAL POWER & CONTROL ENGINEERING

Course name: Fundamentals of Electrical Engineering **Group Assignment I:** (5%)

Course no: EPCE 2101 **Submission date:**30/03/23

Instructions:

- Answer all of the following questions.
- Make your answers **Clear and Readable**.
- *Maximum number of students in one group:5*

1. The charge flowing through the element of electric circuit is plotted in figure1. If the current flowing through the element is given by

$$i(t) = \begin{cases} 3t\text{A}, & 0 \leqq t < 6\text{ s} \\ 18\text{A}, & 6 \leqq t < 10\text{ s} \\ -12\text{A}, & 10 \leqq t < 15\text{ s} \\ 0, & t \geqq 15\text{ s} \end{cases}$$

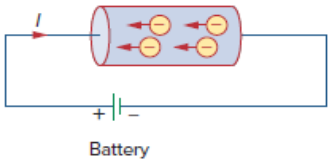

Figure 1

a) Find the charge stored in the element at t =7s.

b) Plot the charge stored in the element over 0 < t < 20 s.

2. From figure2 shown below determine the power loss in the 10Ω resistor by using mesh method.

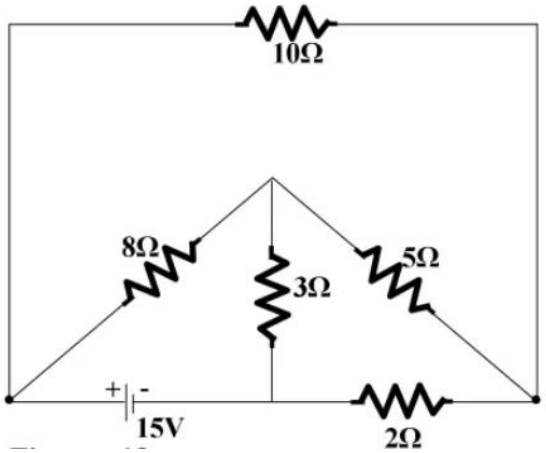

Figure 2

3. From the figure 3 shown below find the value of R by using superposition theorem. [i=0.1A]

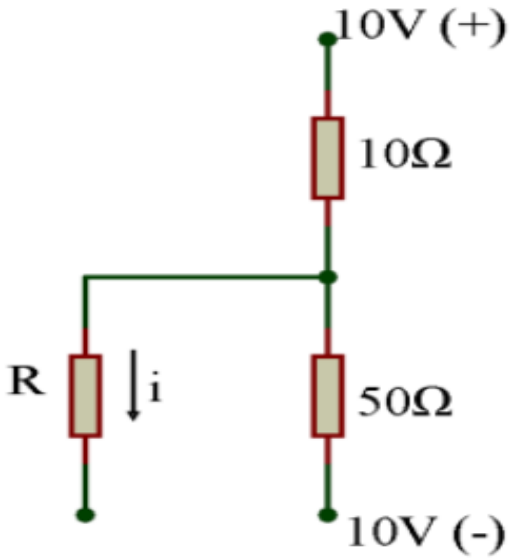

Figure 3

4. Consider the practical ammeter, diagrammed in figure 4 below, consisting of an ideal ammeter in series with a 2-kΩ resistor. The meter sees a full-scale deflection when the current through it is 50μA. If we wished to construct a multi range ammeter reading full-scale values of 1 mA, 10 mA, or 100 mA, depending on the setting of a rotary switch, what should R_1, R_2, and R_3 be?

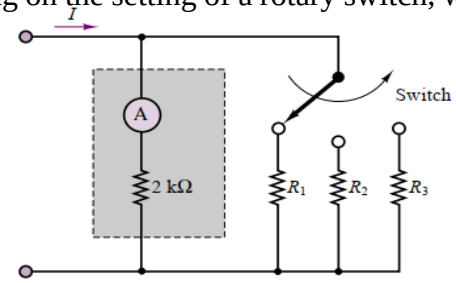

Figure 4

5. Find the maximum power transferred to resistor *R* in the circuit of figure 5 below.

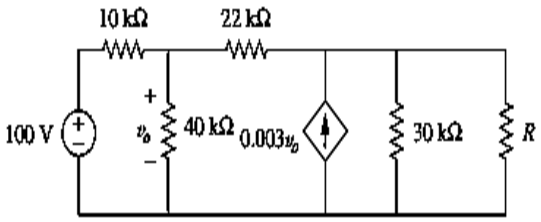

Figure 5

6. From an Automobile Ignition System, we consider the voltage generating system. The system is modeled by the circuit shown in the figure 6 below. The **12-V** source is due to the battery and alternator. The **4-Ω** resistor represents the resistance of the wiring. The ignition coil is modeled by the 8-mH inductor. The 1-μF capacitor (known as the condenser to auto-mechanics) is in parallel with the switch (known as the breaking points or electronic ignition which **opens at t=0s**).

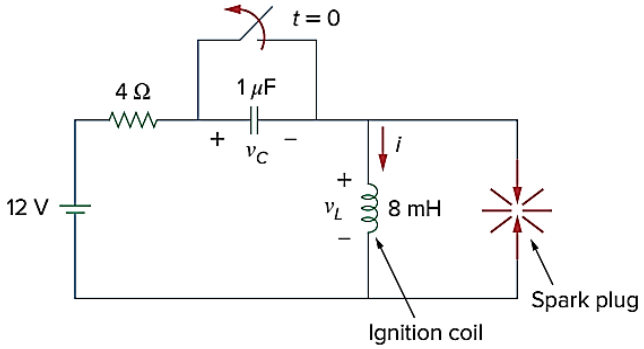

Figure 6

Thus,

a) Determine the voltage drop $V_L(t)$ across the Ignition coil to create spark.

b) Determine the voltage drop across the Capacitor $V_C(t)$ and Resistor model $V_R(t)$