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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023

COURSE NAME	:	ELECTRICAL PRINCIPLES I
COURSE CODE	:	BNR 10203
PROGRAMME CODE	:	BND/ BNE/ BNF
EXAMINATION DATE	:	JULY/ AUGUST 2023
DURATION	:	3 HOURS
INSTRUCTIONS	1.	ANSWER ALL QUESTIONS
	2.	THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSED BOOK.**
	3.	STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

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Q1 (a) The concept of electrical charge is the underlying principle for explaining all electrical phenomeno.
        (i) In your understanding, what can you describe about the electric charge.

                                                                    (4 marks)

        (ii) It is conventional to take current flow as the movement of positive charges and that is opposite to the flow of negative charges. Define what is the direct current (DC) mean.

                                                                    (3 marks)

        (iii) The current entering a certain element is shown in **Figure Q1(a)**. Find the current at t=1ms, t=5ms and t=10ms.

                                                                    (8 marks)

    (b) To move electron in a conductor, in a particular direction requires some work or energy transfer. This work is performed by an external electromotive force (emf). This emf is also known as voltage or potential different.
        (i) Summarize in detail what is the potential different means.

                                                                    (4 marks)

        (ii) An anergy source forces a constant current of 3 A for 12 s to flow through a light bulb. If 4.32 kJ is given off in the form of light and heat energy, determine the voltage drop across the bulb.

                                                                    (6 marks)

Q2 (a) Georg Simon Ohm was a German physicist, best known for his "Ohm's Law", which states that the current flow through a conductor is directly proportional to the potential difference (voltage) and inversely proportional to the resistance. The physical unit of electrical resistance, the Ohm (symbol: Ω), was named after him
        (i) Outline the meaning of Ohm's law.

                                                                    (3 marks)

        (ii) Resistance on the material depend on various factors. Discuss the factor that effect the resistance in the material

                                                                    (7 marks)

    (b) Based on the **Figure Q2(b)**,
        (i) Determine the value of the equivalent resistance for R_{ab}

                                                                    (10 marks)

        (ii) Given that the voltage across point ab, V_{ab}=10V, calculate the power dissipated by resistance 10 Ohm in the circuit

                                                                    (5 marks)

Q3 (a) Compute v_C, i_L and energy stored in the capacitor and inductor in the circuit of **Figure Q3(a)** under DC conditions.

                                                                    (7 marks)

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(b) Solve R, if the equivalent resistance R_{ab} is 16Ω

(10 marks)

(c) The light bulb in **Figure Q3(c)** is rated at 120 V. Calculate the voltage source, V_s to make the light bulb operate at the rated conditions.

(8 marks)

Q4 (a) Based on your understanding, explain the characteristics of capacitor and inductor when they are supplied with direct current (DC) at steady state condition

(4 marks)

(b) Calculate the value of V_o in **Figure Q4(b)** by using Superposition theorem.

(10 marks)

(c) Verify the answer of V_o in **Question Q4(b)** by using Thevenin theorem

(11 marks)

-END OF QUESTIONS –

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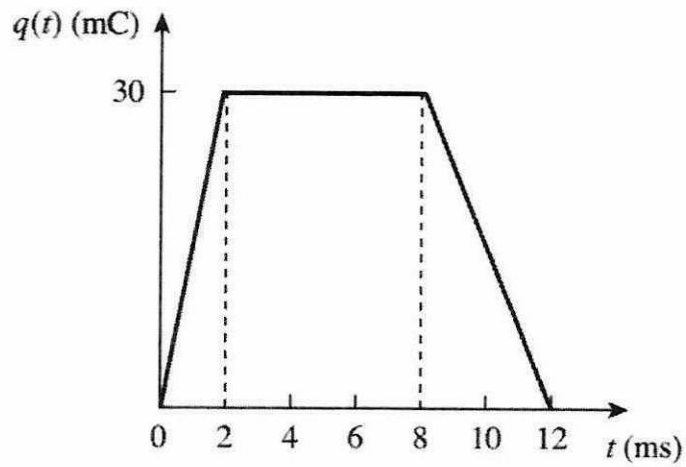
Figure Q1(a) Graph of charge entering element
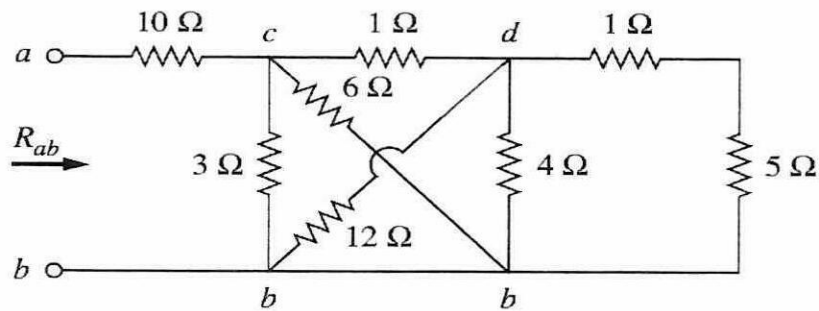
Figure Q2(b) Resistance arrangement in electrical circuit

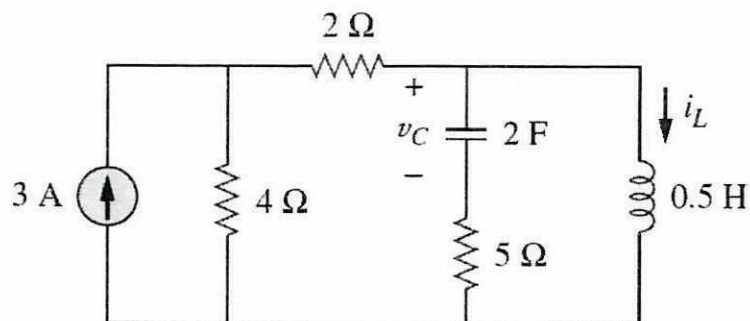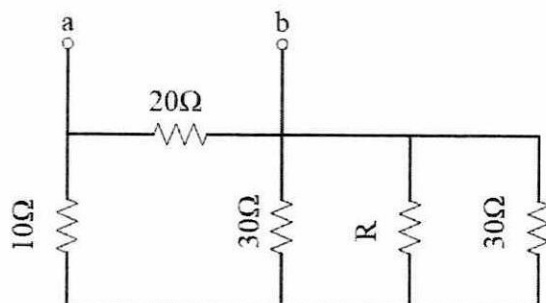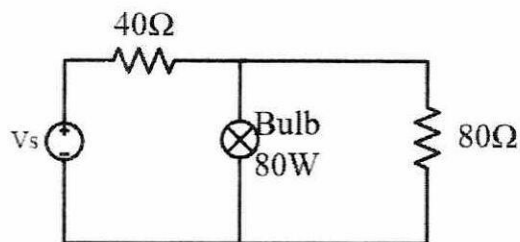Figure Q3(a)

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Figure Q3(b)

Figure Q3 (c)

Figure Q4(b)

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