



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023**

- COURSE NAME : CIRCUIT THEORY
- COURSE CODE : DAE 11103
- PROGRAMME CODE : DAE
- 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 **EIGHT (8)** PAGES

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CONFIDENTIAL

- Q1** (a) Write the Kirchoff current law (KCL) equations for all nodes in the circuit of **Figure Q1(a)**.
(8 marks)
- (b) For the circuit in **Figure Q1(b)**, find the current i_1 in term of i_s .
(12 marks)
- Q2** (a) Calculate the voltage across the 18A current source in **Figure Q2(a)** using mesh or nodal analysis. Justify which method is preferred.
(12 marks)
- (b) Use mesh analysis to compute the current of i_1 , i_2 and i_3 in **Figure Q2(b)**.
(8 marks)
- Q3** (a) For the circuit in **Figure Q3(a)** using the superposition theorem to find i_s .
(8 marks)
- (b) Replace the circuit shown in **Figure Q3(b)** with its Thevenin equivalent.
(12 marks)
- Q4** (a) Consider the circuit in **Figure Q4 (a)**. Under DC condition, find:
(i) i , v_c and i_L .
(5 marks)
(ii) Energy stored in the capacitor and inductor.
(3 marks)
- (b) For the circuit in **Figure Q4 (b)**, determine the time constant, τ .
(5 marks)
- (c) Find $v(t)$ for $t > 0$ in the circuit of **Figure Q4 (c)**. Assume that the switch has been open for a long time and is closed at $t = 0$. Calculate $v(t)$ at $t = 0.25s$.
(7 marks)

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- Q5** (a) A current source in a linear circuit has $i_s = 8 \cos(500\pi t - 25^\circ)$ A.
- (i) What is the amplitude of the current? (1 mark)
 - (ii) What is the angular frequency? (1 mark)
 - (iii) Find the frequency of the current. (2 marks)
 - (iv) Calculate i_s at $t = 2$ ms. (3 marks)
- (b) For the circuit shown in **Figure Q5 (b)** :
- (i) Find the total impedance Z_T . (5 marks)
 - (ii) Determine the current I . (3 marks)
 - (iii) Calculate i_1 and i_2 . (5 marks)

- END OF QUESTIONS -

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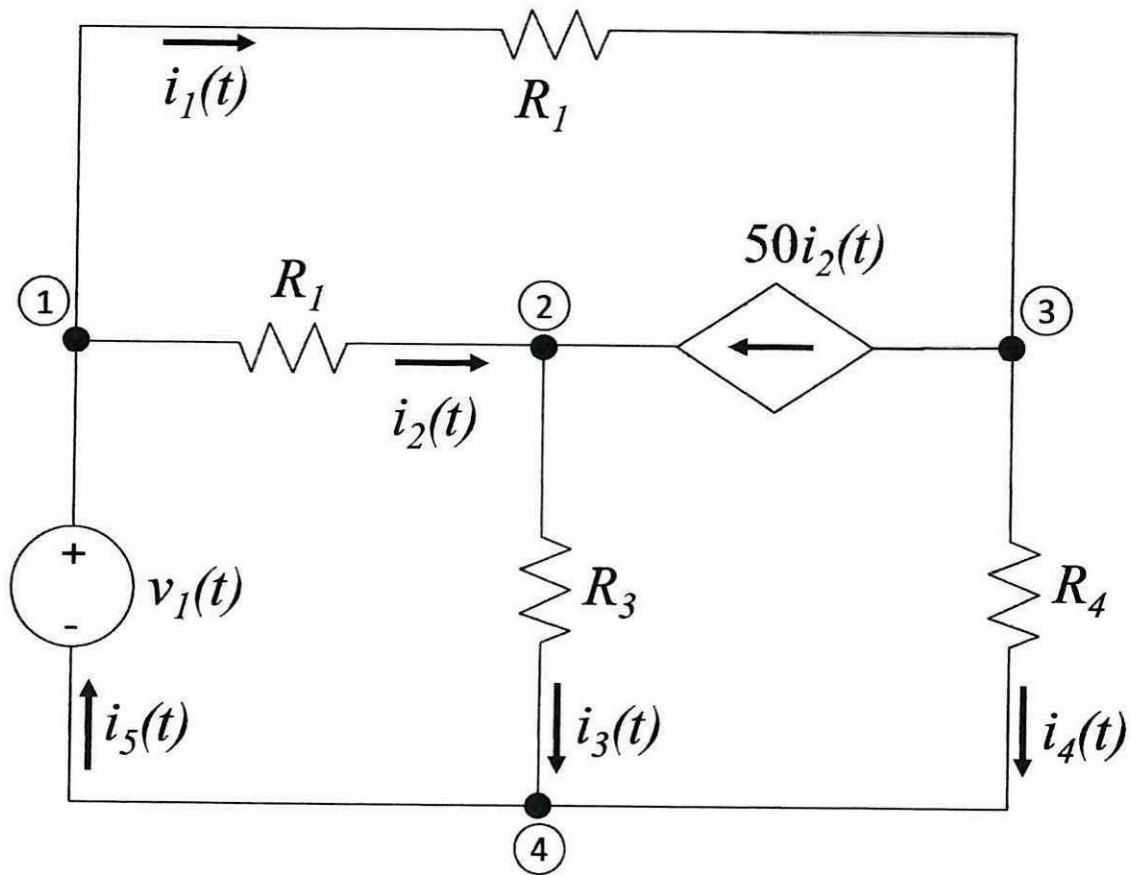


Figure Q1(a)

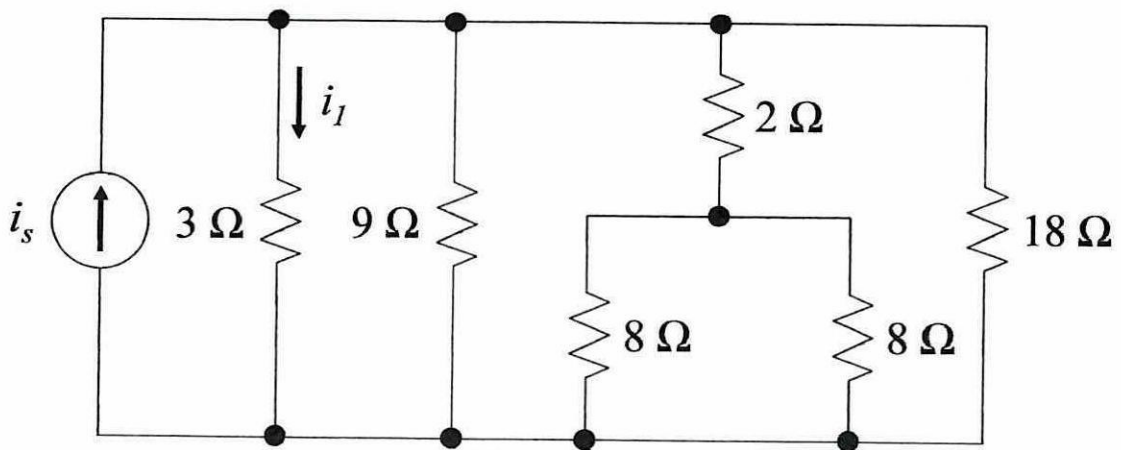


Figure Q1(b)

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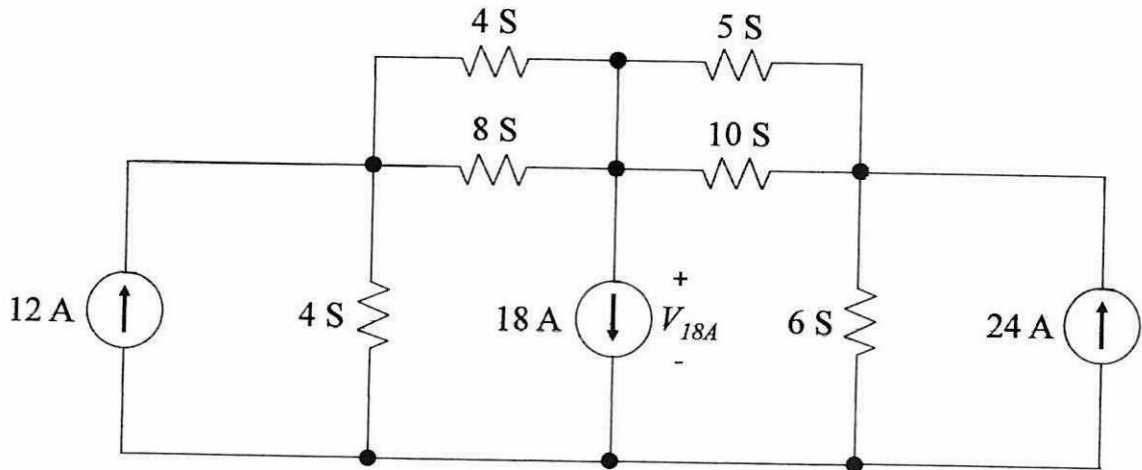


Figure Q2(a)

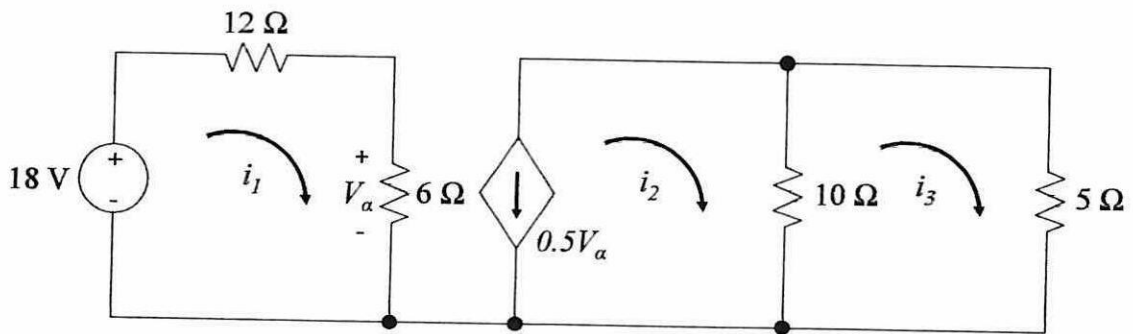


Figure Q2(b)

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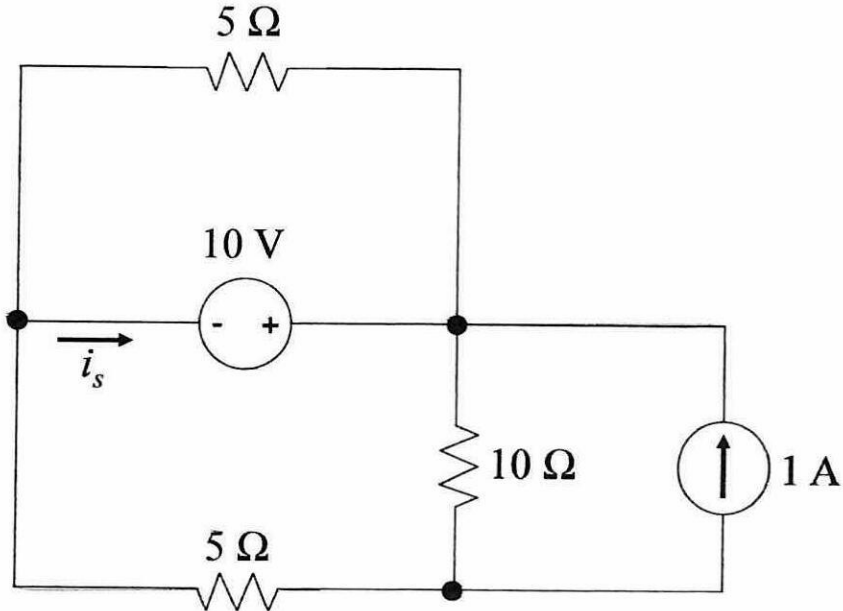


Figure Q3(a)

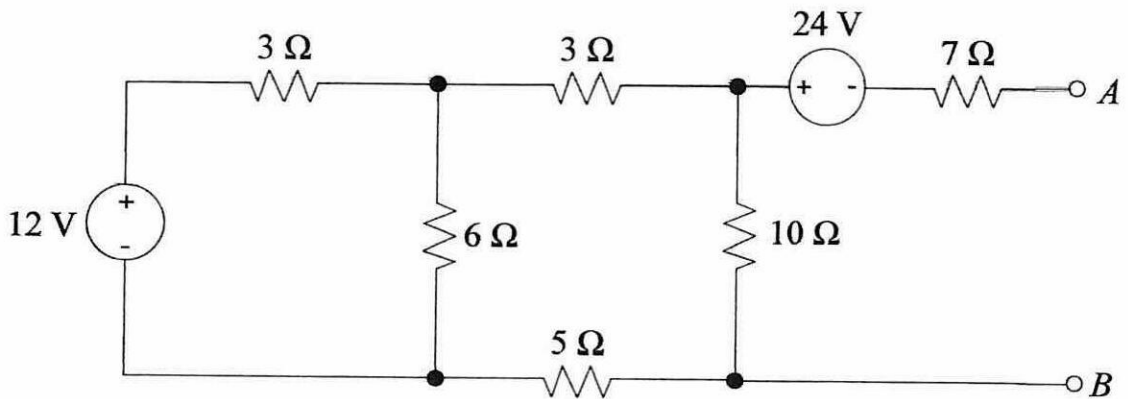


Figure Q3(b)

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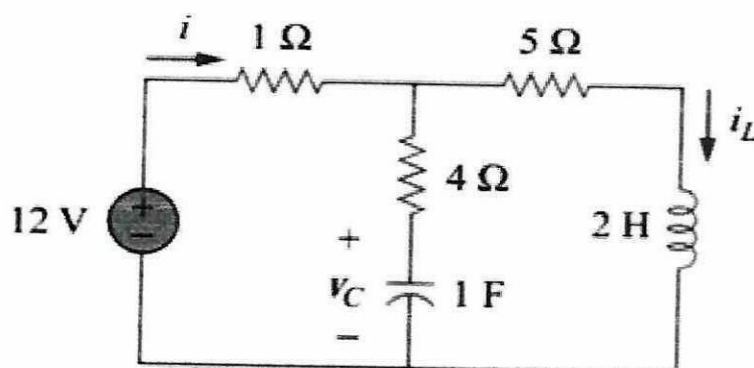


Figure Q4 (a)

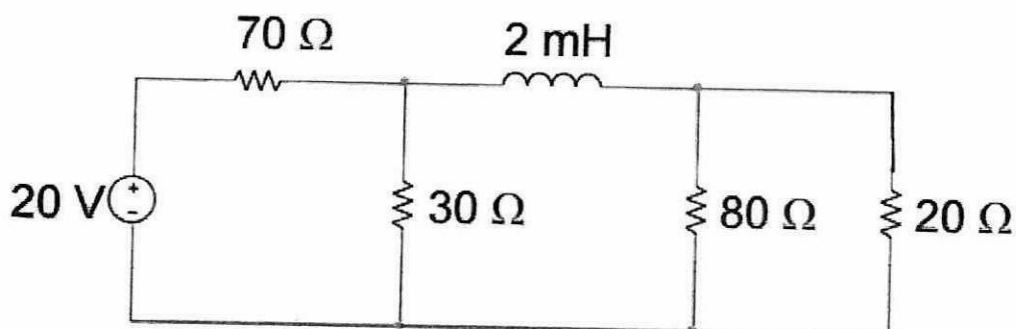


Figure Q4 (b)

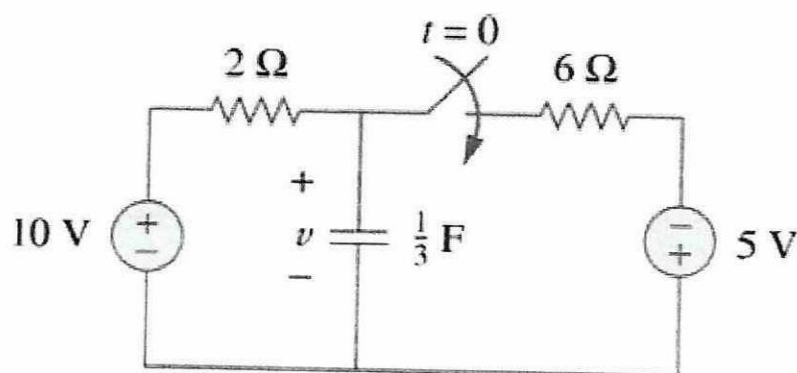


Figure Q4 (c)

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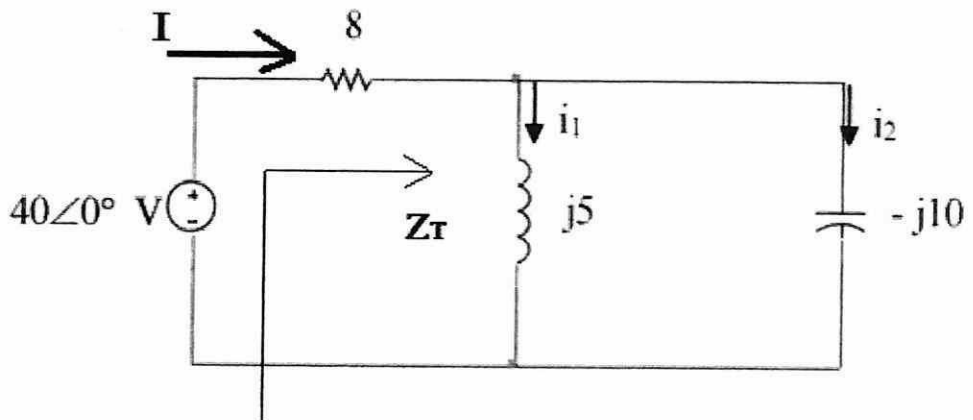


Figure Q5 (b)

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