Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023

COURSE NAME	:	ELECTRIC CIRCUITS II
COURSE CODE	:	BEJ 10403
PROGRAMME CODE	:	BEJ
EXAMINATION DATE	:	JULY/ AUGUST 2023
DURATION	:	3 HOURS
INSTRUCTION	:	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 **SEVEN (7)** PAGES

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Q1 (a) For the circuit in **Figure Q1(a)**, assume the circuit is in steady state at $t = 0^-$, before the switch is moved position **b** at $t = 0\ s$. Based on the circuit, solve the expression $V(t)$ for $t > 0\ s$.

(10 marks)

(b) Referring to the circuit in **Figure Q1(b)**,

(i) Find the value of $v(0)$ and $dv(0)/dt$.

(5 marks)

(ii) Calculate the roots of the characteristics of the circuit. State the response type of the circuit.

(5 marks)

(iii) Determine $v(t)$ for $t > 0$.

(5 marks)

Q2 (a) Given a circuit in **Figure Q2(a)**.

(i) Determine and draw the equivalent circuit in frequency domain.

(3 marks)

(ii) Determine the value of voltage, V and currents, i_1 and i_2.

(6 marks)

(iii) Draw a phasor diagram to illustrate all currents and voltages for the circuit.

(2 marks)

(b) Based on the circuit shown in **Figure Q2(b)**,

(i) Calculate the total impedance, Z_{eq} seen from the input terminal.

(5 marks)

(ii) Analyze the output voltage, V_o when the input is $120\angle 30°$ V.

(7 marks)

(iii) From your answer in part **Q2(b)(ii)**, identify whether the phase shift is leading or lagging.

(2 marks)

Q3 (a) For the circuit shown in **Figure Q3(a)**, Calculate:

(i) The average power delivered by the source.

(2 marks)

(ii) The apparent power.

(2 marks)

(iii) The reactive power.

(1 mark)

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(b) Based on the waveform in **Figure Q3(b)**,

(i) Calculate the effective value of the current waveform.

(5 marks)

(ii) Calculate the average power delivered to a 12 Ω resistor when the current runs though the resistor.

(2 marks)

(c) An electrical hair dryer has the following specifications:

Line voltage: 120 V rms

Line frequency: 60 Hz

Power: 600 W

Power factor: 0.92 (lagging)

(i) Calculate the rms-value current (I rms) drawn by the dryer.

(7 marks)

(ii) Find the value of capacitance that must be connected across the dryer to raise the power factor to 0.95.

(6 marks)

Q4 (a) A two-port network is an electrical network with two separate ports for input and output. Compare between one-port network and two-port network by drawing those two networks respectively.

(3 marks)

(b) For circuit in **Figure Q4(b)**,

(i) Calculate I_1, I_2, V_1 and V_2.

(10 marks)

(ii) Determine the power dissipated in the 10Ω resistor.

(4 marks)

(c) Hybrid parameters (h-parameter) are very useful for describing electronic devices such as transistors.

(i) State all FOUR (4) values of h-parameters available.

(2 marks)

(ii) Determine the h-parameters for the circuit in **Figure Q4(c)(ii)**.

(6 marks)

-END OF QUESTIONS –

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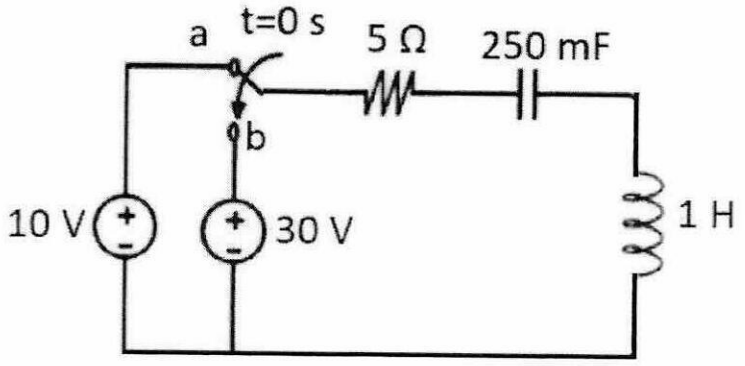
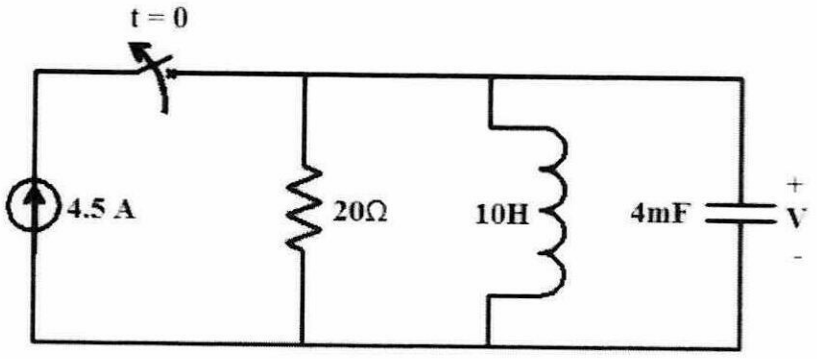


FigureQ1(a)



FigureQ1(b)

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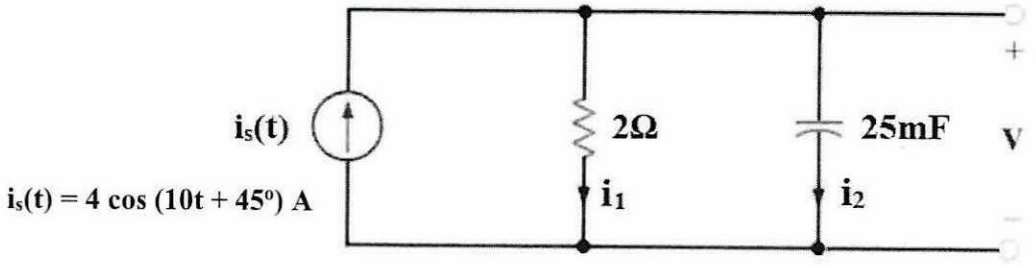

FigureQ2(a)

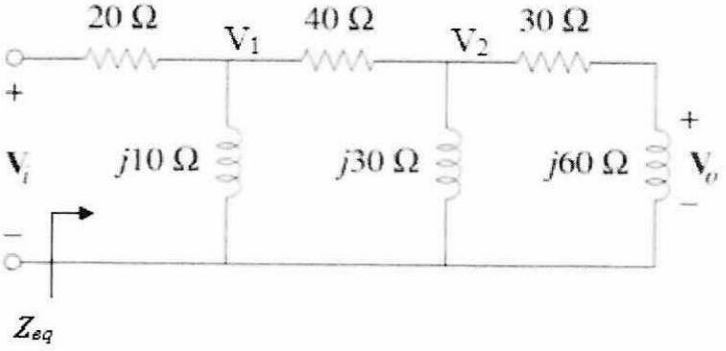

Figure Q2(b)

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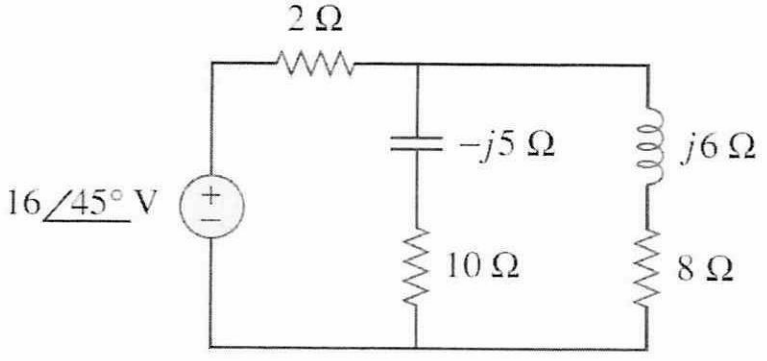

Figure Q3(a)

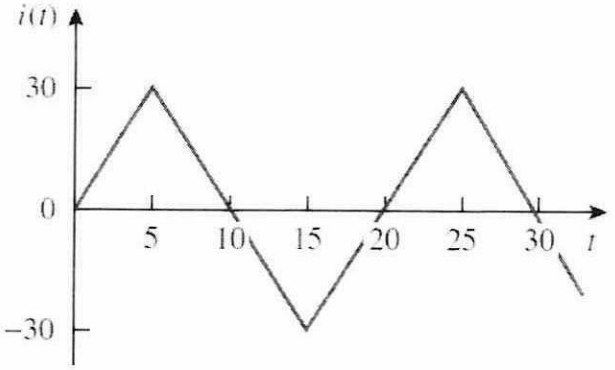

Figure Q3(b)

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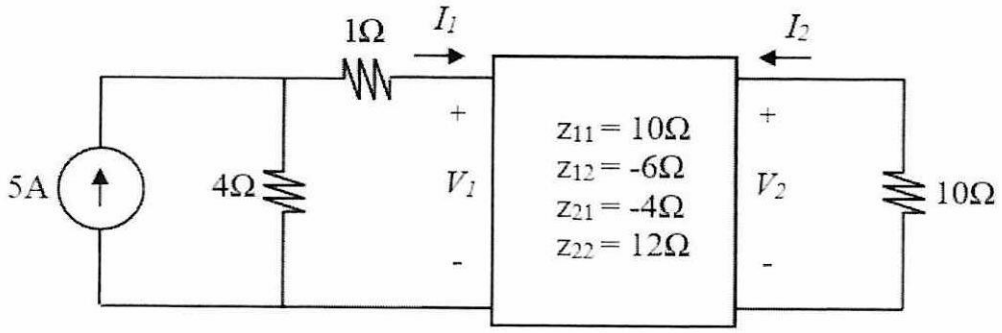

Figure Q4(b)

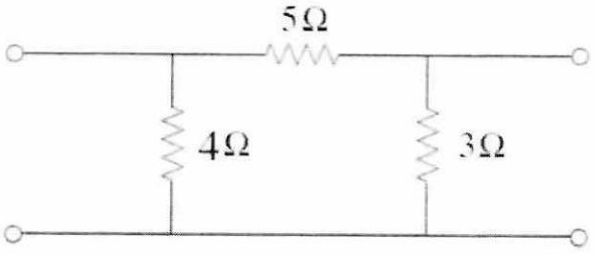

Figure Q4(c)(ii)

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