Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2021/2022

COURSE NAME	:	ELECTRICAL AND ELECTRONICS TECHNOLOGY
COURSE CODE	:	BNJ10903
PROGRAMME CODE	:	BNL
EXAMINATION DATE	:	JULY 2022
DURATION	:	3 HOURS
INSTRUCTION	:	1. ANSWER **ALL** QUESTIONS. 2. THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSE 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) Based on the circuit in **Figure Q1(a);**

(i) determine the type of dependent source.

(2 marks)

(ii) calculate the current, i_o.

(3 marks)

(b) Identify the equivalent resistance, R_{ab} for the circuit in **Figure Q1(b).**

(10 marks)

(c) Based on the circuit in **Figure Q1(c);**

(i) identify the current i and voltage v of the circuit under steady state dc conditions.

(6 marks)

(ii) determine the energy stored in the capacitor and inductor.

(4 marks)

Q2 (a) Identify the value of V_o for the circuit in **Figure Q2(a),** by using nodal analysis.

(8 marks)

(b) Verify the answer of V_o in **Question Q2(a)** by using mesh analysis.

(7 marks)

(c) Calculate the voltage V_o for the circuit in **Figure Q2(c)** by using source transformation.

(10 marks)

Q3 (a) State Faraday's Law.

(2 marks)

(b) A ferromagnetic core is shown in **Figure Q3(b)**. The depth of the core (into the page) is 5 cm, and the other dimensions are as shown in **Figure Q3(b)**. There are 500 turns coil wrapped around the left side of the core. Assume that the relative permeability of the core is 1000.

(i) Determine the value of current that will produce a flux of 0.003 Wb.

(6 marks)

(ii) Determine the flux density at the right side of the core.

(2 marks)

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(iv) Demonstrate the flow of the magnetic flux induced in the ferromagnetic core in a magnetic circuit analogy.

(2 marks)

(c) Explain **THREE (3)** advantages of AC system over the DC system.

(6 marks)

(d) A circuit is connected to a sinusoidal voltage source having a frequency of 60 Hz, an amplitude of 100 V_{rms} and combination of series resistance, R_1 and R_2. The following circuit is shown in the **Figure Q3(d)**.

(i) Illustrate the waveform of the signal and label properly the period of the waveform.

(2 marks)

(ii) Determine the rms current, rms voltage, peak voltage, peak-to-peak voltage and average voltage across R_1.

(5 marks)

Q4 (a) The circuit shown in the **Figure Q4(a),** has R = 1/3 Ω, L = 1/4 H and C = 3 H. The input voltage of the circuit is $v(t) = sin\ 2t$. Analyse the circuit and determine:

(i) the total impedance, Z

(3 marks)

(ii) the total current $i(t)$

(3 marks)

(iii) the phase angle and its phasor diagram

(2 marks)

(iv) the voltage across each element

(3 marks)

(b) For each clipper circuit shown in **Figure Q4(b)**, draw the output waveform by showing all the necessary steps. In all cases, assume the diodes is made of Si, the peak input voltage is $V_P = V_{in} = 10$ V and the battery voltage is 2 V.

(6 marks)

(c) Build the truth table for the combinational logic circuit shown in **Figure Q4(c)**.

(8 marks)

- **END OF QUESTIONS –**

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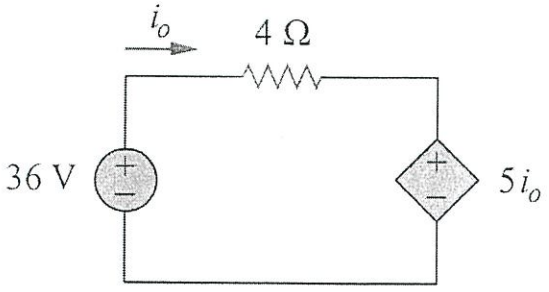

Figure Q1(a)

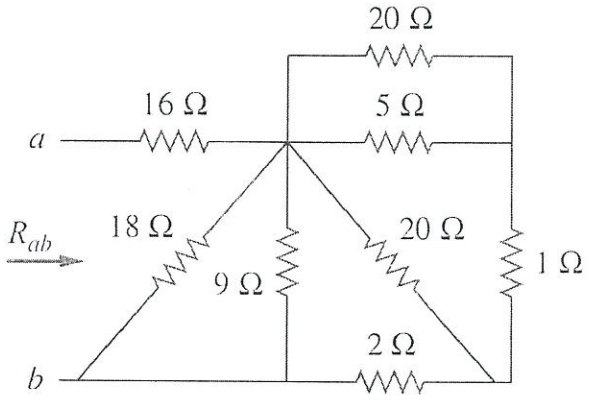

Figure Q1(b)

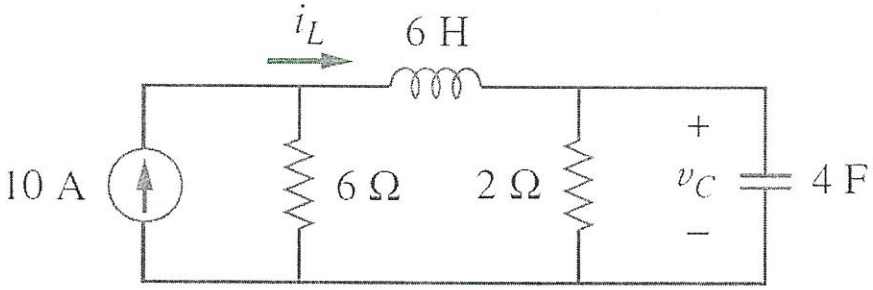

Figure Q1(c)

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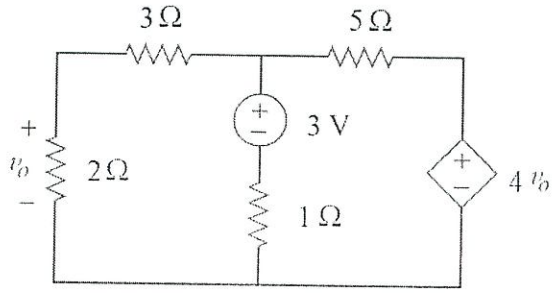

Figure Q2 (a)

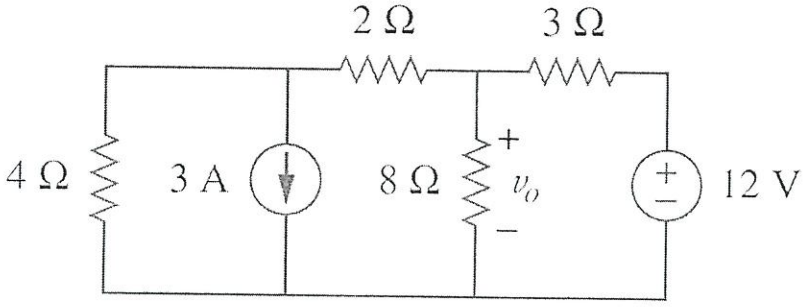

Figure Q2 (c)

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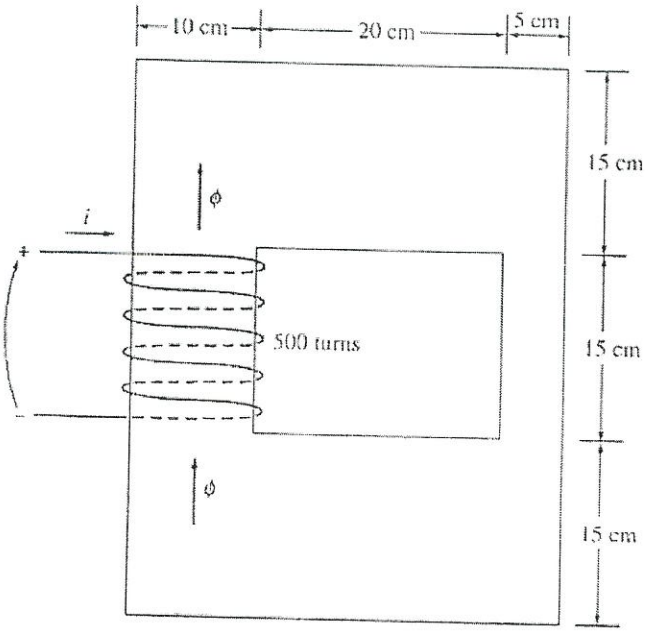

Figure Q3(b)

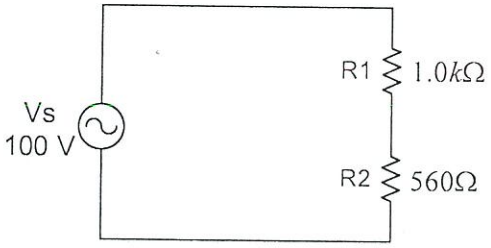

Figure Q3(d)

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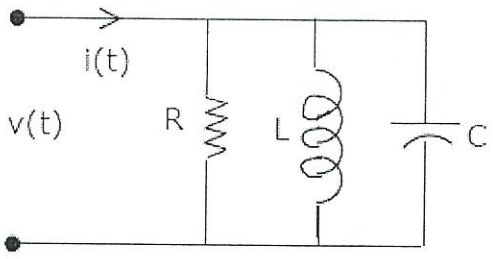

Figure Q4(a)

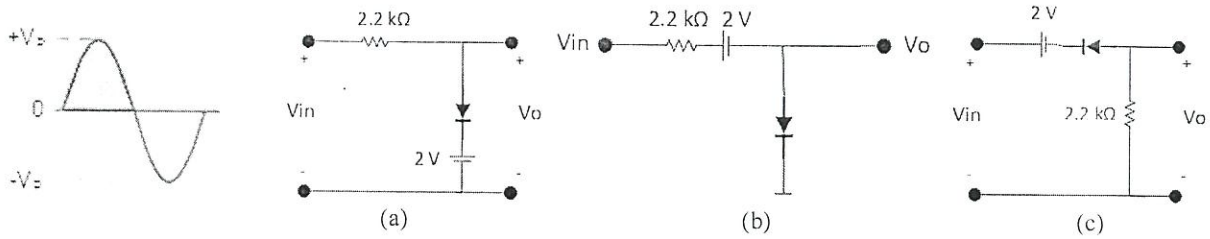

Figure Q4(b)

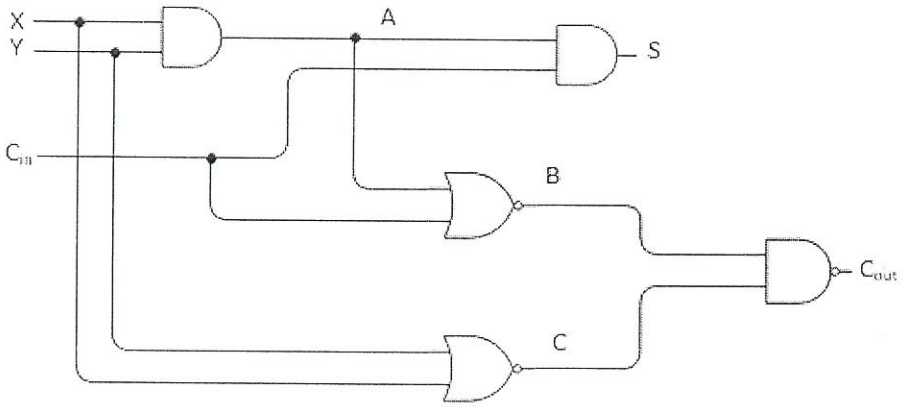

Figure Q4(c)

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