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Universiti Tun Hussein Onn Malaysia

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
(ONLINE)  
SEMESTER II  
SESSION 2019/2020**

COURSE NAME : ELECTRICAL AND ELECTRONIC TECHNOLOGY

COURSE CODE : BDA 14303

PROGRAMME CODE : BDD

EXAMINATION DATE : JULY 2020

DURATION : 3 HOURS

INSTRUCTION : PART A: ANSWER **TWO (2)** QUESTIONS ONLY

PART B: ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF **TEN (10)** PAGES

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## PART A:

Q1 (a) Explain the definition of terms below in electricity.

- (i) One volt
- (ii) One ampere

(4 marks)

(b) **Table Q1(b)** shows the electrical appliances operating in a residential house.

**Table Q1(b)**

Electrical Appliances	Power (W, Watt)
Fan	500
Light	50
Refrigerator	250
Television	100
Air conditioner	800

- (i) Determine the monthly energy (kWh) used in ALL operating electrical appliances used for 2 hours/day in December.
- (ii) Calculate the cost (RM) applied in December by assuming the rate as RM0.80/kWh.

(6 marks)

(c) Given  $R_1 = 25 \text{ k}\Omega$ ,  $R_2 = 10 \text{ k}\Omega$ ,  $R_3 = 5 \text{ k}\Omega$ ,  $R_4 = 15 \text{ k}\Omega$ ,  $R_5 = 1 \text{ k}\Omega$  and  $R_6 = 6 \text{ k}\Omega$  in **Figure Q1(c)**, use Wye-Delta transformation to solve the total resistance,  $R_T$  and current,  $I$ .

(10 marks)

- Q2** (a) Explain the steps required to obtain the solution in electric circuits by nodal analysis. (4 marks)
- (b) As shown in **Figure Q2(b)**, use nodal analysis to find the current  $I_o$ . (9 marks)
- (c) From the circuit as shown in **Figure Q2(c)**, find the branch currents ( $i_1$ ,  $i_2$  and  $i_3$ ) using mesh analysis. (7 marks)
- Q3** (a) Superposition theorem is used to obtain the parameter values in the electrical network. Explain the steps of implementing superposition theorem in electrical network analysis. (4 marks)
- (b) **Figure Q3(b)** shows electrical circuit that consist of a current and voltage independent sources. Use the superposition theorem to find the value of  $v$  in the circuit. (6 marks)
- (c) **Figure Q3(c)** shows electrical network that consist of three independent sources and one dependent source. Using superposition theorem, calculate the value of  $V_{R2}$  on  $3\Omega$  resistor. (10 marks)

## PART B:

**Q4** (a) Sketch graph for sin waveform and cosine waveform for AC voltage and AC current.  
(4 marks)

(b) Obtain the energy stored in each capacitor in **Figure Q4(b)** under DC conditions.  
(6 marks)

(c) Determine the current through a 200  $\mu\text{F}$  capacitor whose voltage is shown in **Figure Q4(c)**. Sketch graph for current,  $I$  versus time,  $t$ .  
(10 marks)

**Q5** (a) State two (2) differences between AC motor and DC motor.  
(4 marks)

(b) Given a sinusoid

$$v(t) = 20 \cos\left(50t + \frac{\pi}{2}\right)$$

Find the:

- (i) Amplitude
- (ii) Phase
- (iii) Period
- (iv) Frequency

(8 marks)

(c) A  $50.0\Omega$  resistor (R), a 0.100 H (L) inductor and a  $10.0\mu\text{F}$  capacitor (C) are connected in series to a 60.0 Hz source (V) as shown in **Figure Q5(c)**. The rms current,  $I_{\text{rms}}$  in the circuit is 2.75A. Find the rms voltage across the resistor, inductor and capacitor.

(8 marks)

- Q6** (a) Differentiate between a step-up transformer and a step-down transformer. (4 marks)
- (b) An ideal transformer is rated at 2400/120V, 9.6kVa, and has 50 turns on the secondary side. Calculate:
- (i) The turn ratio
  - (ii) The number of turns on the primary side
  - (iii) The current rating for the primary and secondary winding
- (6 marks)
- (c) Analyze the logic circuit in **Figure Q6(c)**. Obtain:
- (i) The Boolean expression for Z
  - (ii) The truth table for the logic circuit
- (10 marks)

-END OF QUESTIONS -



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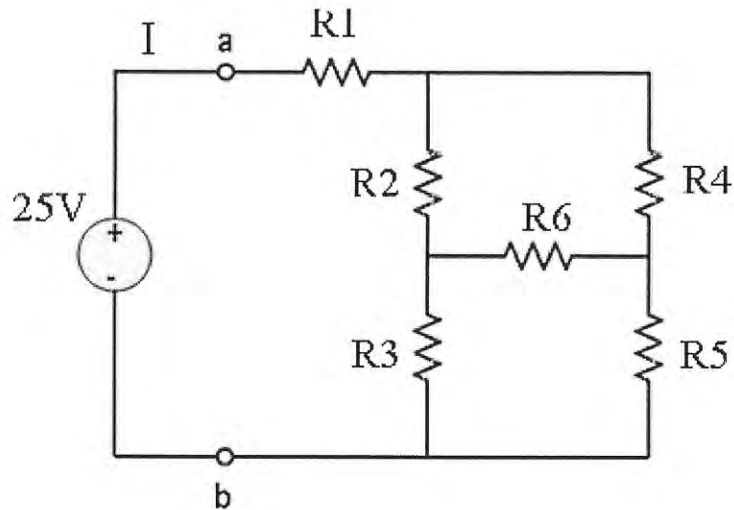


Figure Q1(c)

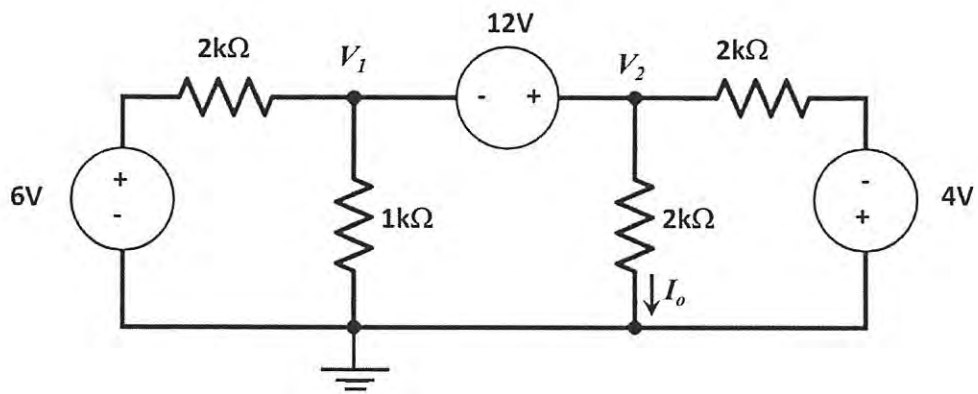


Figure Q2(b)

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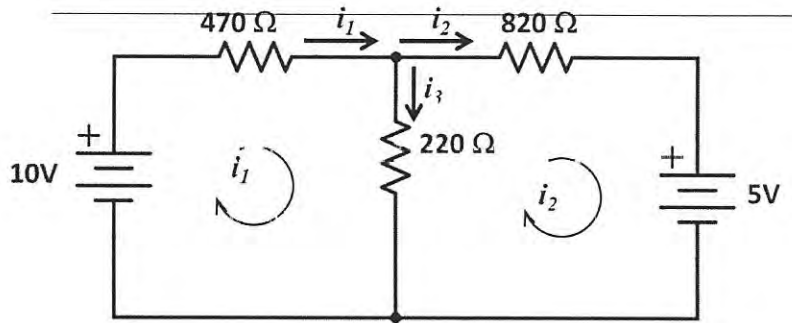


Figure Q2(c)

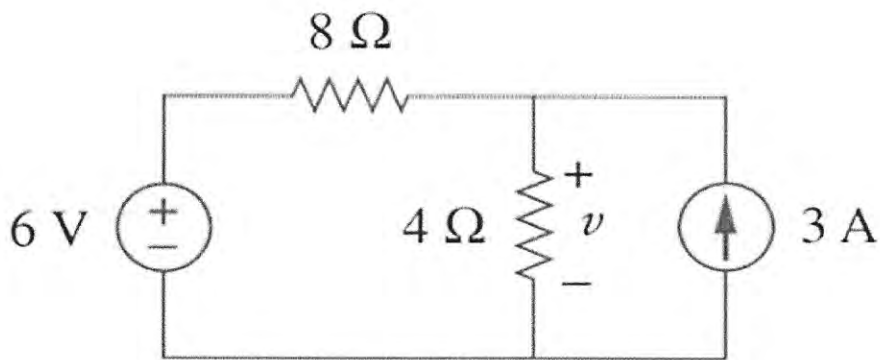


Figure Q3(b)

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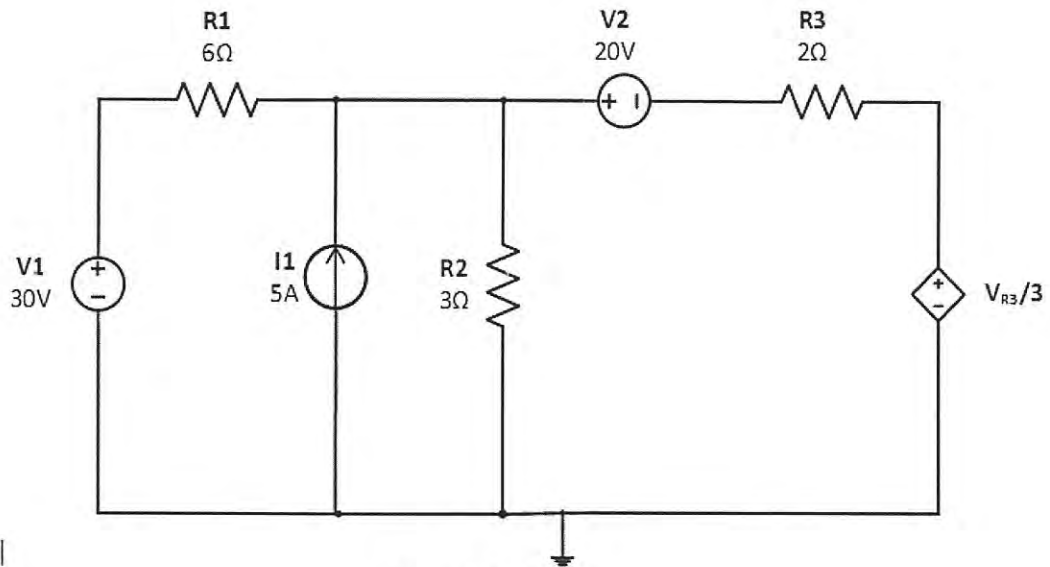


Figure Q3(c)

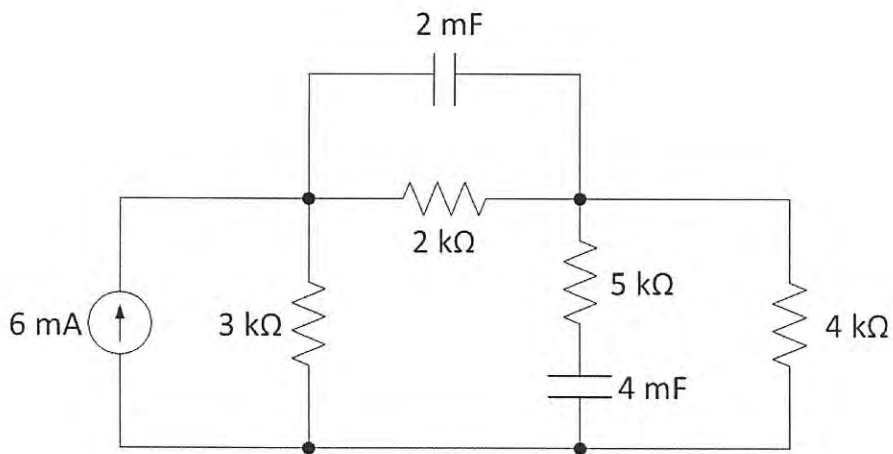


Figure Q4(b)



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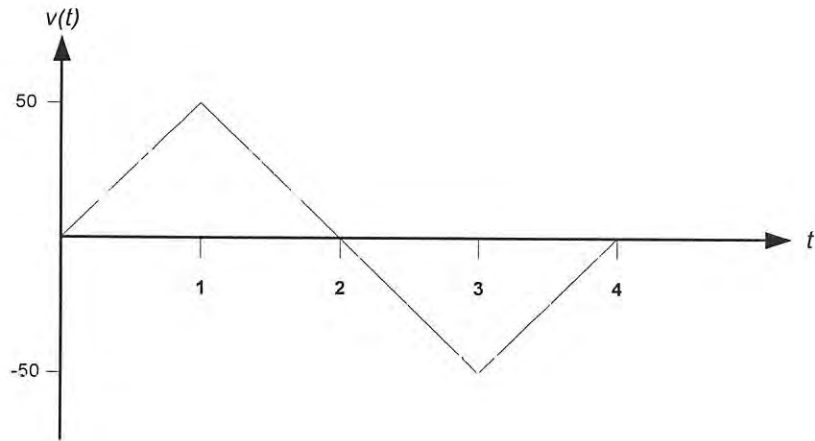


Figure Q4(c)

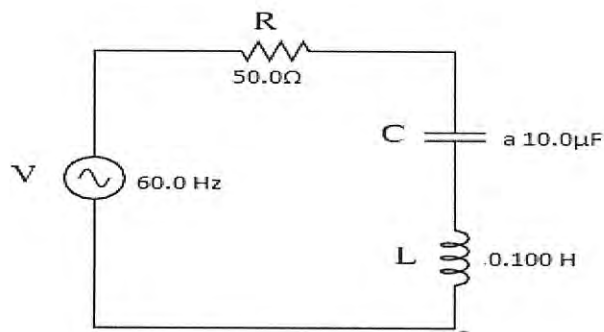
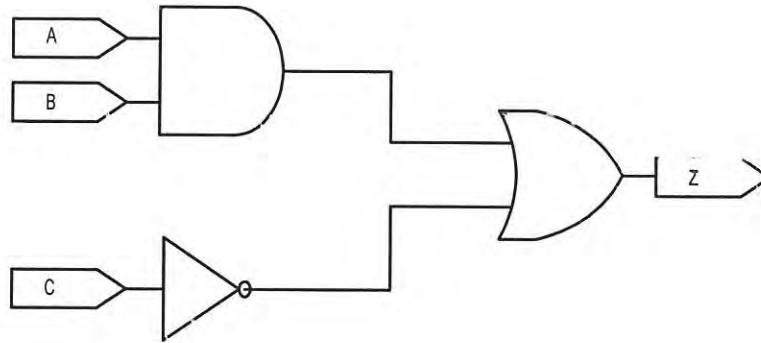


Figure Q5(c)

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**Figure Q6(c)**