



**UTHM**  
Universiti Tun Hussein Onn Malaysia

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

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

- COURSE NAME : ELECTRICAL TECHNOLOGY
- COURSE CODE : DAE 11003
- PROGRAMME CODE : DAE
- EXAMINATION DATE : FEBRUARY 2023
- DURATION : 3 HOURS
- INSTRUCTION :
1. ANSWER **FOUR (4)** QUESTIONS **ONLY FROM FIVE (5)** QUESTIONS PROVIDED.
  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 NINE (9) PAGES

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- Q1** (a) Describe the following electrical terminology and indicate the numbers of valence electron each.
- (i) Conductor (2 Marks)
  - (ii) Semiconductor (2 Marks)
  - (iii) Insulator (2 Marks)
- (b) Determine the resistance and tolerance color code for the following 4-band resistors:
- (i) 20 k $\Omega$  with 5% tolerance. (3 Marks)
  - (ii) 130 M $\Omega$  with 10% tolerance. (3 Marks)
- (c) Referring to **Figure Q1 (c)**, it shown a graph of current versus voltage for **three (3)** resistance values. Calculate value of:
- (i)  $R_1$  (2 Marks)
  - (ii)  $R_2$  (2 Marks)
  - (iii)  $R_3$  (2 Marks)
- (d) Referring to **Figure Q1 (d)**, draw the placement of meters to measure:
- (i) Voltage (V) across  $R_2$  (2 marks)
  - (ii) Current (I) flow at  $R_4$  (2 marks)
- (e) Given a battery rated at 100 Ah. Find how many hours it can delivered to the 14 A loads. (3 Marks)
- Q2** (a) Express Kirchhoff's Current Law (KCL) equivalence for the circuit referring to **Figure Q2 (a)**. (3 Marks)
- (b) **Five (5)** resistors in series with 20 V source. The voltage drops across four of the resistors are 1.5 Volt, 5.5 Volt, 3 Volt, and 6 Volt.
- (i) Calculate the voltage dropped across fifth resistor. (3 marks)
  - (ii) Draw the equivalent circuit consist of parts given. (5 marks)

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- (c) Referring to **Figure Q2 (c)**, determine the current measured by the Ammeter if the switch position at:
- (i) Point B (4 marks)
  - (ii) Point C (4 marks)
- (d) Referring to **Figure Q2 (d)**, determine the values of:
- (i)  $V_s$  (2 marks)
  - (ii)  $R_2$  (4 marks)
- Q3**
- (a) Illustrate and draw the following series-parallel circuit:  
A series combination of three parallel circuits, each containing two resistors. The source voltage is 25 Volt DC.  
(6 Marks)
- (b) Referring to **Figure Q3 (b)**, determine the output voltage when there is 100 k $\Omega$  load connected between point A and B.  
(8 Marks)
- (c) Referring to **Figure Q3 (c)**, calculate the total resistance ( $R_T$ ) across the source.  
(11 Marks)
- Q4**
- (a) Define 'reluctance' in electromagnetic properties with aid of a definitive formula and its definition.  
(3 Marks)
- (b) Referring to **Figure Q4 (b)**, show the magnetic field lines when two likely poles bar magnets are place near each other.  
(4 Marks)
- (c) In a certain magnetic field, the cross-sectional area is 830 cm<sup>2</sup> and the flux is 3152  $\mu$ W. Determine the flux density.  
(4 Marks)
- (d) (i) Define 'peak value' of a sine wave.  
(2 Marks)
- (ii) With the aid of diagram, illustrate the positive and negative peak voltage in one cycle.  
(2 Marks)

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- (e) Referring to **Figure Q4 (e)**, a sinusoidal voltage is applied to the resistive circuit. Determine the following:
- (i)  $I_{rms}$  (2 Marks)
  - (ii)  $I_p$  (2 Marks)
  - (iii)  $I_{pp}$  (2 Marks)
  - (iv)  $I_{avg}$  (2 Marks)
  - (v)  $I$  at positive peak (2 Marks)

**Q5** (a) Define ‘mutual inductance’ in transformer properties with aid of a definitive formula its definition. (3 Marks)

(b) List **three (3)** types of transformer core material. (3 Marks)

(c) Perform the following operations

(i) 
$$\frac{(250\angle 90^\circ + 175\angle 75^\circ)(50 - j100)}{(125 + j90)(35\angle 50^\circ)}$$
 (4 Marks)

(ii) 
$$\frac{(100\angle 15^\circ)(85 - j150)}{25 + j45}$$
 (3 Marks)

(d) A certain transformer has primary voltage for 418 Volt, primary winding 400 turns, secondary winding 100 turns and secondary load 654  $\Omega$ . Determine the following:

- (i)  $I_p$  (3 Marks)
- (ii)  $I_s$  (2 Marks)
- (iii)  $V_s$  (2 Marks)
- (iv)  $P_L$  (2 Marks)

(e) Construct and label completely the basic circuit of the transformer. (3 Marks)

**-END OF QUESTIONS -**

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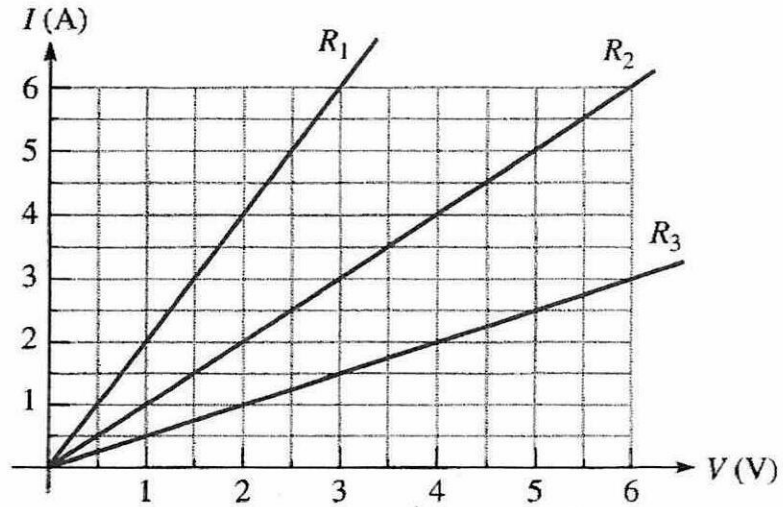


Figure Q1 (c)

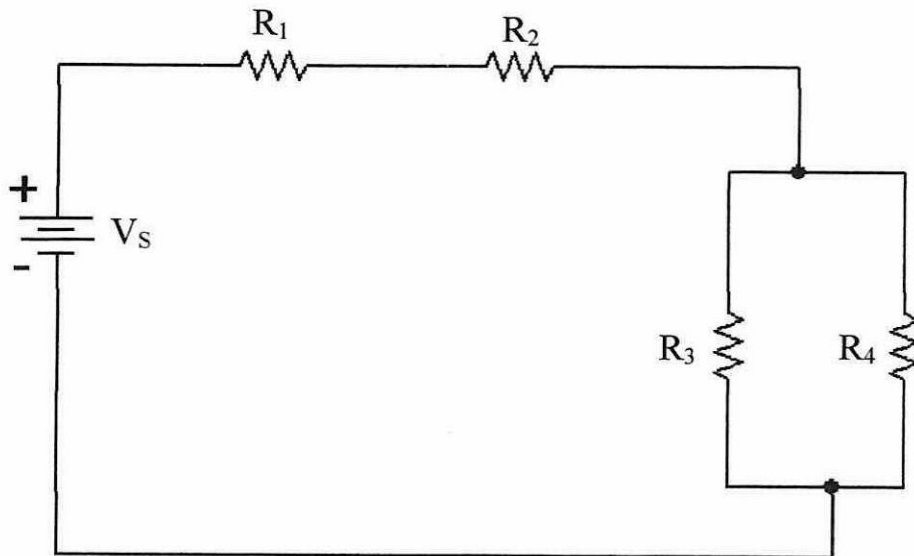


Figure Q1 (d)

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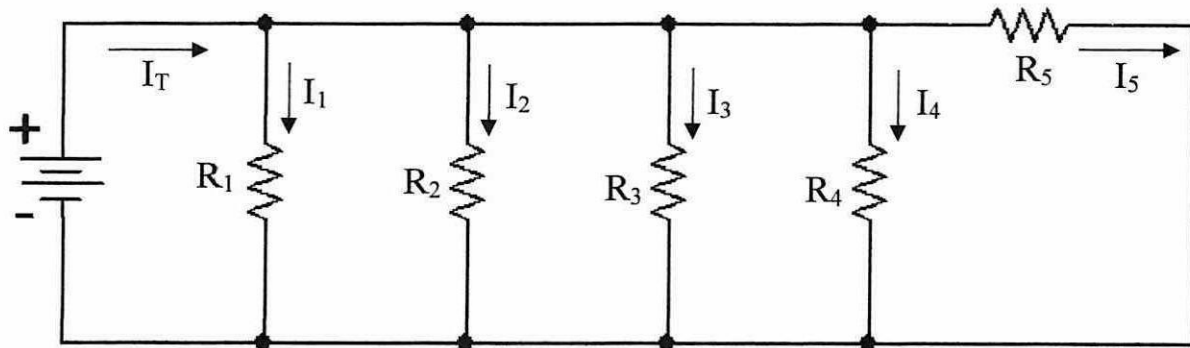


Figure Q2 (a)

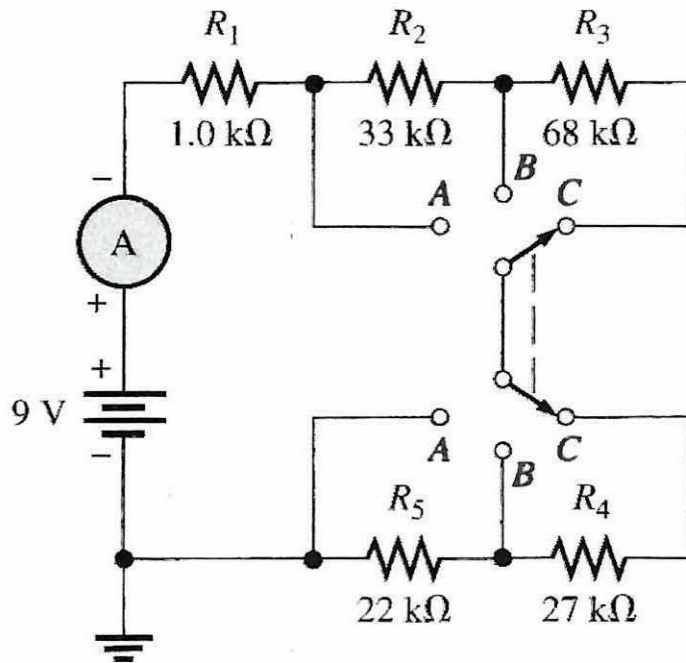


Figure Q2 (c)

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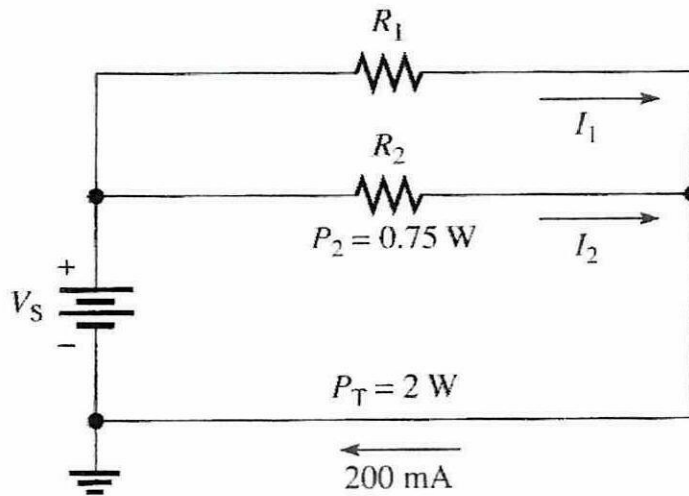


Figure Q2 (d)

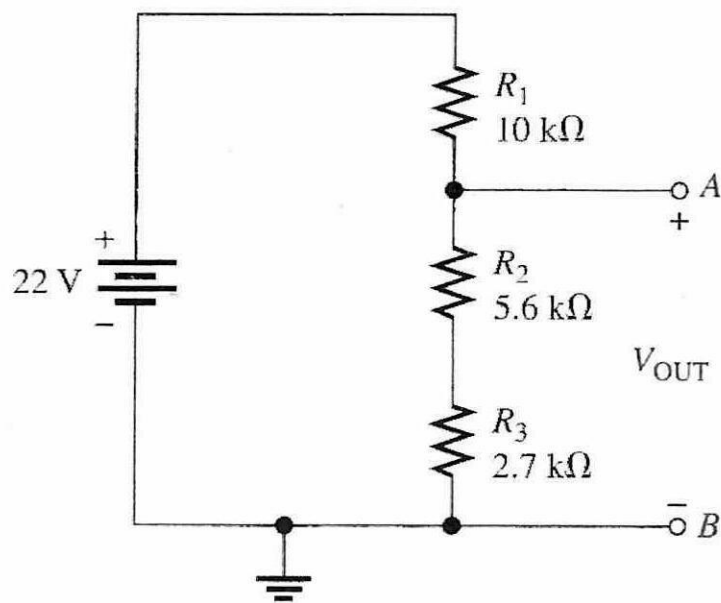
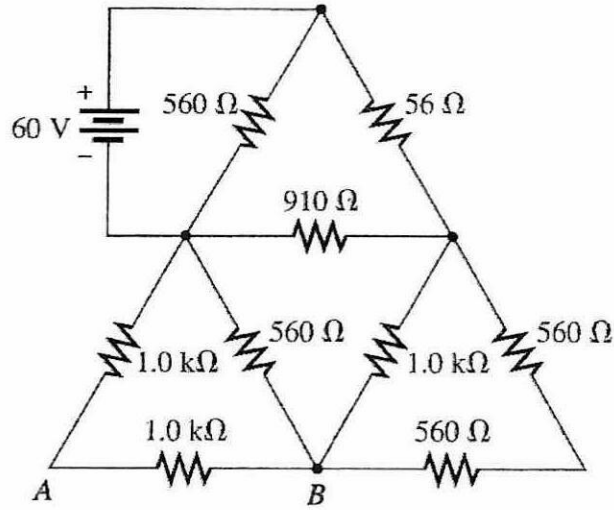


Figure Q3 (b)

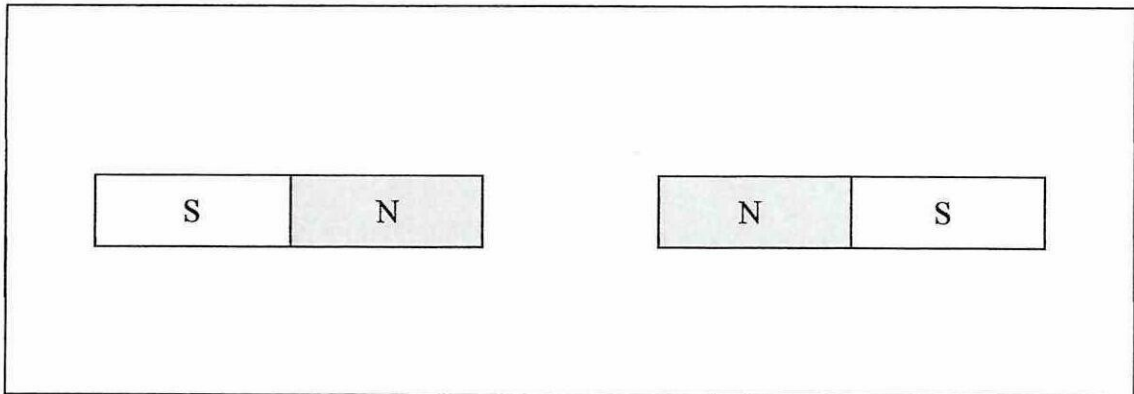
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**Figure Q3 (c)**



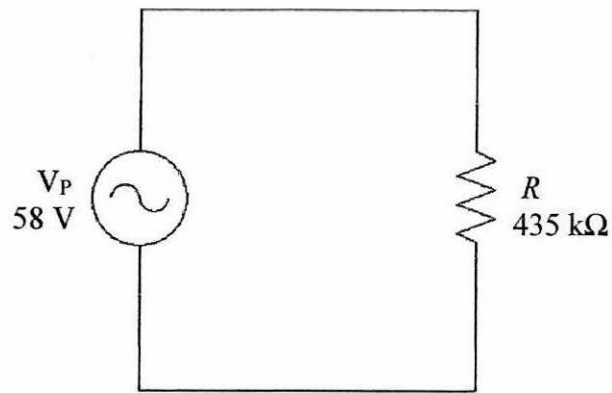
**Figure Q4 (b)**



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**Figure Q4 (e)**