Universiti Tun Hussein Onn Malaysia

# UNIVERSITI TUN HUSSEIN ONN MALAYSIA

## FINAL EXAMINATION
## SEMESTER I
## SESSION 2016/2017

| | | |
|---|---|---|
| COURSE NAME | : | ELECTRICAL TECHNOLOGY |
| COURSE CODE | : | DAE 11003 |
| PROGRAMME CODE | : | DAE |
| EXAMINATION DATE | : | DECEMBER 2016 / JANUARY 2017 |
| DURATION | : | 2 HOURS 30 MINUTES |
| INSTRUCTION | : | ANSWER **FOUR (4)** QUESTIONS ONLY |

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

**Q1** (a) List **three (3)** particles contained in the atomic structure according to the classic Bohr Model.

(3 marks)

(b) Illustrate the placement of an ammeter and a voltmeter to measure the current and the source voltage in **Figure Q1(b)**.

(4 marks)

(c) Determine the resistance values for the following:

(i) Red, violet, orange, gold
(ii) Brown, gray, red, silver

(6 marks)

(d) Determine the color bands for each of the following values:
(i) 330Ω
(ii) 2.2kΩ
(iii) 56kΩ

(9 marks)

(e) Explain **three (3)** basic functions of multimeter.

(3 marks)

**Q2** (a) Define Ohm's Law

(3 marks)

(b) Referring to the circuit in **Figure Q2(b)**, determine the followings:

(i) Calculate the current if the voltage ranging from 10V to 100V (10V intervals). Construct the table of voltage, V and current, I.

(ii) Plot a graph of current, I versus voltage, V. (Plot a graph for 10 points).

(iii) Give a conclusion based on your answer in **Q2(b)(ii).**

(12 Marks)

(c) Determine the total resistance ($R_T$) for circuit of **Figure Q2(c)**.

(3 Marks)

(d) Find $R_1$, $R_2$ and $R_3$ in **Figure Q2(d)**.

(7 Marks)

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**Q3.** (a) Define:
(i) Kirchhoff's voltage law.
(ii) Kirchhoff's current law.
(6 marks)

(b) Give **two (2)** examples of voltage divider applications.
(4 marks)

(c) In the circuit of **Figure Q3(c)**, determine the resistance $R_2$, $R_3$ and $R_4$.
(10 marks)

(d) Determine the current in each branch of the current dividers in **Figure Q3(d)**.
(5 marks)

**Q4.** (a) Describe the series-parallel combinations between terminal A and D in **Figure Q4(a)**.
(4 marks)

(b) A Wheatstone bridge circuit consists of **four (4)** resistors and a dc voltage source which look alike a 'diamond' configuration.

(i) Draw the Wheatstone bridge (complete with $R_1$, $R_2$, $R_3$, $R_4$, dc source and $V_{out}$ terminals).

(ii) Explain the condition of the balanced Wheatstone bridge.
(8 Marks)

(c) Referring to **Figure Q4(c)**, determine the followings:

(i) Magnetizing force ($H$)
(ii) Magnetic flux ($\Phi$)
(iii) Magnetic flux density ($B$)
(13 marks)

**Q5.** (a) Draw two sine waves as follows: Sine wave A is the reference, and sine wave B lags A by $90^0$. Both have equal amplitudes.
(4 marks)

(b) Convert the following angular values from degrees to radians:
(i) $30^0$
(ii) $45^0$
(4 marks)

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(c) A sinusoidal voltage is applied to the resistive circuit in **Figure Q5(c)**. Determine the following:

(i) $I_{rms}$
(ii) $I_{avg}$
(iii) $I_p$
(iv) $I_{pp}$
(v) $i$ at the positive peak

(10 marks)

(d) Fine the half-cycle average values of the voltages across $R_1$ and $R_2$ in **Figure Q5(d)**. All values shown are rms.

(7 marks)

**Q6** (a) Draw a phasor diagram to represent the sine wave in **Figure Q6(a)** with respect to a $0^0$ reference.

(5 marks)

(b) Convert each of the following rectangular numbers to polar form:

(i) $40 - j40$
(ii) $50 - j200$

(4 marks)

(c) Solve the following equations:

(i) $(9 + j3) + (5 + j8)$
(ii) $(4.5<48^0) \times (3.2<90^0)$
(iii) $\dfrac{8\angle 50°}{2.5\angle 39°}$

(6 marks)

(d) Determine Is in **Figure Q6(d)**. What is the value of $R_L$?

(10 marks)

**-END OF QUESTIONS –**

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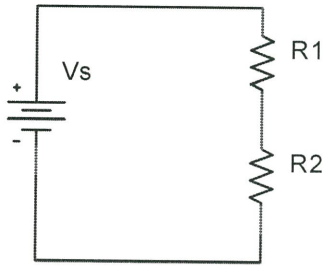


**Figure Q1(b)**

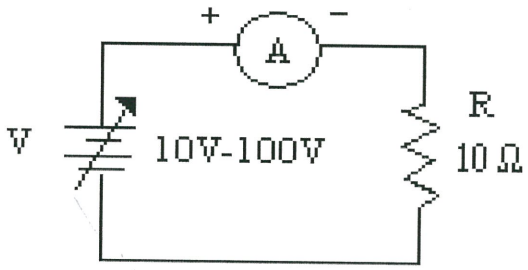


**Figure Q2(b).**

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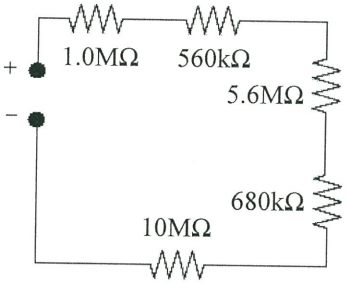


**Figure Q2(c)**

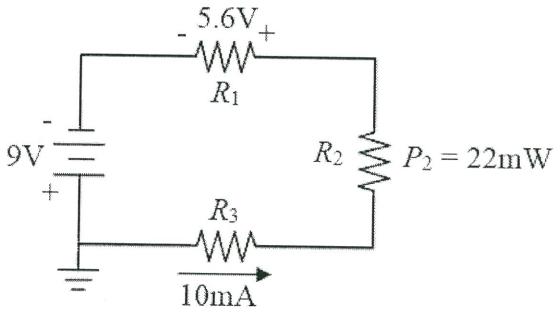


**Figure Q2(d)**

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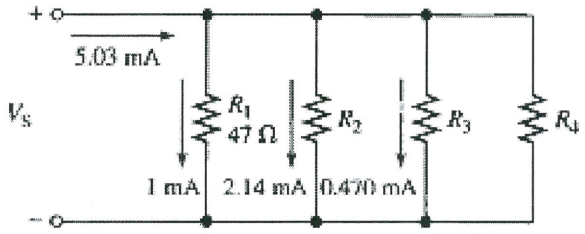


**Figure Q3(c)**

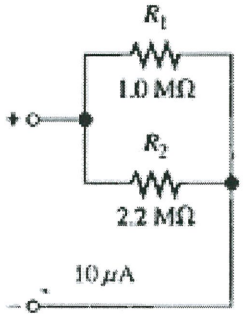


**Figure Q3(d)**

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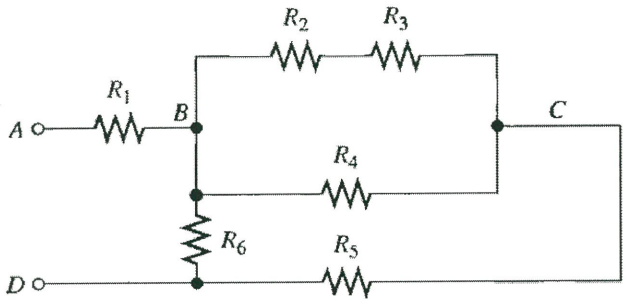


**Figure Q4(a)**

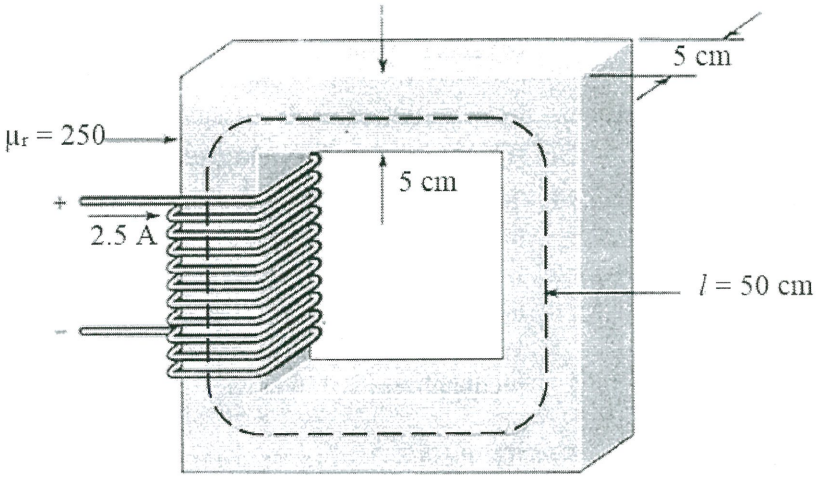


**Figure Q4(c)**

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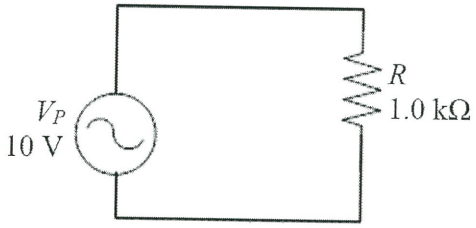


**Figure Q5(c)**

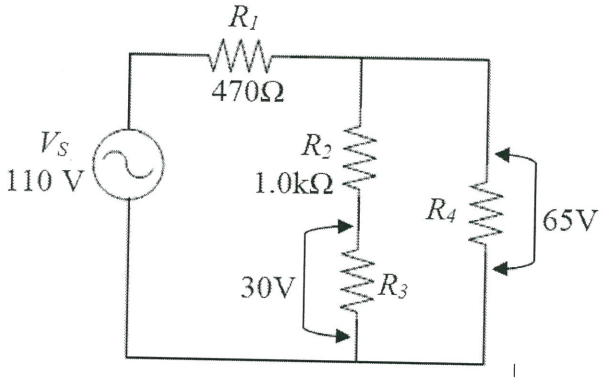


**Figure Q5(d)**

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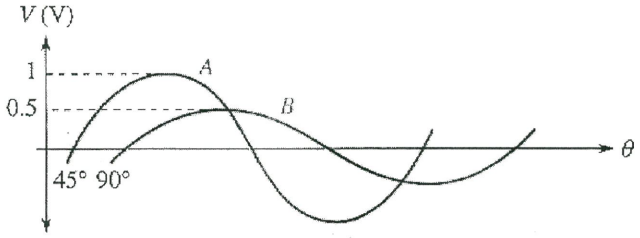


**Figure Q6(a)**

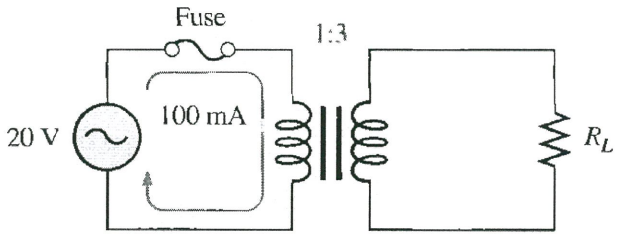


**Figure Q6(d)**

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