Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2015/2016

COURSE NAME	:	ELECTRICAL AND ELECTRONIC TECHNOLOGY
COURSE CODE	:	BNJ 10903
PROGRAMME CODE	:	BNK / BNH / BNM
EXAMINATION DATE	:	JUNE / JULY 2016
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **FOUR (4)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF **NINE (9)** PAGES

Q1 (a) Define the following electronics terminology

(i) Voltage
(ii) Ampere
(iii) Coulomb
(iv) Ohm's Law

(8 marks)

(b) 1 electron charge is equal to -1.602 x 10^{-19}C. Calculate charge (Q) for 7,800 electrons?

(3 marks)

(c) Consider a charge container whose charge (Q) is a function of time (t) given by

$$Q = 5 + e^{-10t}$$

Determine the expression of current through the container. What is the current for $t = 8$ seconds?

(6 marks)

(d) A resistance of 10 ohms is connected across 10 volts source. Determine the power loss across the resistance and energy consumed by the resistance in 2 hours.

(8 marks)

Q2 (a) Describe the Kirchoff's Voltage Law and Kirchoff's Current Law. Show the suitable equation for both.

(4 marks)

(b) For the circuit in **Figure Q2(b)**, compute:

(i) Equivalent resistant
(ii) Total current
(iii) Current through each resistor
(iv) Power for each elements
(v) Power supplied by the source

(7 marks)

(c) Find the power absorbed by 1 kΩ resistor and 6V source as illustrated in **Figure Q2(c)**. Solve the problems by analyze the circuit using:

(i) Node-Voltage Analysis.
(ii) Mesh-Current Analysis.

(14 marks)

Q3 (a) The voltage across a 5 mF capacitor varies as shown in **Figure Q3(a)**. Determine and plot the capacitor current, power and energy.

(9 marks)

(b) An inductor is an electrical component designed to store energy in its magnetic field.

(i) Give **TWO (2)** examples the application of inductor.

(ii) The current in an inductor, L = 1/2 H, is $i = 2te^{-t}$ A for $t \geq 0$s and i = 0 A for $t < 0$s. Calculate the voltage, power and energy in this inductor.

(8 marks)

(c) An iron ring has a cross-sectional area of 500 mm^2 and a mean diameter of 25 cm. It is wound with 600 turns. If the value of relative permeability is 250, calculate the total flux set up in the ring. The coil resistance is 500 Ω and the supply voltage is 240 V.

(4 marks)

(d) When a conductor is moved across a magnetic field so as to cut through the flux, an electromagnetic force (e.m.f.) is produced in the conductor. This effect is known as electromagnetic induction. Briefly explain **TWO (2)** laws related to the electromagnetic induction.

(4 marks)

Q4 (a) Explain the differences between AC signal and DC signal.

(4 marks)

(b) Find the period and frequency of the waveform as shown in **Figure Q4(b)**. Then, calculate rms current (I_{rms}), rms voltage (V_{rms}), peak voltage (V_p), peak-to-peak voltage (V_{pp}) and average voltage (V_{avg}) across resistor R1. Voltage source (V_s) is in rms value.

(6 marks)

(c) Calculate the total voltage, V_{total} as seen at terminals a-b of **Figure Q4(c)**.

(7 marks)

(d) **Figure Q4(d)** shows the AC circuit with the voltage source, $v(t) = 28 \sin 2t$ V. Find the current $i_1(t)$ and $i_2(t)$ in the circuit by using mesh analysis.

(8 marks)

Q5 (a) Give the application of the electronic devices below:

(i) Diode
(ii) Sensor
(iii) Transformer

(3 marks)

(b) Build the truth table for the combinational logic circuit shown in **Figure Q5(b)**.

(5 marks)

(c) Design a combinational logic circuit that produces a truth table as shown in **Table Q5(c).**

(8 marks)

(d) **Figure Q5(d)** shows the two types of rotor which are squirrel cage rotor and wound rotor. Give a description of both rotors.

(4 marks)

(e) There are four different methods for supplying the DC current to the motor or generator poles which are separate excitation, series connection, shunt connection and compound. Draw the equivalent circuit for series connection.

(5 marks)

- END OF QUESTION -

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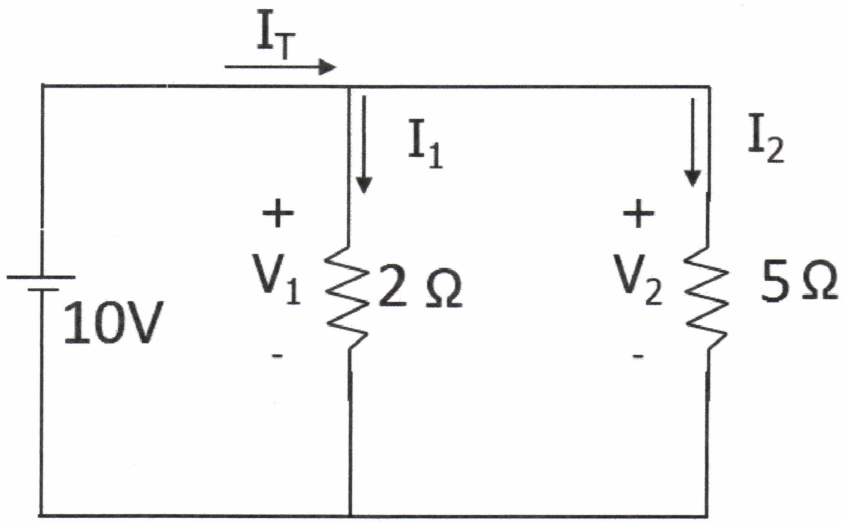

Figure Q2(b)

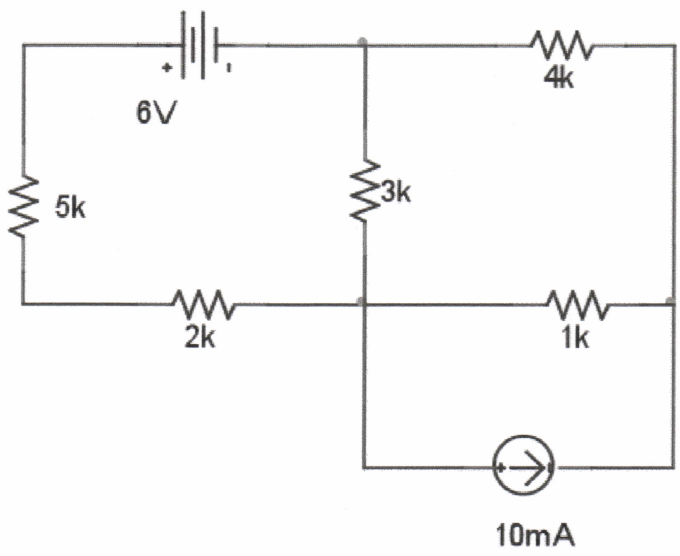

Figure Q2(c)

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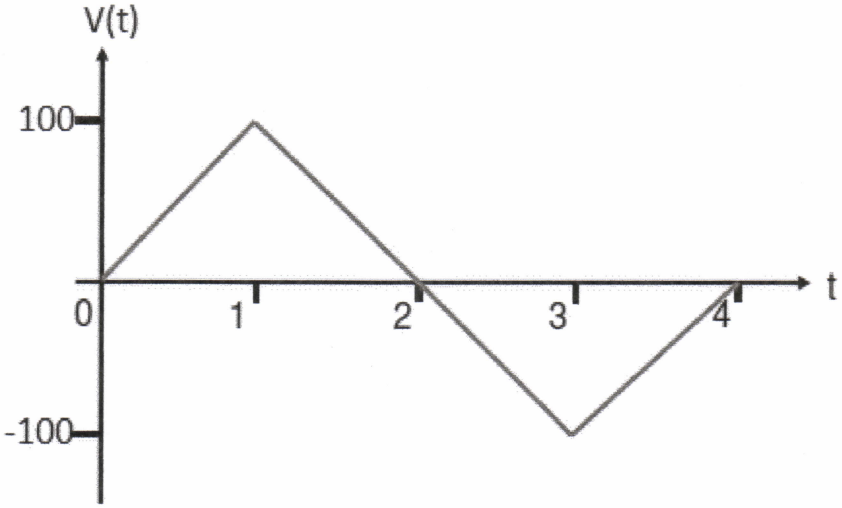

Figure Q3(a)

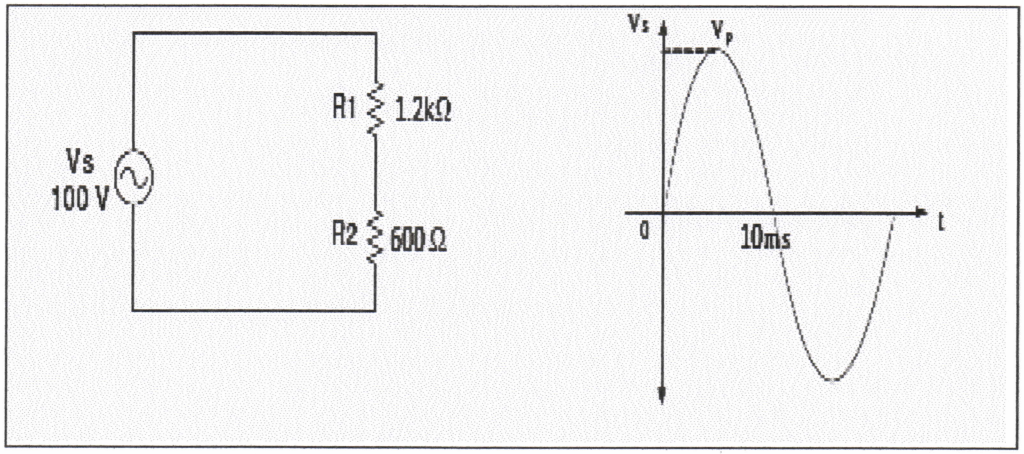

Figure Q4(b)

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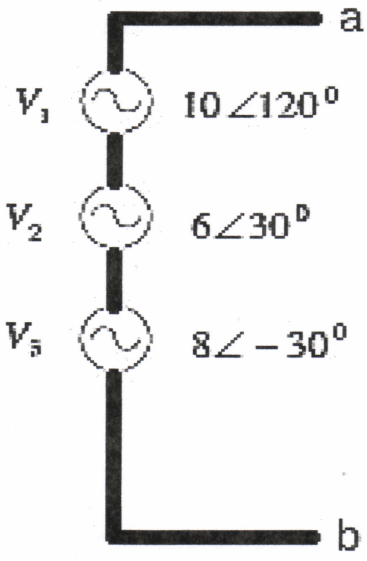

Figure Q4(c)

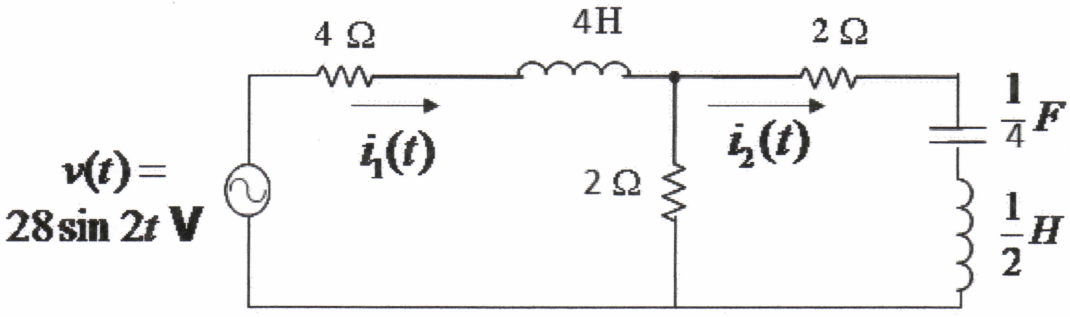

Figure Q4(d)

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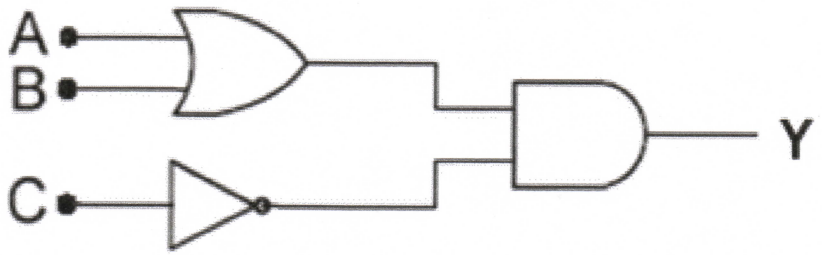

Figure Q5(b)

Table Q5(c)

Input			Output
A	**B**	**C**	**Z**
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

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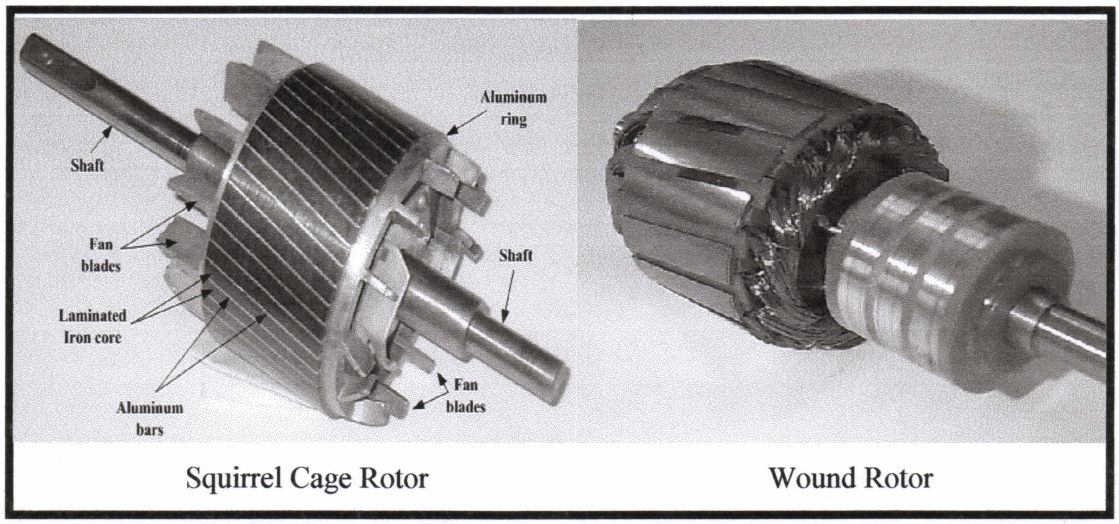

Figure Q5(d)