UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2012/2013

COURSE NAME	:	ELECTRICAL AND ELECTRONIC TECHNOLOGY
COURSE CODE	:	BDA14303 / BEX17003 / BEE1803
PROGRAMME	:	BDD
EXAMINATION DATE	:	JUNE 2013
DURATION	:	3 HOURS
INSTRUCTIONS	:	1. **SECTION A** CONSIST OF ***TWO*(2)** QUESTIONS. ANSWER **ALL** QUESTIONS. 2. **SECTION B** CONSISTS OF ***FIVE***(5) QUESTIONS. ANSWER ANY ***THREE(3)*** QUESTIONS.

THIS QUESTION PAPER CONSISTS OF **EIGHT (8)** PAGES

PART A ***(ANSWER ALL QUESTIONS)***

Q1 (a) State the difference between direct current and alternating current with the aid of suitable figures.

(4 marks)

(b) In an electrochemistry cell consists of two electrodes immersing in an ionic solution and the two electrodes (cathodes and anodes) are connected to the positive and negative terminals of a battery. The current flowing through the electrodes is

$$i(t) = \begin{cases} 2A, & 0 < t < 2 \\ 5e^{-2t}, & t > 2 \end{cases}$$

(i) Determine the charge entering the cell from t = 0s to t = 3s

(6 marks)

(ii) If the energy to move the charge from one electrode to another electrode is 30J, find the voltage drop across the two electrodes.

(2 marks)

(c) Referring to **Figure Q1(c),** calculate the power absorbed by each resistors.

(8 marks)

Q2 (a) Referring to **Figure Q2(a)**, how many branches and nodes does the circuit have?

(2 marks)

(b) Define Kirchoff's Voltage Law (KVL).

(2 marks)

(c) For the circuit in **Figure Q2(c)**, determine:

(i) Equivalent resistance

(2 marks)

(ii) Total current

(2 marks)

(iii) Currents through each resistor

(2 marks)

(iv) Power for each element

(2 marks)

(v) Power supply by the source

(2 marks)

(d) Apply mesh analysis to find V_o in the circuit of **Figure Q2(c)**.

(6 marks)

PART B ***(ANSWER ANY THREE (3) QUESTIONS)***

Q3 (a) Capacitor is one of the energy storage elements in electrical circuit. Explain with the aid of suitable figures and/or equation for the following questions:

(i) Construction of capacitor.

(2 marks)

(ii) Calculate the amount of charge stored if a 0.01μF capacitor is supplied with a 9V voltage source.

(3 marks)

(iii) Determine the current through a 200μF capacitor whose voltage is shown in **Figure Q3(a)(iii)** below and draw the resultant current. Given that,

$$V(t) = \begin{cases} 50t \text{ V} & 0 < t < 1 \\ 100\text{-}50t \text{ V} & 1 < t < 3 \\ -200 + 50t \text{ V} & 3 < t < 4 \\ 0 & \text{otherwise} \end{cases}$$

(9 marks)

(b) Determine the equivalent inductors for the circuit in **Figure Q3(b)** and then find the total voltage from $t = 1$s to $t = 2$s. Given that the current is $i(t) = (2 - 2e^{-t})$A.

(6 marks)

Q4 (a) Explain the following terms.

(i) Magnetomotive force (MMF)

(2 marks)

(ii) Magnetic flux

(2 marks)

(iii) Reluctance

(2 marks)

(b) Draw with a diagram to explain how a magnetic field is generated when a current passes through a conductor.

(2 marks)

(c) An iron ring of mean diameter 15 cm and 10 cm^2 in cross-section is wound with 200 turns of wire. There is an air gap of 2 mm cut in the ring. For a flux density of 1 Wb/m^2 and a relative permeability of 500;

(i) Draw the schematic diagram of this ring and the configuration.

(2 marks)

(ii) Determine the exciting current, inductance and the stored energy.

(10 marks)

Q5 (a) Explain the importance of power factor in power delivery.

(2 marks)

(b) A current source of $i(t) = 1.789 \cos (4t+26.57^{o})$ A is applied to a single element load. The resulting voltage across the element is $v(t) = 4.47 \cos (4t-63.43^{o})$ v.

(i) What type of element is this? Calculate its value.

(6 marks)

(ii) Which signal leads and by how much?

(2 marks)

(c) A sinusoidal voltage is applied to the AC circuit in **Figure Q5(c)**.

(i) Find the output power of the voltage source.

(8 marks)

(ii) Find the power dissipation in resistor, R_1 and R_2.

(2 marks)

Q6 (a) Define the term of AC Motor?

(2 marks)

(b) Give **ONE (1)** advantage of AC motor compare to DC motor?

(2 marks)

(c) List **ONE (1)** way to increase the turning force (or torque) that the DC motor can create.

(2 marks)

(d) Define the following DC motor term as below:

(i) Armature

(2 marks)

(ii) Commutator

(2 marks)

(iii) Brushes

(2 marks)

(e) Give **TWO (2)** examples DC motor for

(i) residential and commercial

(2 marks)

(ii) industrial

(2 marks)

(f) A three-phase 300V, 60 Hz, six pole, induction motor delivers 10kW at a slip of 3%.

Calculate:

(i) synchronous speed

(2 marks)

(ii) rotor speed

(2 marks)

Q7 (a) Use diagram to show electron flow of a diode when it is forward biased.

(3 marks)

(b) Draw a I-V characteristic curve of the diode and explain the operation of the diode.

(4 marks)

(c) A 5V D C supply is required to power a microcontroller in a device. Sketch the schematic diagram of the DC power supply circuit and the clean output waveforms. Explain the function of each component sketched.

(8 marks)

(d) Explain why analog-to-digital converter is needed in many electronic circuit applications.

(5 marks)

-END OF QUESTION-

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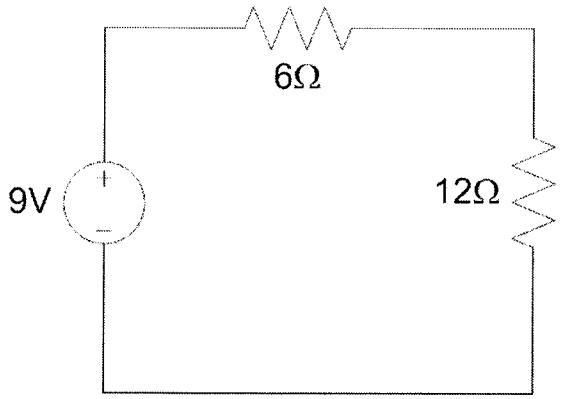

FIGURE Q1(c)

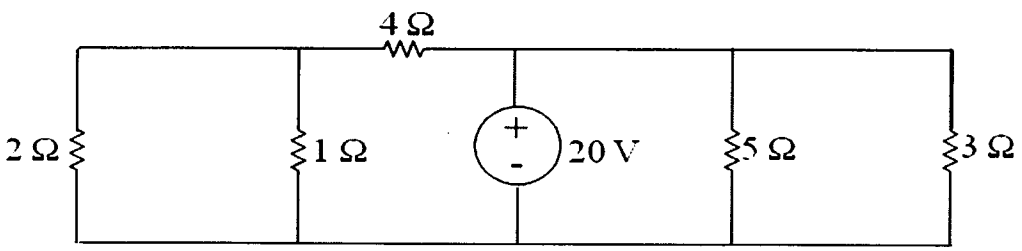

FIGURE Q2(a)

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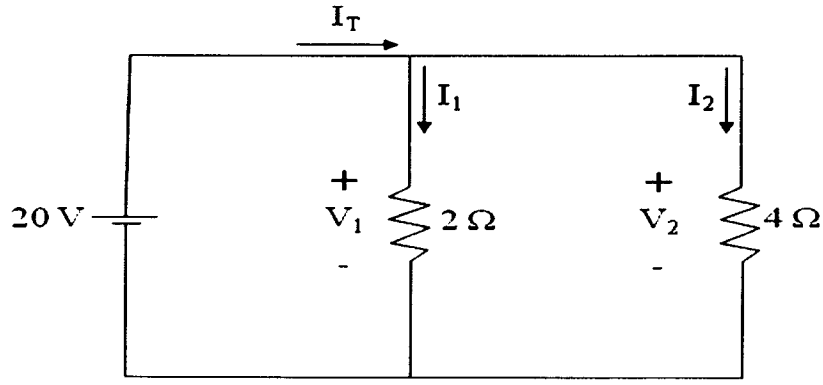

FIGURE Q2(b)

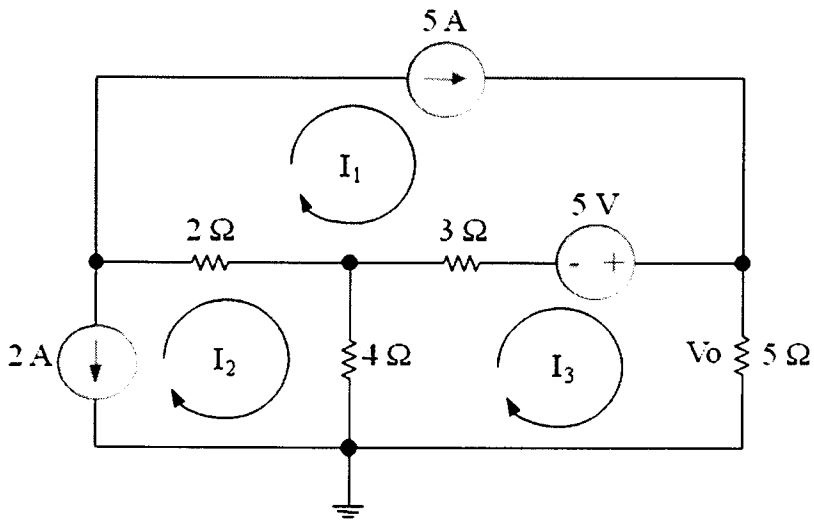

FIGURE Q2(c)

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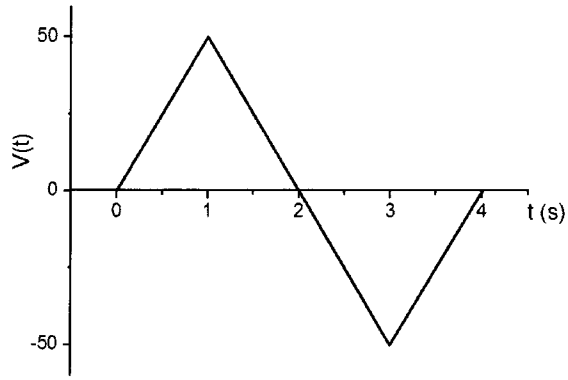

FIGURE Q3(a)(iii)

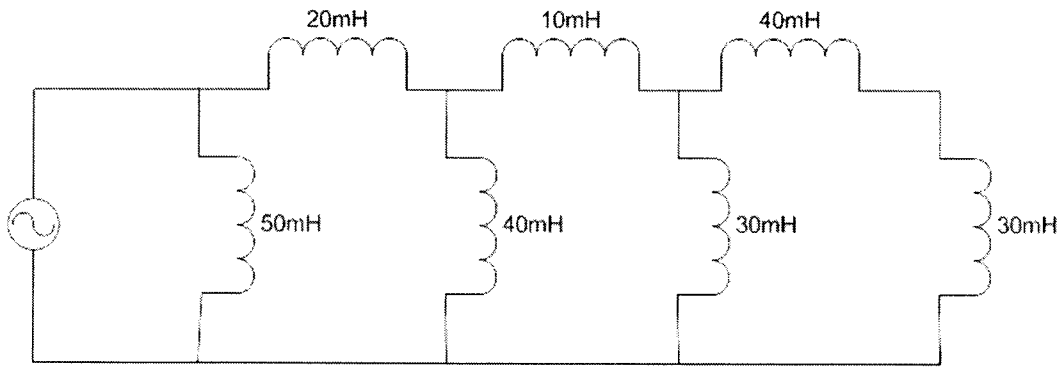

FIGURE Q3(b)

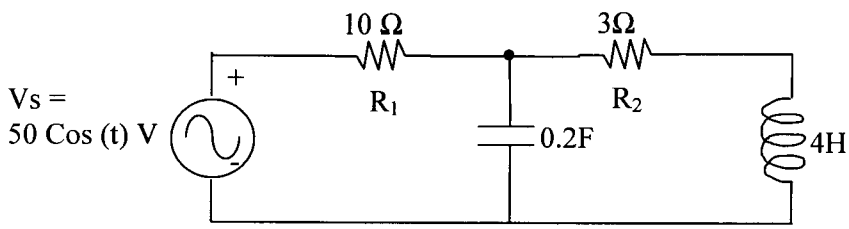

FIGURE Q5(c)