UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2013/2014

COURSE NAME	:	ELECTRICAL PRINCIPLE I
COURSE CODE	:	DAR 11003
PROGRAMME	:	1 DAR
EXAMINATION DATE	:	DECEMBER 2013/JANUARY 2014
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **FIVE(5)** QUESTIONS ONLY

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

Q1 For the circuit of Figure Q1:

(a) Determine the resistance R_T. (5 marks)

(b) Find the currents I_1 and I_2. (10 marks)

(c) Find the voltage V_a. (5 marks)

Q2 (a) Write the mesh equation for the circuit in Figure Q2(a). Using determinants, solve for the loop currents. Use clockwise mesh currents.

(10 marks)

(b) Write the nodal equation for the circuit in Figure Q2(b). Using determinants, solve for the nodal voltages V_1 and V_2.

(10 marks)

Q3 (a) Find the Thévenin equivalent circuit for the network external to the resistor R in Figure Q3(a).

(10 marks)

(b) Find the Norton equivalent circuit for the network external to the resistor R in Figure Q3(b).

(10 marks)

Q4 For the circuit of Figure Q4:

(a) Write the mathematical expression for the voltages v_C and v_{R1} and the current i_C after the switch is thrown into position 1.

(8 marks)

(b) Find the values v_C, v_{R1} and the current i_C when the switch is moved to position 2 at t=100ms.

(6 marks)

(c) Write the mathematical expression for the voltages v_C and v_{R2} and the current i_C if the switch is moved into position 3 at t=200 ms.

(6 marks)

Q5 For the circuit of Figure Q5:

(a) Write the mathematical expressions for the current i_L and the voltage v_L following the closing of the switch. Note the magnitude and direction of the initial current..

(10 marks)

(b) Sketch the waveform of i_L and v_L for the entire period from initial value to steady-state level.

(10 marks)

Q6 For the oscilloscope display of of Figure Q6 :

(a) Determine the period of each waveform. (5 marks)

(b) Determine the frequency of each waveform. (5 marks)

(c) Find the rms value of each waveform. (5 marks)

(d) Determine the phase shift between the two waveforms and which leads or lags.

(5 marks)

Q7 (a) Find the sinusoidal expression for the applied voltage e_{in} for the system of Figure Q7(a) if

$V_a = 60 \sin(\omega t + 30°)$
$V_b = 30 \sin(\omega t + 60°)$
$V_c = 40 \sin(\omega t + 120°)$

(10 marks)

(b) Find the sinusoidal expression for the current i_s for the system of Figure Q7(b) if

$i_1 = 6 \times 10^{-3} \sin(377t + 180°)$
$i_2 = 8 \times 10^{-3} \sin(377t - 180°)$
$i_3 = 2i_2$

(10 marks)

END OF QUESTION

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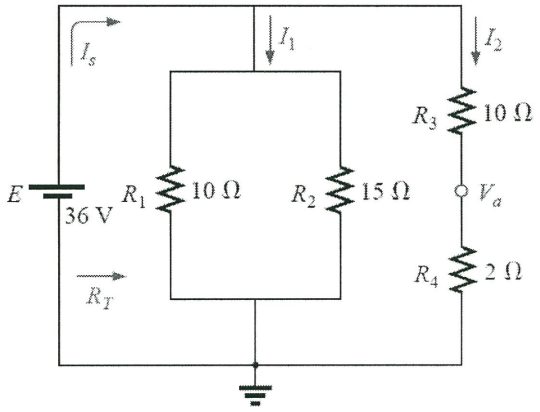

FIGURE Q1

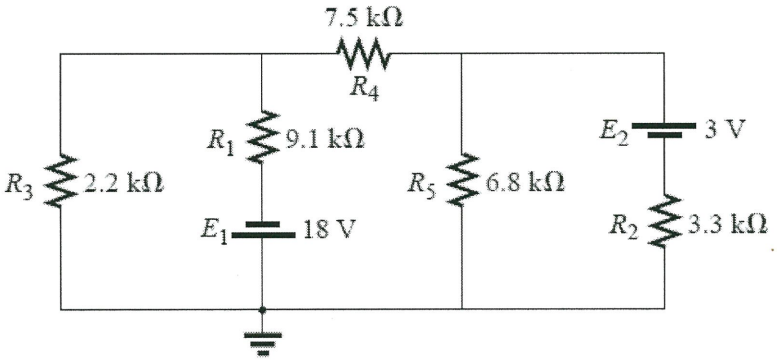

FIGURE Q2(a)

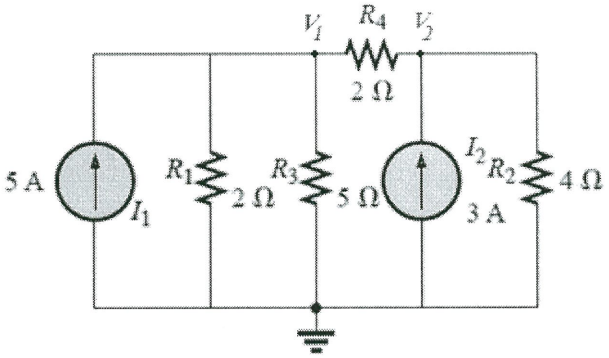

FIGURE Q2(b)

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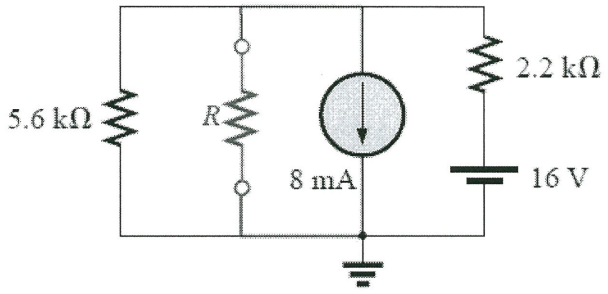

FIGURE Q3(a)

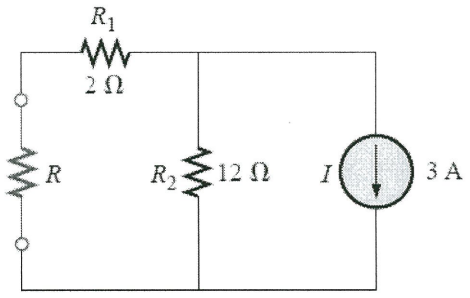

FIGURE Q3(b)

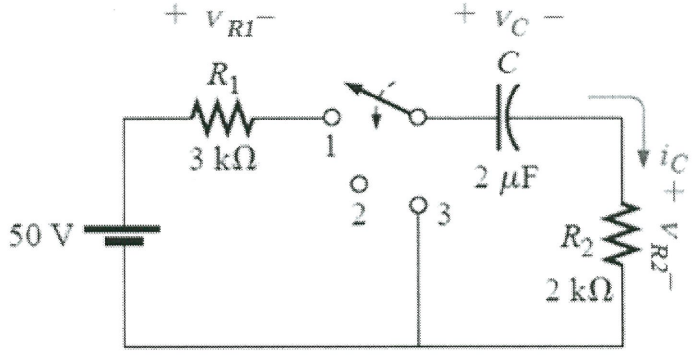

FIGURE Q4

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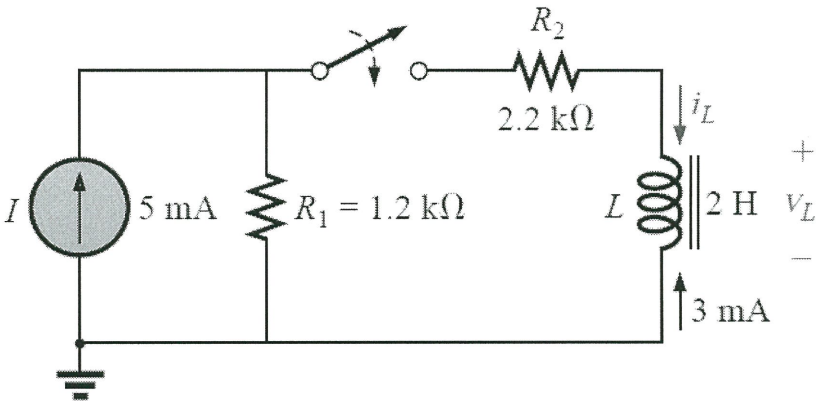
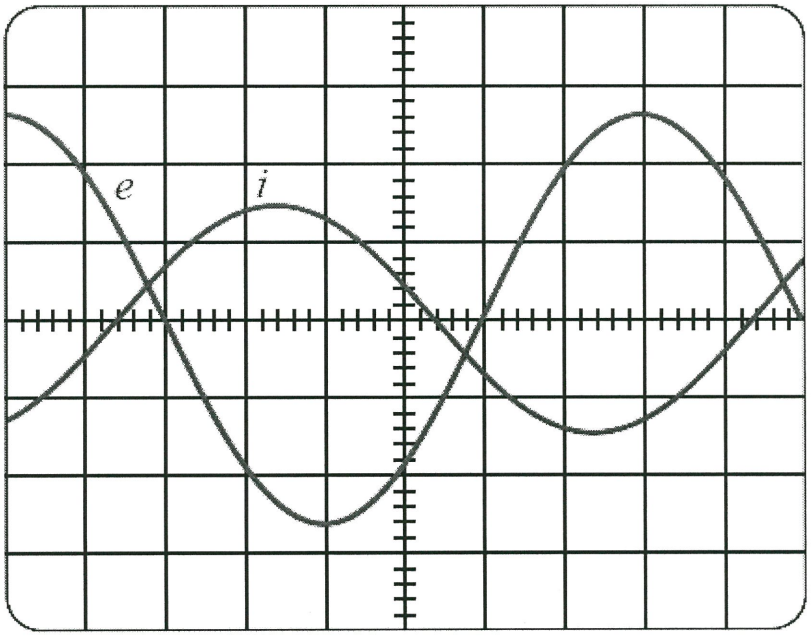


FIGURE Q5



Vertical sensitivity = 0.5 V/div.
Horizontal sensitivity = 1 ms/div.

FIGURE Q6

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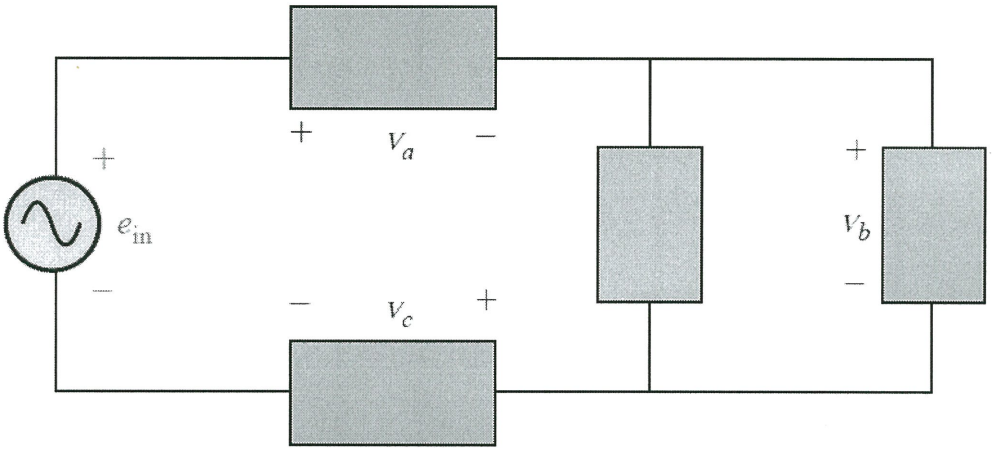

FIGURE Q7(a)

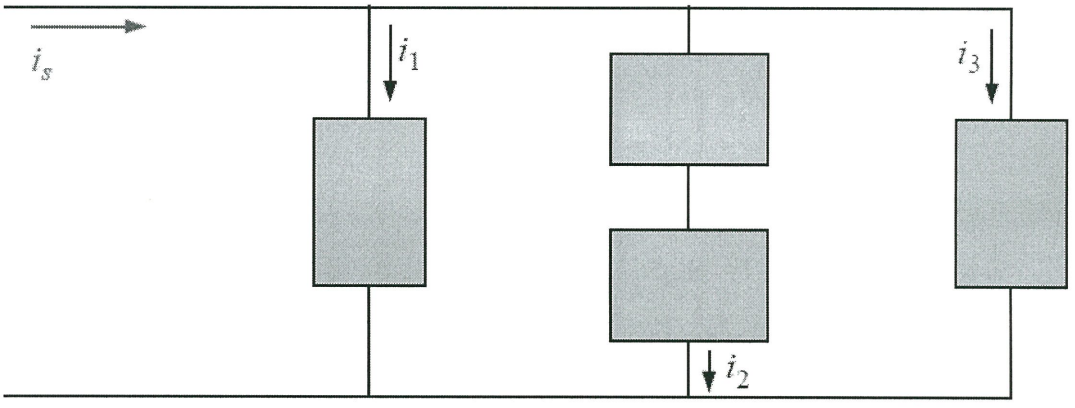

FIGURE Q7(b)