UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(TAKE HOME)
SEMESTER II
SESSION 2019/2020

COURSE NAME	:	ELECTRIC CIRCUITS I / ELECTRIC CIRCUIT ANALYSIS I
COURSE CODE	:	BEV10303 / BEF12403
PROGRAMME	:	BEV
EXAMINATION DATE	:	JULY 2020
DURATION	:	4 HOURS
INSTRUCTION	:	1) ANSWER **ALL** QUESTIONS 2) THE ANSWER BOOKLET NEEDS TO BE SUBMITTED 30 MINUTES AFTER THE EXAMINATION PERIOD OF THIS PAPER ENDS (UPLOAD THEM IN ONE PDF FILE)

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1 For the circuit in **Figure Q1(a)**, solve for I_x, I_y and V_z using superposition method.

(15 marks)

Q2 For the circuit shown in **Figure Q2**:

(i) Convert the delta-connected resistors R_2-R_3-R_4 to an equivalent star (wye) connection and redraw the circuit with values indicated.

(7 marks)

(ii) For the redrawn circuit in **Q2(i)**, replace the current source by a voltage source using source transformation technique. Determine and sketch the Thevenin's equivalent circuit across R_5.

(7 marks)

(iii) Using the Thevenin's equivalent circuit in **Q2(ii)**, determine the current in R_5 and the current supplied by the 9V source in the original circuit.

(4 marks)

(iv) If R_5 is allowed to vary, determine the value of R_5 for maximum power transfer. Compute the value of this maximum power.

(2 marks)

Q3 (a) Describe the relationship between the maximum power transfer theorem and efficiency in an electrical circuit.

(3 marks)

(b) Predict the efficiency of a system if:

(i) $R_{load} = R_{source}$.

(2 marks)

(ii) $R_{load} = \infty\ \Omega$ or $R_{source} = 0\ \Omega$.

(2 marks)

(iii) $R_{load} = 0\ \Omega$.

(2 marks)

(c) For the circuit shown in **Figure Q3(c)**:

(i) Determine the Norton's equivalent circuit across the terminals of R.

(5 marks)

(ii) Using the equivalent circuit derived in **Q3(c)(i)**, determine the currents I_1, I_2, I_3 and I_4 in the original circuit, when $R = 6\Omega$.

(5 marks)

(iii) Determine the power loss in each resistor in the circuit.

(4 marks)

(iv) If R is allowed to vary, determine the value of R for maximum power transfer. Compute the value of this maximum power.

(2 marks)

– END OF QUESTIONS –

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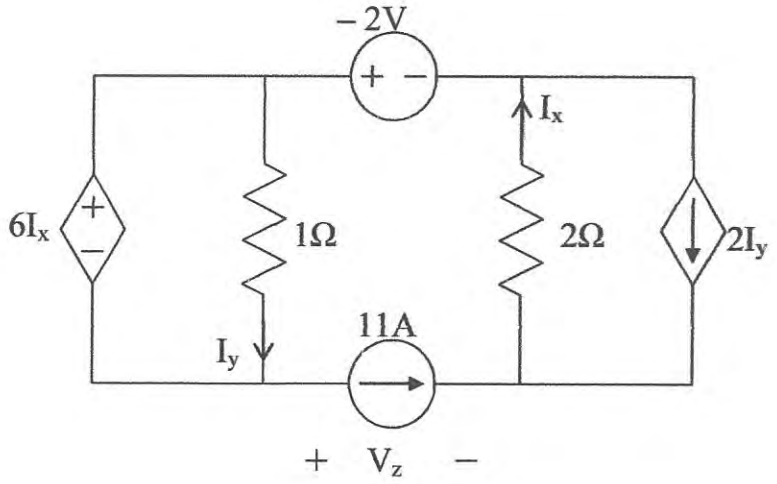

Figure Q1(a)

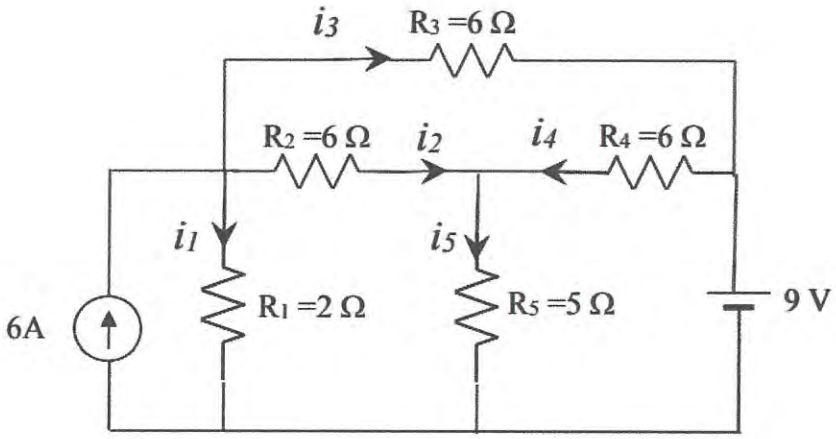

Figure Q2

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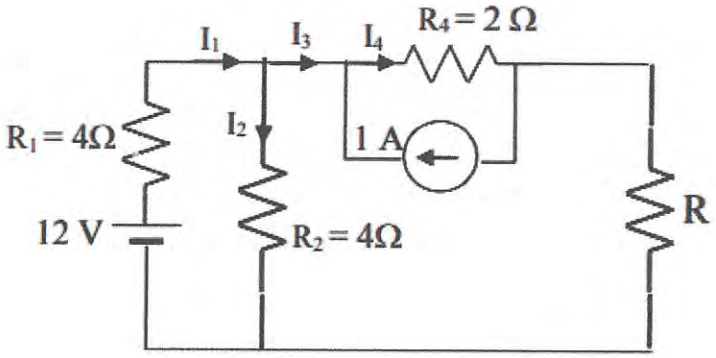

Figure Q3(c)