Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2016/2017

COURSE NAME	:	ELECTRICAL PRINCIPLES I
COURSE CODE	:	BNR 10203
PROGRAMME	:	1BND/1BNE/1BNF
EXAMINATION DATE	:	DECEMBER 2016 / JANUARY 2017
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	ANSWER **FOUR(4)** QUESTIONS ONLY

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

Q1 (a) Define "Kirchhoff's Current Law" (KCL) and "Kirchhoff's Voltage Law" (KVL).
(2 marks)

(b) Describe Ohm's law.
(2 marks)

(c) Compute the branch currents I_1 to I_5 for the circuit shown in **Figure Q1(c)** using KCL.
(5 marks)

(d) Determine I_1 to I_5 for the circuit shown in **Figure Q1(d)**.
(12 marks)

(e) The Rotating Machine in **Figure Q1(e)** is rated at 120 V, 3 A. Calculate V_s in order to make the Rotating Machine operates at the rated conditions.
(4 marks)

Q2 (a) Calculate the currents mesh I_1 to I_3 in **Figure Q2(a)** using mesh analysis.
(10 marks)

(b) Using nodal analysis, determine I_o and V_o in the circuit of **Figure Q2(b)**.
(11 marks)

(c) Analyze the transistor circuit of **Figure Q2(c)**, find I_C, if $\beta = 200$, $V_o = 5.4$ V and $V_{BE} = 0.7$ V.
(4 marks)

Q3 (a) In the circuit of **Figure Q3(a)**, calculate I_o when $V_s = 12$ V, 13 V and 34 V.
(7 marks)

(b) Given the circuit in **Figure Q3(b)**, use superposition to obtain I_o.
(13 marks)

(c) Use Thevenin theorem to find V_{TH} and R_{TH} at the terminal $a - b$ in **Figure Q3(c)**.
(5 marks)

Q4 (a) Describe "Inverting Amplifier" and "Noninverting Amplifier".

(3 marks)

(b) Obtain V_o and I_o for the ideal op amp circuits in **Figure Q4(a)**.

(7 marks)

(c) Determine I_o by analyzing the inverting amplifier circuit shown in **Figure Q4(b)**.

(7 marks)

(d) Determine I_o in the cascaded op amp circuit shown in **Figure Q4(c)**.

(8 marks)

Q5 (a) Obtain the equivalent capacitance between terminal a and b of the circuit shown in **Figure Q5(a)**.

(6 marks)

(b) Calculate the current through 15 mH inductor if the voltage across it is:

$$v(t) = \begin{cases} 450t^4, & t > 0 \\ 0, & t < 0 \end{cases}$$

Also, determine the energy stored at $t = 3$ s, assume $i(v) > 0$.

(6 marks)

(b) In the circuit of **Figure Q5(b)**, let $I_s = 60e^{-3t}$ A and $V_1(0) = 70$ V, $V_2(0) = 120$ V. Analyze:

(i) $V_1(t)$ and $V_2(t)$
(ii) The energy in each capacitor at $t = 0.75$ s.

(9 marks)

(c) Determine the equivalent inductance at terminals a and b of the circuit shown in **Figure Q5(c)**.

(4 marks)

- END OF QUESTION -

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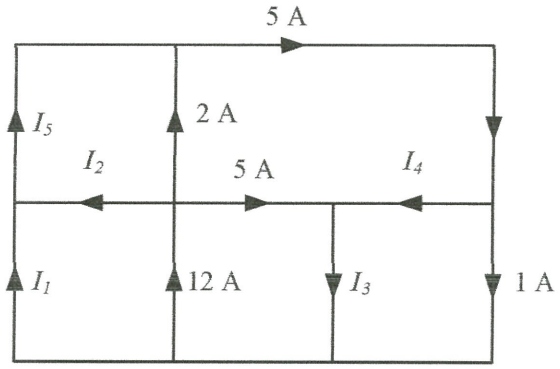

FIGURE Q1(c)

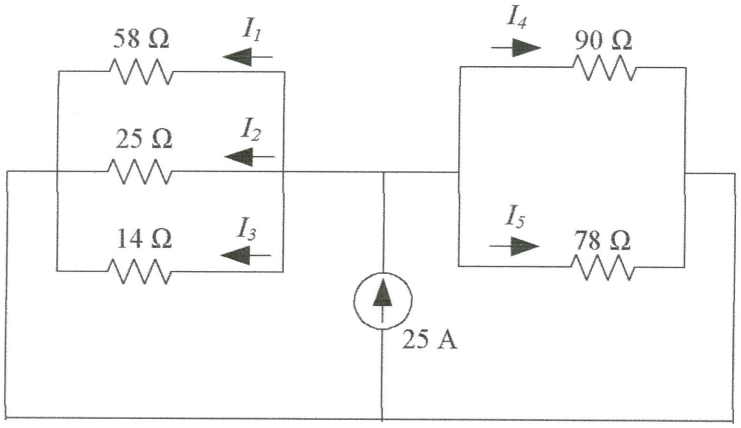

FIGURE Q1(d)

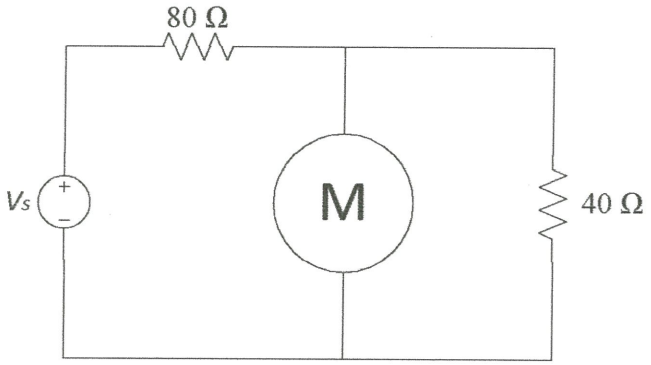

FIGURE Q1(e)

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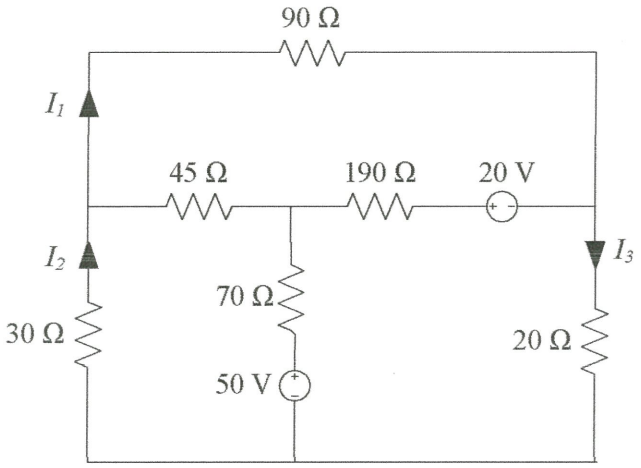

FIGURE Q2(a)

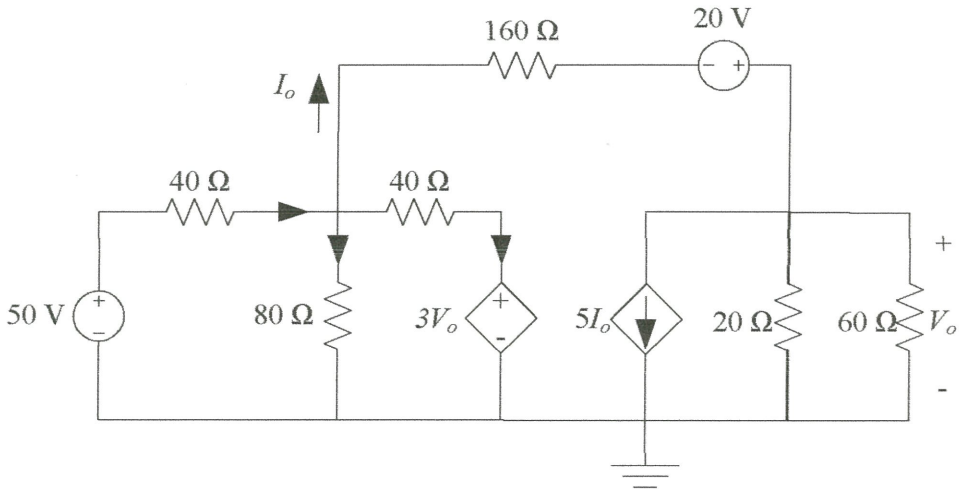

FIGURE Q2(b)

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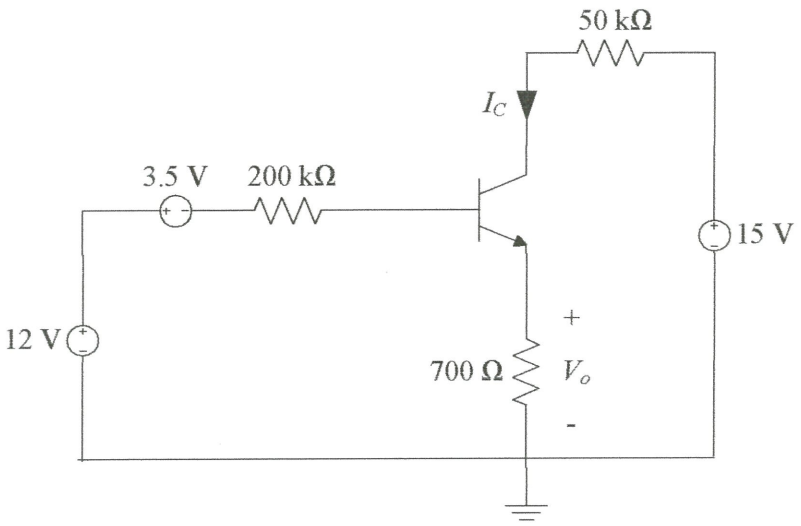

FIGURE Q2(c)

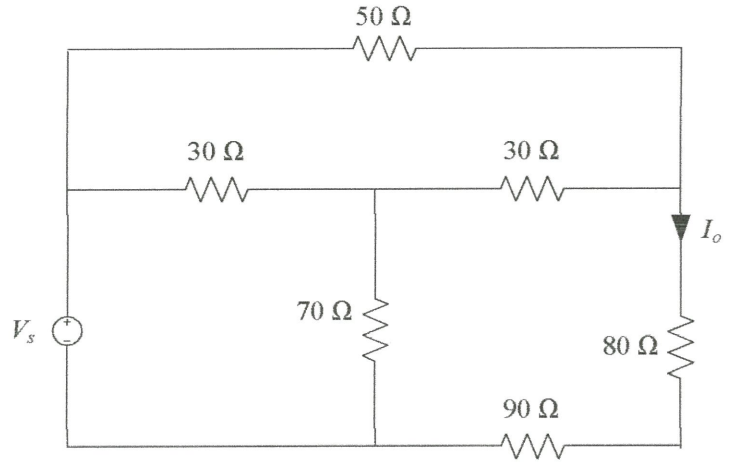

FIGURE Q3(a)

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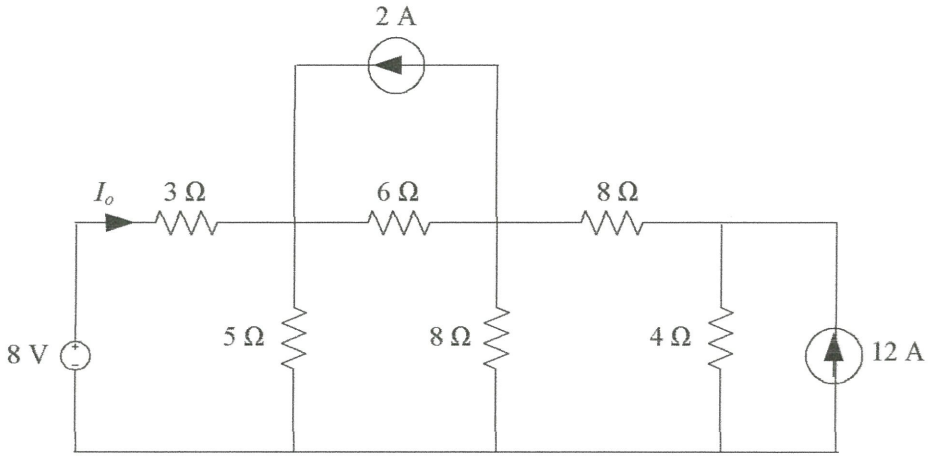

FIGURE Q3(b)

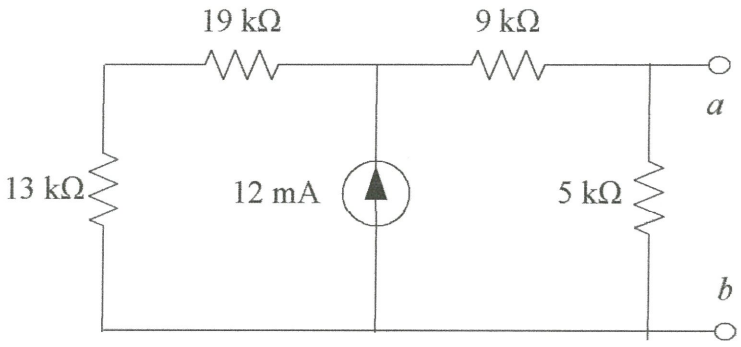

FIGURE Q3(c)

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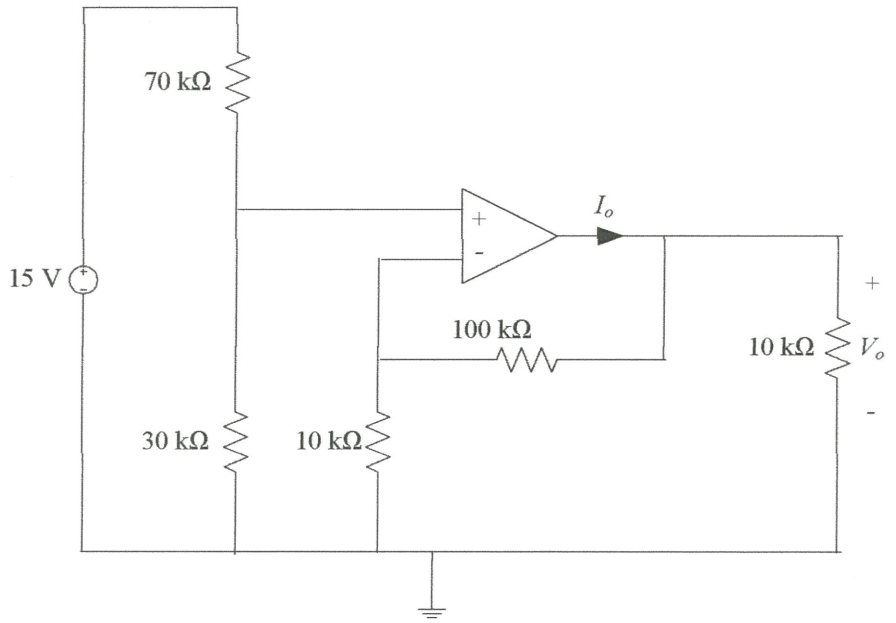

FIGURE Q4(a)

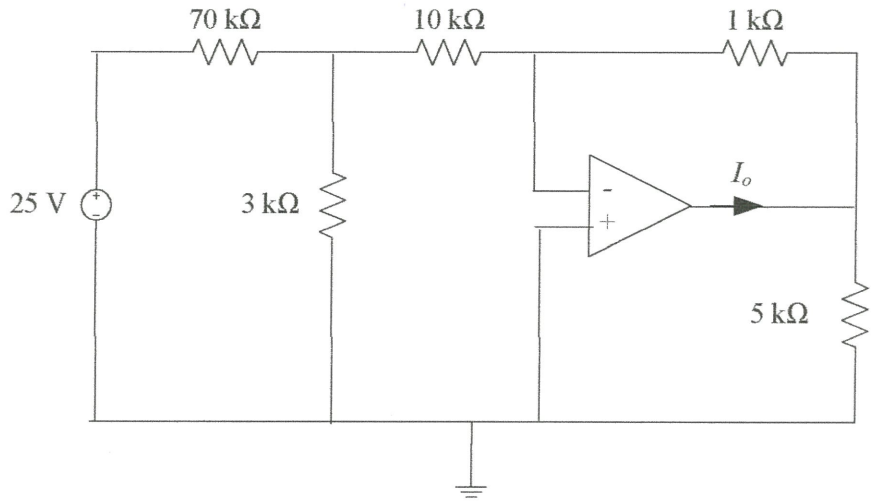

FIGURE Q4(b)

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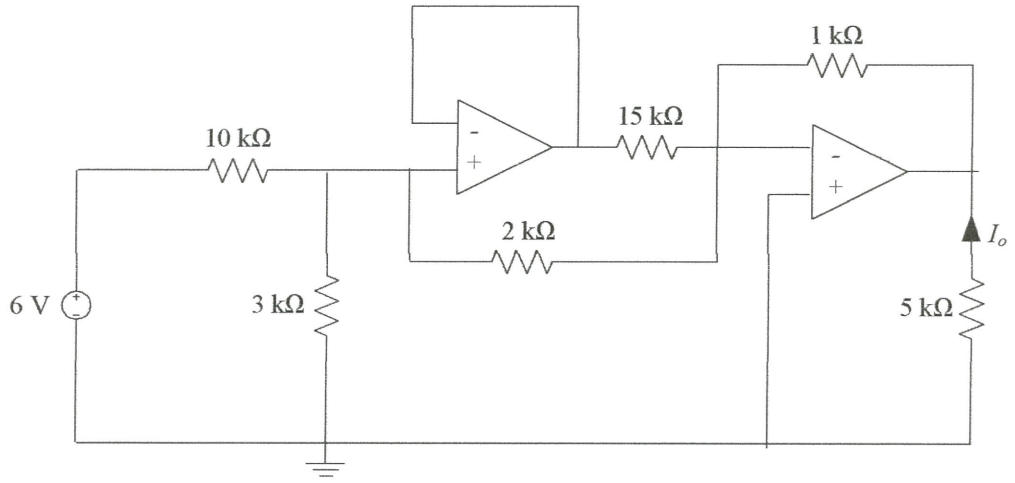

FIGURE Q4(c)

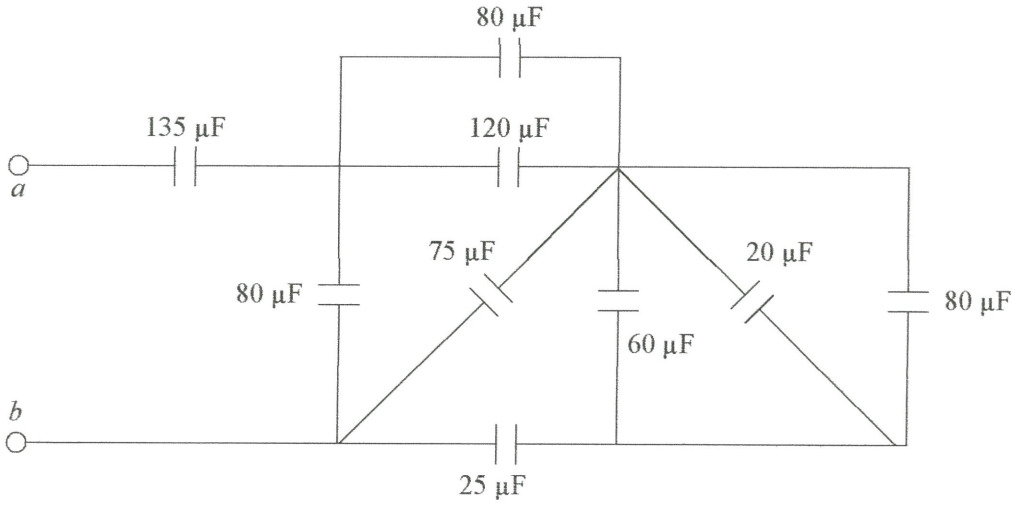

FIGURE Q5(a)

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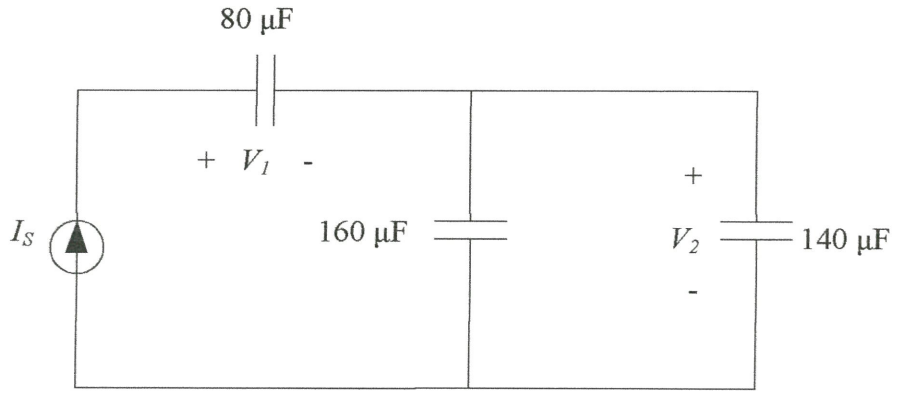

FIGURE Q5(b)

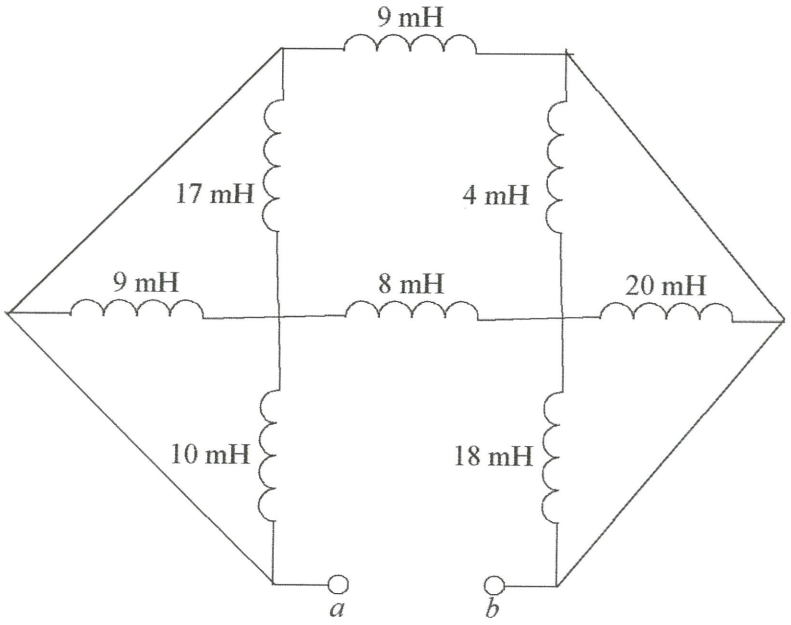

FIGURE Q5(c)