



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER I  
SESSION 2018/2019**

COURSE NAME : ELECTRICAL & ELECTRONIC TECHNOLOGY

COURSE CODE : BDU10803

PROGRAMME : BDC/BDM

EXAMINATION DATE : DECEMBER 2018/JANUARY 2019

DURATION : 3 HOURS

INSTRUCTION : ANSWER ALL QUESTIONS

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

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- Q1**
- (a) State the function of inductor and the SI unit of inductance. (2 marks)
- (b) Find  $L_{eq}$  at the terminal a-b of the circuit in **Figure Q1(b)**. (5 marks)
- (c) Consider the circuit in **Figure Q1(c)**. Under DC conditions, find;
- (i) current,  $i$ , (1 mark)
- (ii) voltage,  $v_c$ , (1 mark)
- (iii) current,  $i_L$ , (1 mark)
- (iv) the energy stored in the capacitor and inductor. (4 marks)
- (d) Referring to the circuit in **Figure Q1(d)**;
- (i) Express the Kirchoff Voltage Law (KVL) equation. (2 marks)
- (ii) Determine the value of current,  $I$ . (2 marks)
- (iii) Find the voltage drop across resistor  $3 \Omega$ ,  $v_I$ . (2 marks)
- (e) (i) Describe the differences between nodal analysis and mesh analysis. (2 marks)
- (ii) Determine the voltages at the nodes in **Figure Q1(e)(ii)** using nodal analysis. (10 marks)
- Q2**
- (a) By applying Superposition theorem, find the current,  $i_T$  and the voltage,  $v_T$  for the circuit given in **Figure Q2(a)**. (8 marks)

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- (b) Consider the circuit in **Figure Q2(b)** and calculate;
- (i) Thevenin resistance,  $R_{Th}$ , (2 marks)
  - (ii) Thevenin voltage,  $V_{Th}$ , (5 marks)
  - (iii) value of  $R_L$  for maximum power transfer, (1 mark)
  - (iv) maximum power,  $P_{max}$ . (2 mark)

**Q3** (a) Apply DeMorgan's theorem to each of the following expressions:

- (i)  $\overline{(A + B + C)D}$  (4 marks)
- (ii)  $\overline{AB + CD + EF}$  (4 marks)

- (b) Referring to the logic diagram in **Figure Q3(b)**;
- (i) Write Boolean expression; (3 marks)
  - (ii) Develop a truth table from the Boolean expression in Q3(b)(i). (4 marks)
- (c) As part of an aircraft's functional monitoring system, a circuit is required to indicate the status of the landing gears prior to landing. A green LED display turns ON if all three gears are properly extended. A red LED display turns on if any of the gears fail to extend. Implement a control circuit to meet this requirement as shown in **Figure Q3(c)**. (10 marks)

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- Q4** (a) Draw all types of magnetic circuits with their equivalent electric circuit. (5 marks)
- (b) For the series magnetic circuit shown in **Figure Q4(b)**;
- (i) Calculate the value of current,  $I$  required to develop a magnetic flux of  $\Phi=4 \times 10^{-4} \text{ Wb}$  if the magnetic field,  $H$  (cast steel) = 170 At/m. (3 marks)
- (ii) Determine the permeability of material,  $\mu$  under these conditions. (2 marks)
- (c) Explain **THREE (3)** classifications of DC motors with their applications. (6 marks)
- (d) Determine the total dissipated power in three identical coils that contains resistor 100  $\Omega$  and inductance 42 mH when connected in a star to a 415 V, 50 Hz, 3-phase supply. (9 marks)

- END OF QUESTIONS -

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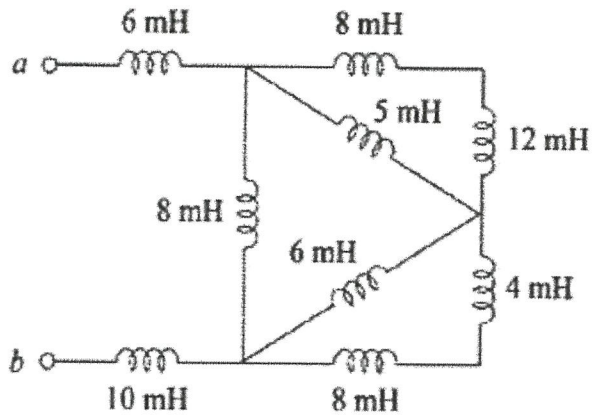


Figure Q1(b)

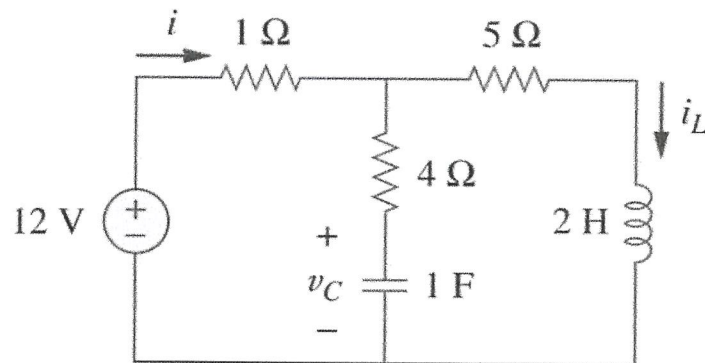


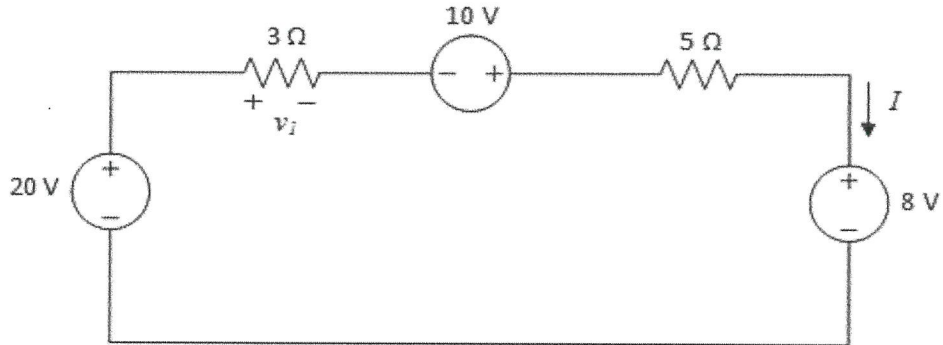
Figure Q1(c)

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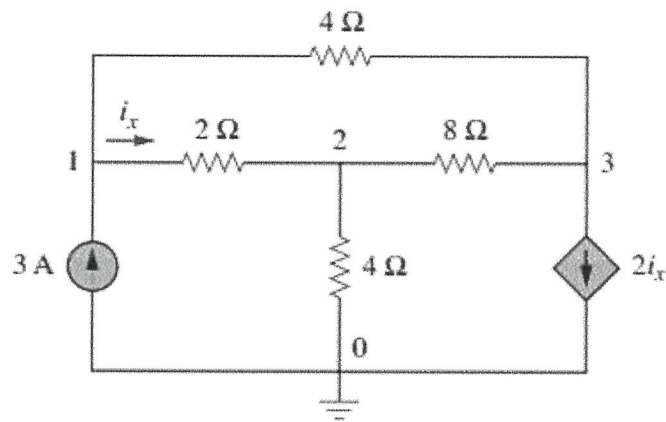
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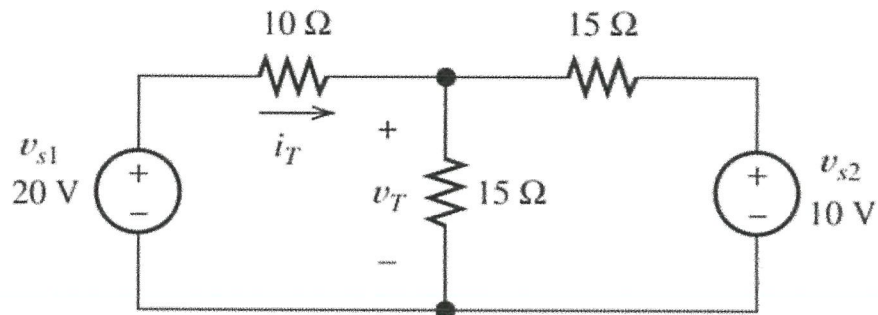
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**Figure Q1(d)**



**Figure Q1(e)(ii)**



**Figure Q2(a)**

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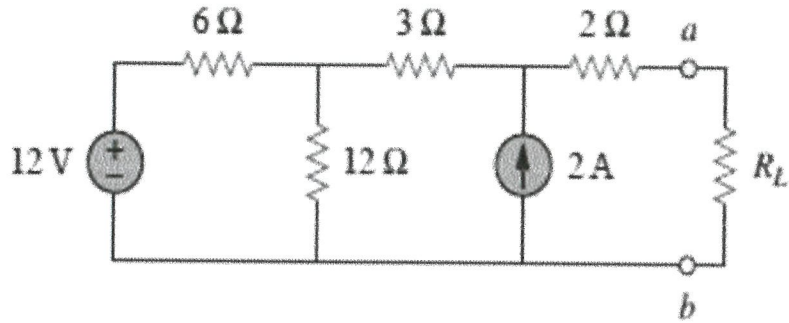


Figure Q2(b)

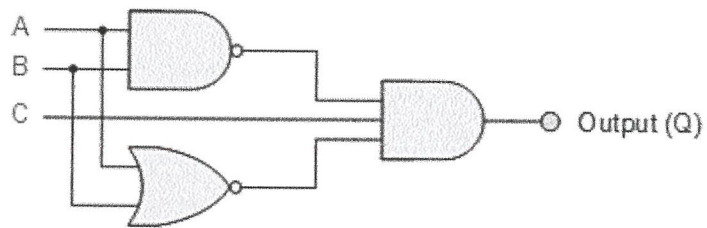


Figure Q3(b)

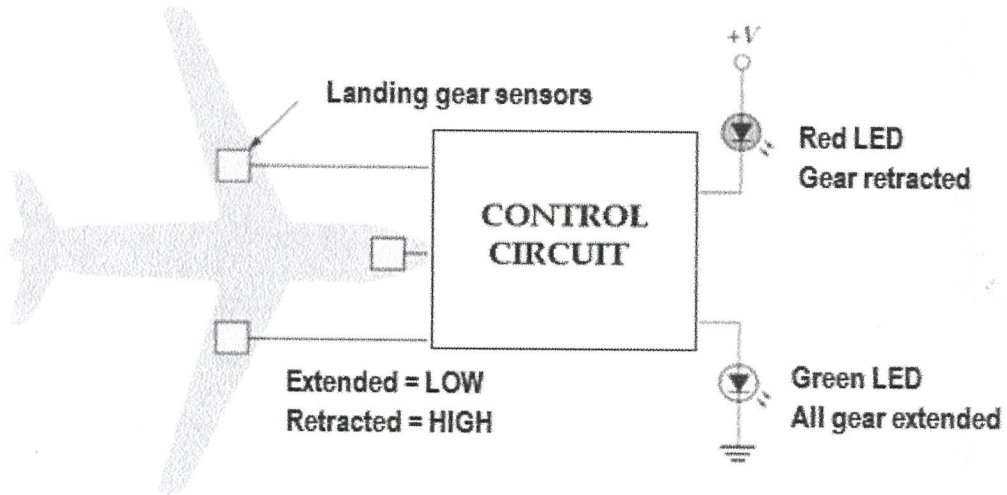


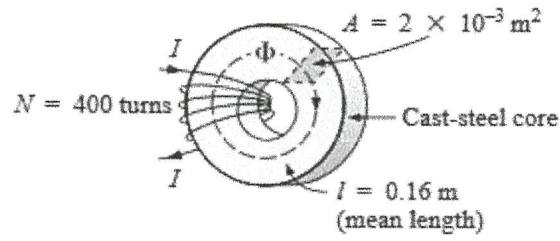
Figure Q3(c)

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**Figure Q4(b)**