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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
(ONLINE)
SEMESTER I
SESSION 2020/2021**

COURSE NAME : BASIC ELECTRIC AND ELECTRONIC
COURSE CODE : DAM 13503 / DAM 21403
PROGRAMME CODE : DAM
EXAMINATION DATE : JANUARY / FEBRUARY 2021
DURATION : 3 HOURS
INSTRUCTION : ANSWER FIVE (5) QUESTIONS ONLY
OPEN BOOK EXAMINATION

THIS QUESTION PAPER CONSISTS OF EIGHT (8) PAGES

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Q1 Referring to Figure Q1;

- (a) Find total resistance R_T . (4 marks)
- (b) Predict the voltage drop across resistance R_1 (V_{R1}), resistance R_2 (V_{R2}), resistance R_3 (V_{R3}) and resistance R_4 (V_{R4}). (8 marks)
- (c) Solve the current flow through resistance R_1 (I_{R1}), resistance R_2 (I_{R2}), resistance R_3 (I_{R3}) and resistance R_4 (I_{R4}) (8 marks)

Q2 (a) According to the Kirchoff's Current Law, the algebraic sum of all currents entering and exiting a node must equal zero. If I_x in **Figure Q2(a)** is corresponding to your last digit matrix number, calculate the currents I_1, I_2, I_3 and I_y in the circuit below. (For example, If your number is AA200620, your I_x value is 0 Ampere).

(4 marks)

(b) As a reverse engineer in automotive manufacturing, you have to analyse a drive train controller circuit with some unknown variables, as shown in **Figure Q2(b)**. If R_x is corresponding to your last digit matrix number, calculate the $V_x, V_T, V_A,$ and R_4 . (For example, If your number is AA200620, your R_x value is 0 Ω).

(4 marks)

(c) Since you were graduated from Universiti Tun Hussein Onn Malaysia (UTHM), your colleague placed his trust on you to analyse flow of current in a circuit, as shown in **Figure Q2(c)**. If V_x is corresponding to your last digit matrix number, determine the currents $I_1, I_2,$ and I_3 in the circuit below. Please sketch the actual current flow direction for each loop. (For example, If your matrix number is AA200610, your V_x value is 0 V)

(12 marks)



- Q3** (a) Describe what is magnetomotive force and compare it with electromotive force. Use diagrams to explain your answer. (6 marks)
- (b) A steel ring of 25 cm mean diameter and of circular section 3 cm in diameter has an air gap of 1.5 mm length. It is wound uniformly with 700 turns of wire carrying a current of 2 Ampere. Calculate
- (i) Magnetomotive force, mmf (2 marks)
- (ii) Magnetic flux (3 marks)
- (iii) Relative permeability of steel ring (3 marks)
- (c) Explain **THREE(3)** differences between DC motor and generator. You may use diagrams in your answer. (6 marks)
- Q4** (a) A filter circuit consists of an inductor and two capacitors as in **Figure Q4(a)**. Its purpose is to smooth the power-supply voltages so that a pure direct current is delivered to the load. If the reactance of C_1 is 175Ω at a frequency of 60 Hz, determine its capacitance. (10 marks)
- (b) **Figure Q4(a)** clearly shows that a filter circuit is needed after the rectifier circuit. A filter circuit that converts the AC power-line voltage to the required DC value is called load. Describe in detail step by step the action of filter circuit on the output of the circuit. (10 marks)

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- Q5** (a) A series–parallel AC circuit has two branches across the 60-Hz 240-V power line as shown in **Figure Q5(a)**. Find I_1 , I_2 , I_3 , V_1 , V_2 and V_3 . (Double-ended arrows are used to indicate direction for AC current). (10 marks)
- (b) A 50Ω electric iron and a 120Ω lamp are connected in parallel across a 240-V 60-Hz AC line, as shown in **Figure Q5(b)**
- (i) Calculate the total current (3 marks)
- (ii) Calculate the total resistance (1 marks)
- (iii) Find the total power drawn by the circuit (2 marks)
- (iv) Draw the phase diagram (4 marks)
- Q6** (a) A transformer consists of two windings electrically insulated from each other and wound upon a common core. Briefly explain these two windings. (4 marks)
- (b) A power transformer in **Figure Q6(b)** is used to couple electric energy from a power-supply line to two separate secondary windings, each designed for a different voltage output. The primary of the transformer is connected to a 120V source of supply and has 50 turns. Find the number of turns on each secondary. (6 marks)
- (c) A step down transformer with a turns ratio of 25000:500 has its primary connected to a 11kV transmission line. If the secondary is connected to a 20Ω load. Determine;
- (i) The secondary voltage, V_s (4 marks)
- (ii) The secondary current, I_s (3 marks)
- (iii) The secondary power, P_s (3 marks)

- END OF QUESTIONS -



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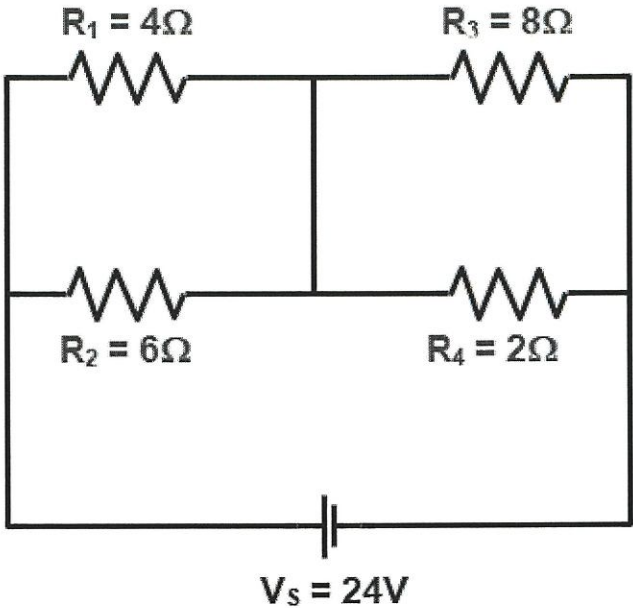


Figure Q1

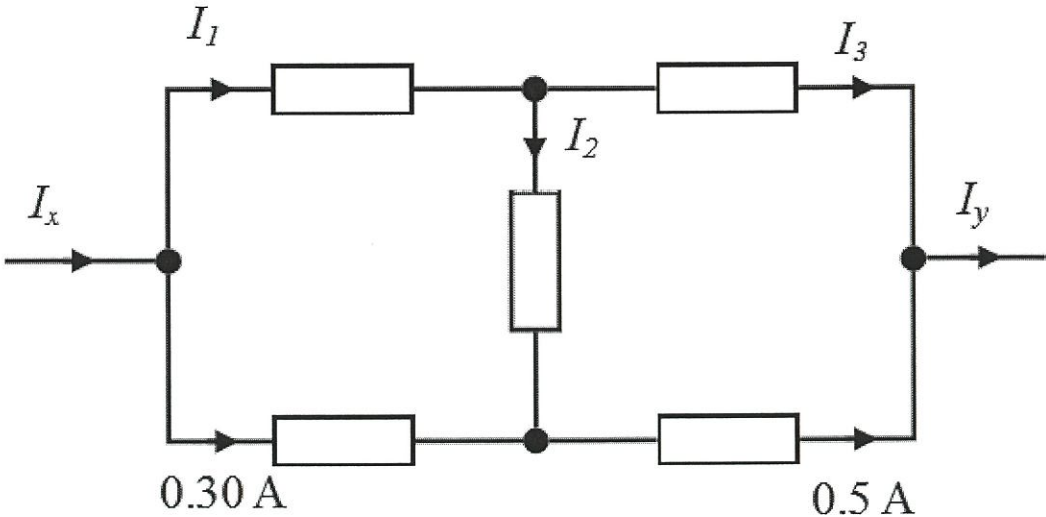


Figure Q2(a)

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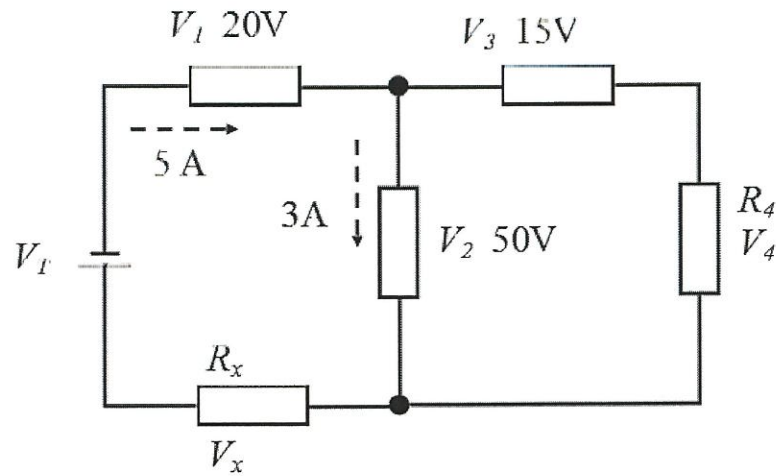


Figure Q2(b)

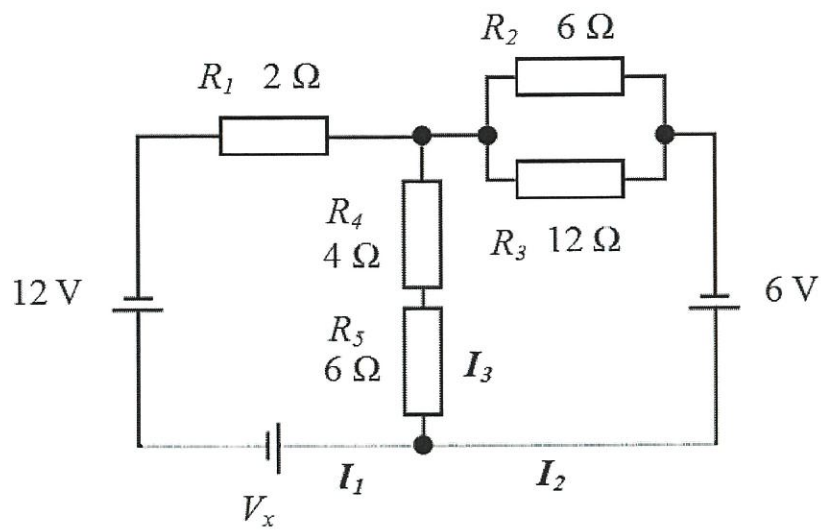


Figure Q2(c)

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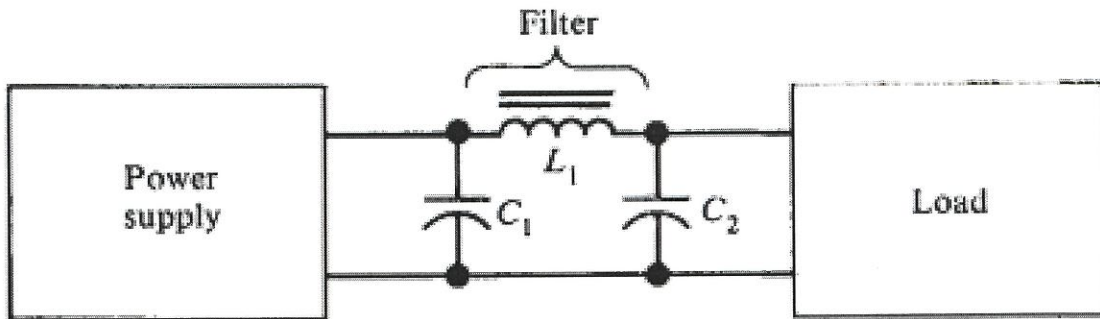


Figure Q4(a)

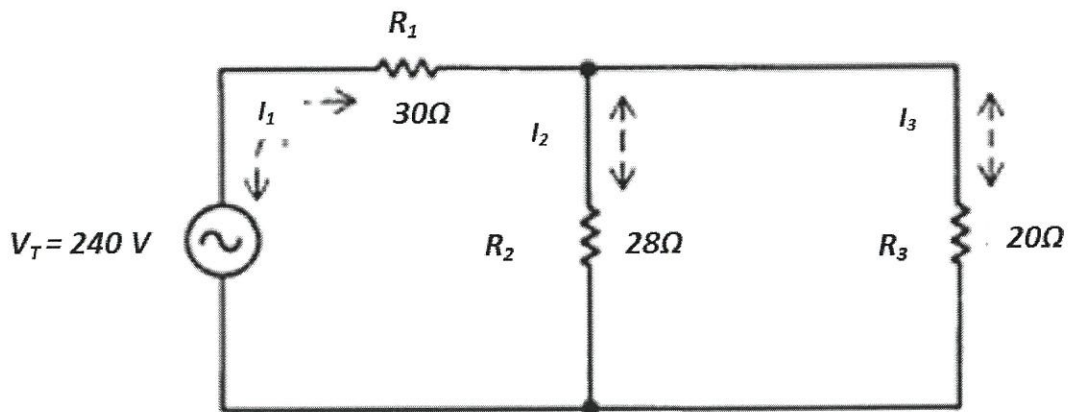


Figure Q5(a)

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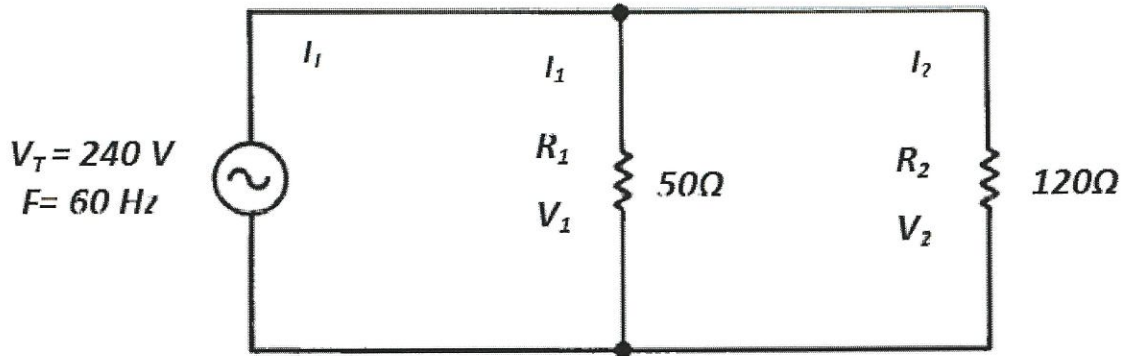


Figure Q5(b)

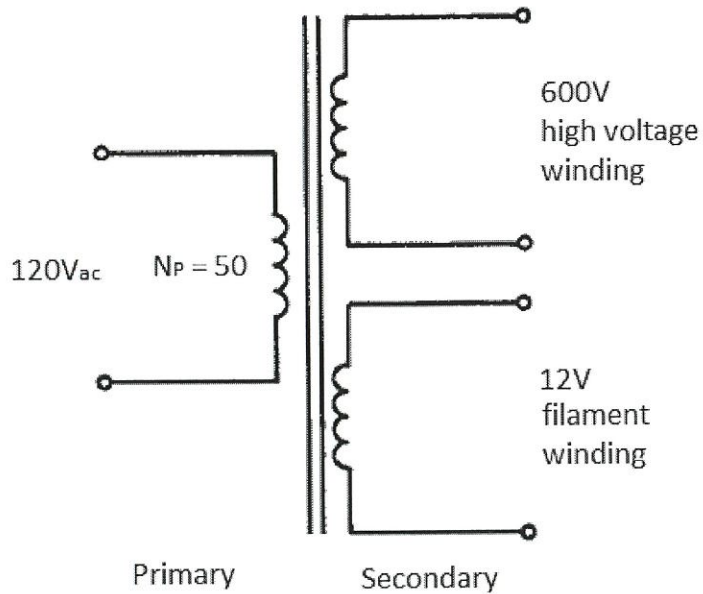


Figure Q6(b)

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