



UTHM

Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020**

COURSE NAME : BASIC ELECTRIC AND ELECTRONIC

COURSE CODE : DAM 32103 / DAM 21403

PROGRAMME CODE : DAM

EXAMINATION DATE : DECEMBER 2019 / JANUARY 2020

DURATION : 3 HOURS

INSTRUCTION : ANSWERS FIVE (5) QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF SEVEN (7) PAGES

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Q1 Refer to **Figure Q1**:

- (a) Find total resistance R_T . (4 marks)
- (b) Predict the voltage drop across resistance R_2 (V_{R2}), resistance R_4 (V_{R4}), resistance R_5 (V_{R5}), resistance R_6 (V_{R6}) and resistance R_7 (V_{R7}). (8 marks)
- (c) Solve the current flow through resistance R_2 (I_{R2}), resistance R_4 (I_{R4}), resistance R_5 (I_{R5}), resistance R_6 (I_{R6}) and resistance R_7 (I_{R7}). (8 marks)

Q2 Refer to **Figure Q2**. Given $V_1=10V$, $V_2=12V$, $R_1=3\Omega$, $R_2=4\Omega$ and $R_3=12\Omega$.
By using Method of Branch Currents:

- (a) Determine I_1 and I_2 obtain from that method. (7 marks)
- (b) Calculate voltage drop in R_1 , R_2 , R_3 from I_{R1} and I_{R3} . (6 marks)
- (c) Sketch a design of light detector using Light-Dependent Resistor (LDR) and N555 to turn on light at night and off at daylight. (7 marks)

Q3 Iron ring has a mean circumferential length of 30 cm and a cross-sectional area of 1cm^2 . It is wound uniformly with 600 turns of wire. Measurements made with a search coil around the ring show that the current in the windings is 0.06 A and the flux in the ring is 6×10^{-6} Wb.

- (a) Predict the flux density B . (5 marks)
- (b) Calculate field intensity H . (5 marks)
- (c) Derive formula from **Q3(a)** and **Q3(b)** then determine permeability μ . (5 marks)
- (d) Calculate relative permeability μ_r from previous analysis **Q3(c)**. (5 marks)

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Q4 (a) Deduce a condition at which an RLC circuit behaves like a resistive circuit. State whether the current in the circuit is minimum or maximum. (10 marks)

(b) A 120 Hz with 25 mA Alternating Current (AC) flows in a circuit containing a 10 μ F capacitor, a resistor 100 Ω and an inductor 100 H as shown in **Figure Q4(b)**. Determine is the voltage drop across the capacitor. (10 marks)

Q5 (a) A circuit 500 Ω Resistor is in parallel with 300 Ω X_L inductor as shown in **Figure Q5(a)**.

Calculate:

- i. The total circuit current I_T ,
- ii. The phase angle θ .
- iii. Impedance Z_T . (10 marks)

(b) A circuit that converts the AC power-line voltage to the required DC value is called a power supply.

- i. Describe in detail step by step to convert a AC power line voltage to DC voltage.
- ii. Illustrate by circuit schematic. (10 marks)

Q6 Refer to **Figure Q6**, calculate;

- (a) The secondary voltage, V_s . (4 marks)
- (b) The secondary current, I_s . (4 marks)
- (c) The secondary power, P_s . (4 marks)
- (d) The primary power, P_p . (4 marks)
- (e) The primary current, I_p . (4 marks)

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- Q7** The step-down autotransformer at a power factor of unity is designed to deliver 240 V to a load of 5 kW as shown in **Figure Q7**. The autotransformer's primary winding is connected to a 600 V source, Find the current in
- (a) The load (7 marks)
 - (b) The primary winding and (7 marks)
 - (c) The secondary winding (6 marks)

- END OF QUESTION -

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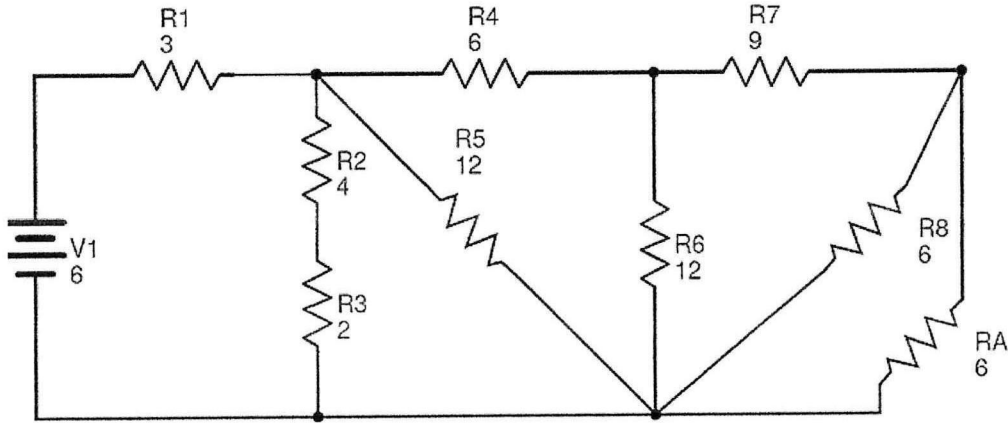


Figure Q1

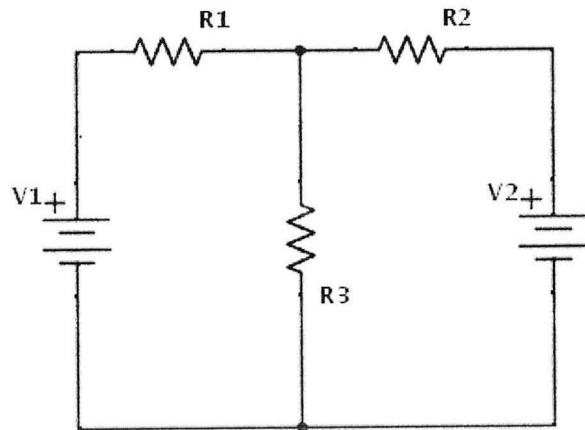


Figure Q2

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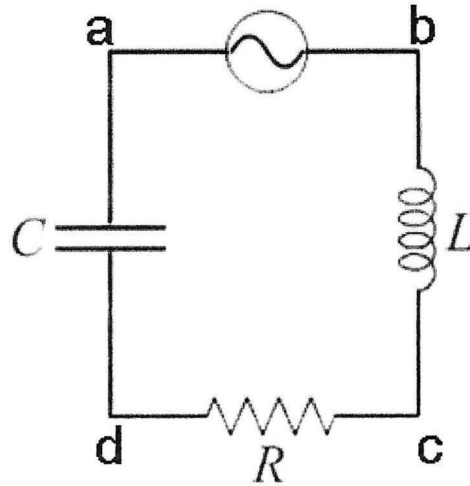


Figure Q4(b)

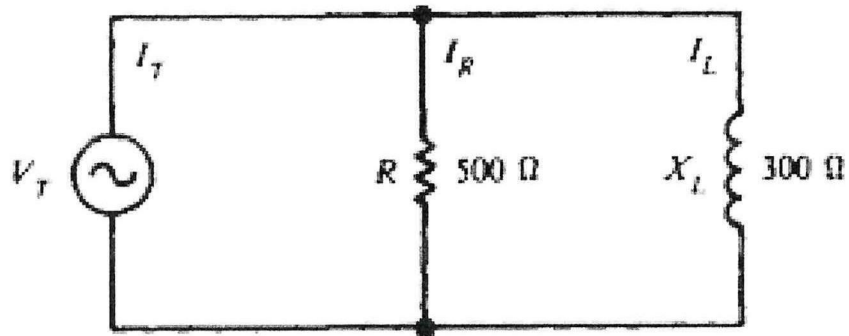


Figure Q5(a)

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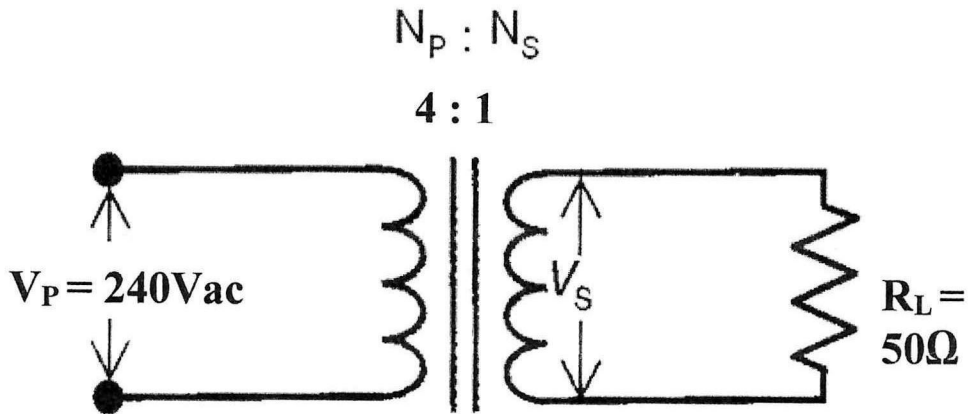


Figure Q6

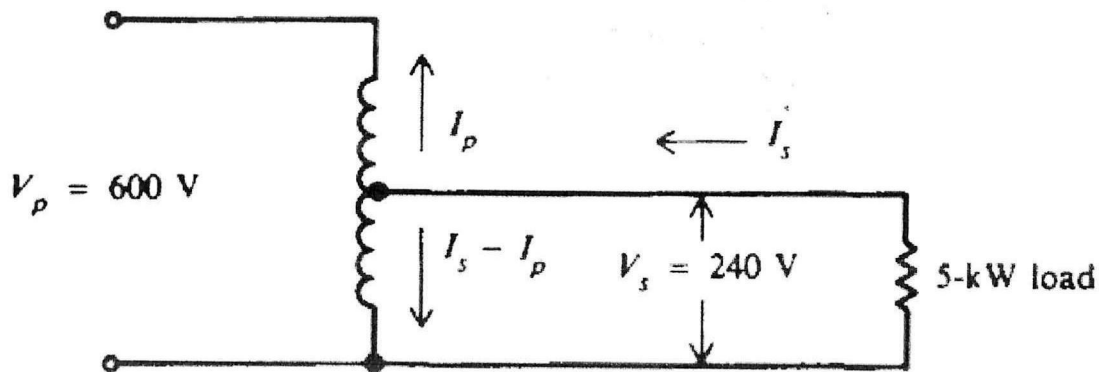


Figure Q7

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