



UTHM

Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION SEMESTER I SESSION 2022/2023

- COURSE NAME : BASIC ELECTRIC & ELECTRONIC
- COURSE CODE : DAM 13503
- PROGRAMME CODE : DAM
- EXAMINATION DATE : FEBRUARY 2023
- DURATION : 3 HOURS
- INSTRUCTIONS :
1. ANSWER ALL QUESTIONS
 2. THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSED BOOK**.
 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF SEVEN (7) PAGES

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- Q1** (a) Refer to **Figure Q1 (a)**, show all the calculation to find the value for;
- (i) Total resistance R_T (5 marks)
 - (ii) The voltage drop across resistance R_4 (V_{R4}) (5 marks)
- (b) Refer to **Figure Q1 (b)**. Given $V_A = 58V$, $V_B = 10V$, $R_1 = 4\Omega$, $R_3 = 3\Omega$, and $R_2 = 2\Omega$. By using mesh current method;
- (i) Find I_1 and I_2 (7 marks)
 - (ii) Find voltage drop in R_1 , R_2 , and R_3 . (3 marks)
- Q2** (a) Explain the **Three (3)** types of magnetic materials. (6 marks)
- (b) Describe the action that takes place when two like poles and when two, unlike poles, are placed near each other. Use diagrams to explain your answer. (4 marks)
- (c) **Figure Q2 (c)** shows a magnetic circuit has a 12-V battery connected to a 50 Ω coil of 600 turns with an iron core of 20 cm in length. Calculate;
- (i) Magnetomotive force, mmf (3 marks)
 - (ii) Field intensity, H (2 marks)
 - (iii) Flux density B in core with μ_r of 600 (3 marks)
 - (iv) The total flux Φ at each pole with an area of 5 cm² (2 marks)

- Q3** (a) Draw schematic diagrams of how a capacitor charges and discharges. Then, briefly describe how it functions. (5 marks)
- (b) For the filter circuit of **Figure Q3 (b)** Resistor-Inductor-Capacitor (RLC) circuit with load resistor (R_{load}) of $50k\Omega$, toroidal core power choke coil inductor of $45mH$, and has resistance about 0Ω . In the application, create a band pass filter with cutoff frequencies of 25 and 23 kHz.
- (i) Compute series resonance frequency. (2 marks)
- (ii) Compute the value of the capacitor in relation to the resonance frequency. (6 marks)
- (iii) Compute the equivalent series resistance using the quality factor and bandwidth. (5 marks)
- (iv) Clearly define the potential value for R_{out} with all variables generated. (2 marks)
- Q4** (a) With the aid of diagram, explain the peak value and peak to peak in sine wave for voltage or current. (5 marks)
- (b) A sine wave voltage varies from zero to a maximum of 110 kV. Determine the instantaneous value of a sine-wave voltage at angles 25° , 45° , 90° , 180° , and 240° ? (5 marks)
- (c) State **Three (3)** types of nonsinusoidal wave and explain its use in application circuit. Sketch **Two (2)** of the wave stated from your answer (7 marks)
- (d) If a sine wave has a peak value of $50V$, calculate;
- (i) The root mean square value, RMS. (1 mark)
- (ii) The average value. (1 mark)
- (iii) Peak to peak value. (1 mark)

- Q5** (a) A transformer consists of two winding electrically insulated from each other and wound upon a common core. Explain briefly these two windings. (2 marks)
- (b) A filament transformer reduces the 240 V in the primary to 12 V on the secondary. If there are 200 turns on the primary and 20 turns on the secondary, find the voltage ratio and turns ratio. (4 marks)
- (c) The step-down autotransformer at a power factor of unity is designed to deliver 120 V to a load of 3 kW as shown in **Figure Q5 (c)**. The autotransformer's primary winding is connected to a 400 V source. Calculate:
- (i) Current in load. (2 marks)
 - (ii) Current in the primary winding. (2 marks)
 - (iii) Current in the secondary winding. (1 mark)
- (d) A step-down transformer with a turns ratio of 2500:500 has its primary connected to a 120 V transmission line. If the secondary is connected to a 12Ω load, calculate:
- (i) Secondary Voltage, V_s (3 marks)
 - (ii) Secondary Current, I_s (2 marks)
 - (iii) Primary Current, I_p (2 marks)
 - (iv) Secondary Power, P_s (2 marks)

-END OF QUESTIONS -

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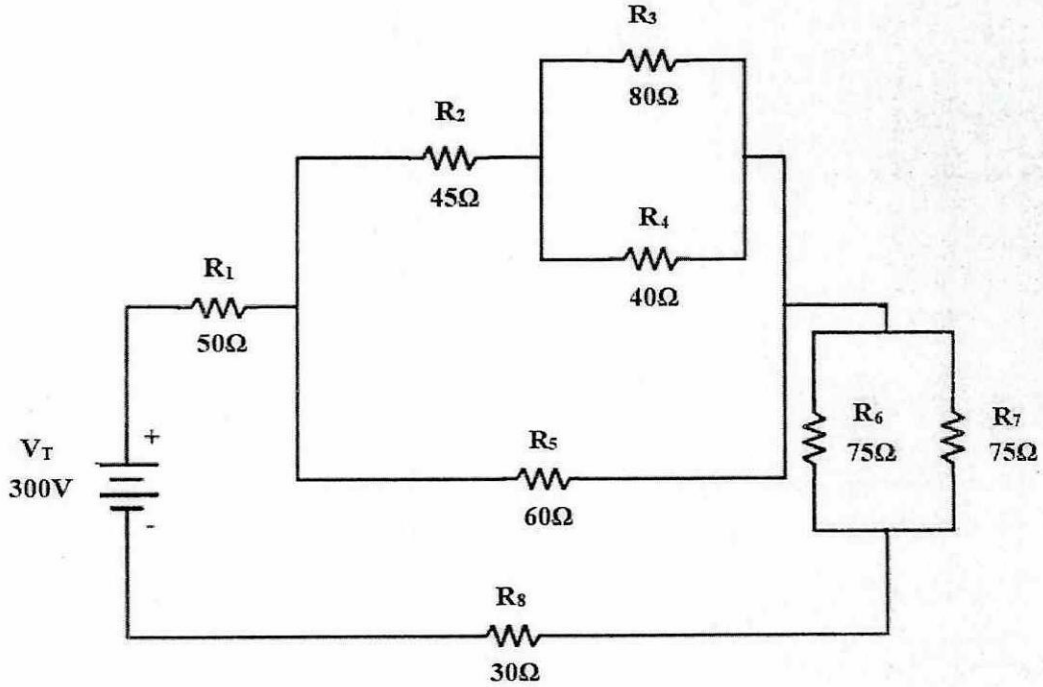


Figure Q1 (a)

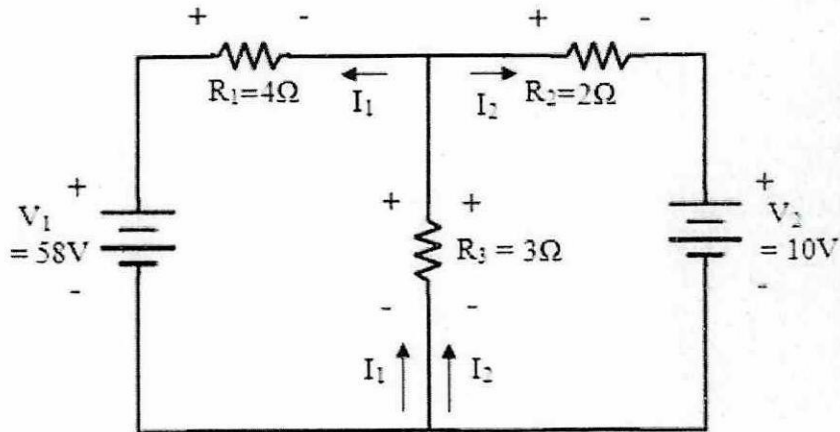


Figure Q1 (b)

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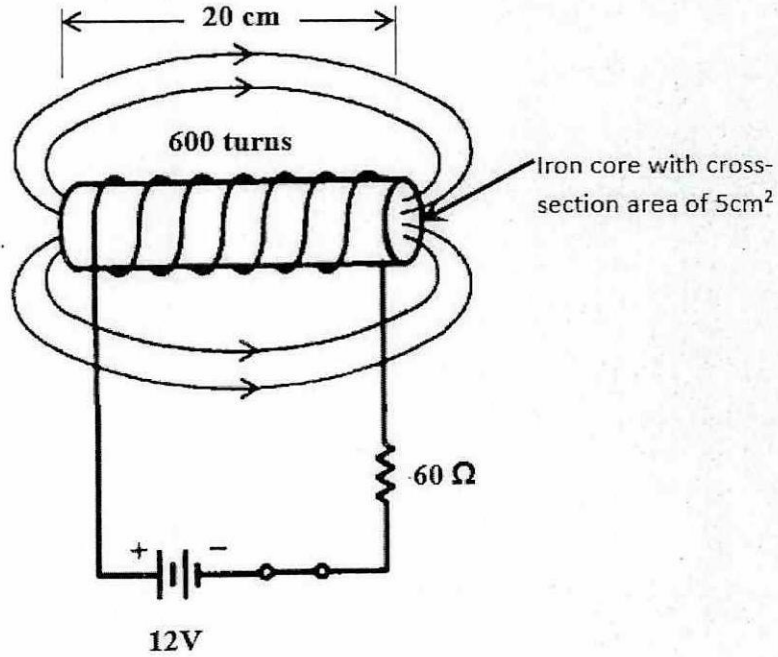


Figure Q2 (c)

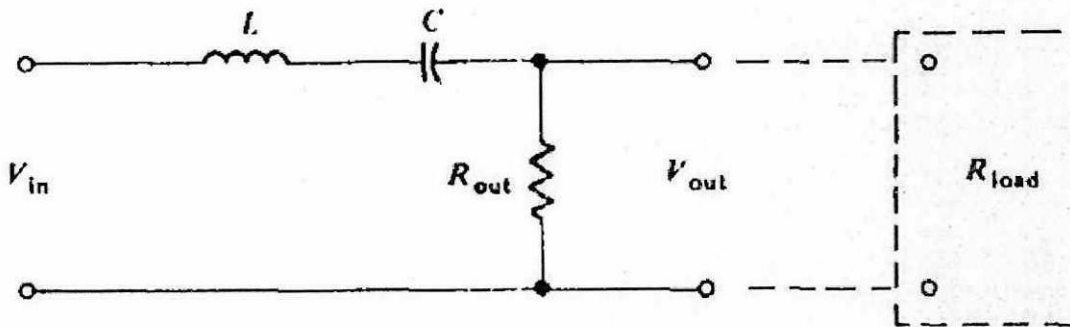


Figure Q3 (b)

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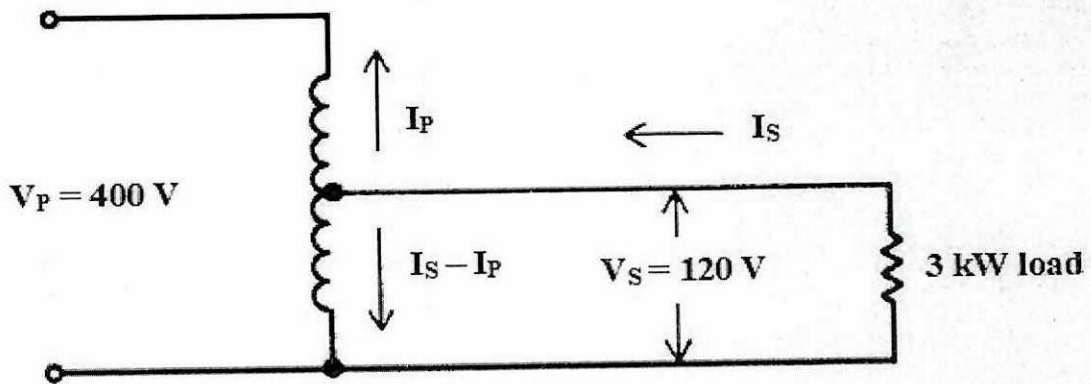


Figure Q5 (c)