



UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF CHEMICAL AND BIO-ENGINEERING TECHNOLOGY

FINAL EXAMINATION
OCTOBER 2025 SEMESTER

COURSE CODE : CLB10402
COURSE TITLE : FUNDAMENTALS OF ELECTRICAL & ELECTRONICS
PROGRAMME NAME : TECHNICAL FOUNDATION - BACHELOR
DATE : 28 JANUARY 2026
TIME : 2:00PM - 4:00PM
DURATION : 2 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consist of TWO sections.
4. Answer ALL questions for Section A.
5. Section B consist of four questions. Answer THREE (3) questions only.
6. Please write your answer on the answer booklet provided.
7. Please answer all questions in English only.
8. Please answer MCQ/EMQ questions using OMR sheet. ☐ *Tick if applicable*
9. Refer to the attached Formula/ Appendies. ☐ *Tick if applicable*

THERE ARE 10 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 40 marks)

Answer ALL questions.

Please use the answer booklet provided.

Question 1

Answer the following questions:

- (a) Describe **five** safe work practices to reduce the risk of injury or fire when working with electrical equipment.

(10 marks)

- (b) The severity of electrical shock depends on several factors. Briefly explain three of those factors.

(3 marks)

- (c) Name the direction/indicator of three fingers from Fleming's Left-Hand Rule in the figure below.

Refer Below - Figure1 : Left-hand Fleming Rule .

(3 marks)

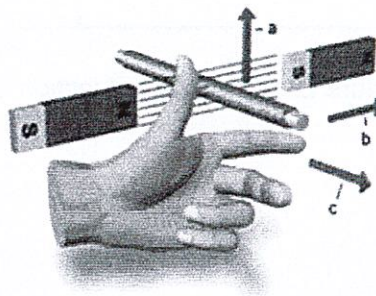
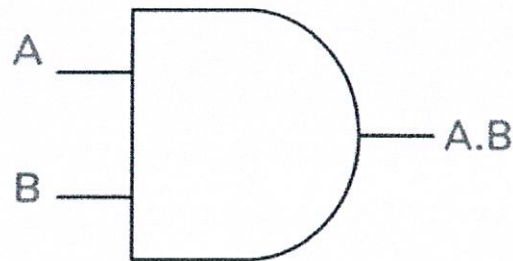


Figure 1: Left-hand Fleming Rule

- (d) In digital electronics, **boolean function** is a fundamental concept that defines the logical and mathematical relationship between input binary variables and binary result. Identify the truth table for the function below.

Refer Below - Figure2 : The Boolean function .

(4 marks)



Truth Table

A (Input 1)	B (Input 2)	X = (A.B)

Figure 2: The Boolean function

Question 2

In electrical and electronics systems and their applications, several factors need to be identified.

- (a) Determine the **four** major elements in the electrical system in the figure below.
Refer Below - Figure3 : Element in electrical system .

(4 marks)

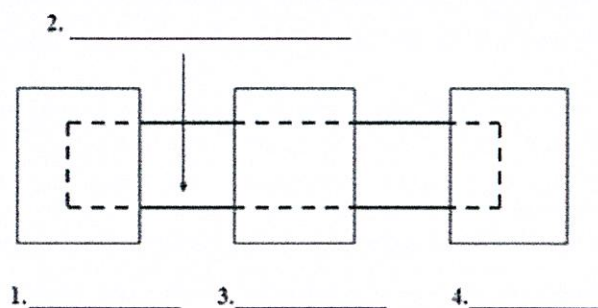


Figure 3: Element in electrical system

- (b) Determine **four** applications of the capacitor in the electrical and electronics industry.
(8 marks)
- (c) In the figure shown below, determine the requirement of:
Refer Below - Figure4 : DC Circuit Diagram .

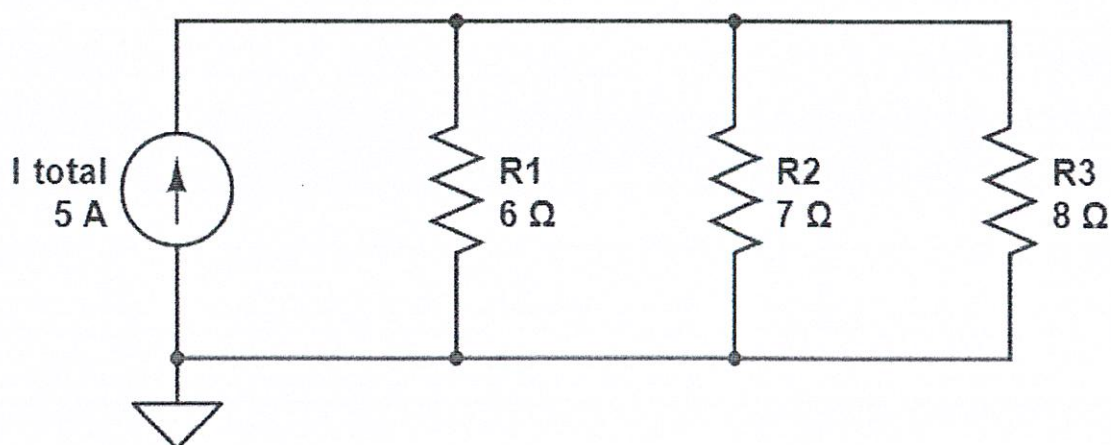


Figure 4: DC Circuit Diagram

- i. Identify the suitable rule/formula to be applied.

(2 marks)

- ii. Calculate the current (I) through the resistors R_1 , R_2 and R_3 .

(6 marks)

SECTION B (Total: 60 marks)

Answer THREE (3) questions only.

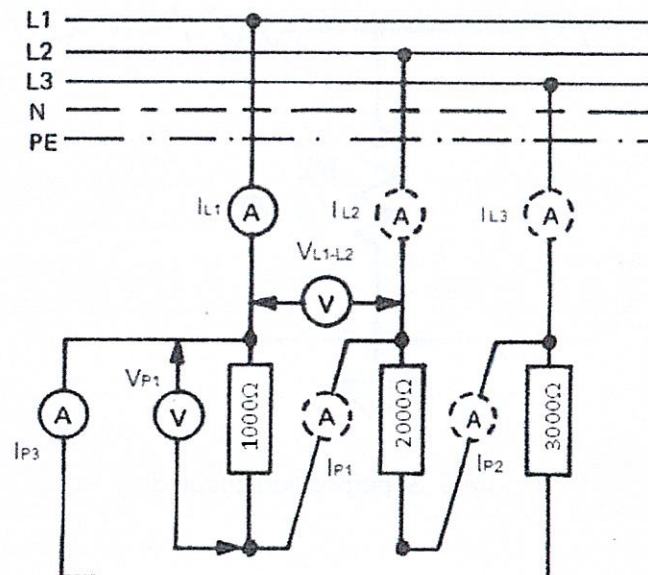
Please use the answer booklet provided.

Question 1

The connection of the three-phase AC circuit has been established as shown in Figure 5. By using a voltmeter, the reading of V_{LL} is 430 V. Calculate the value of I_{LINE} , V_{PHASE} , I_{PHASE} , and P_{PHASE} of the circuit for L1, L2, and L3 in the table below. (Please show the methods of calculation.)

Refer Below - Figure5 : 3 Phase circuit diagram .

(20 marks)



	V_{LL} (V)		I Line (A)	V Phase (V)	I Phase (A)	P Phase (W)
L1 – L2	430	L1				
L2 – L3	430	L2				
L3 – L1	430	L3				

Figure 5: 3 Phase circuit diagram

Question 2

By using the superposition theorem in the figure below:

- (a) Define the superposition theorem in electrical engineering.

(2 marks)

- (b) Calculate the current (I) at each branch of I_1 , I_2 and I_{34} .

Refer Below - Figure6 : Superposition circuit diagram .

(18 marks)

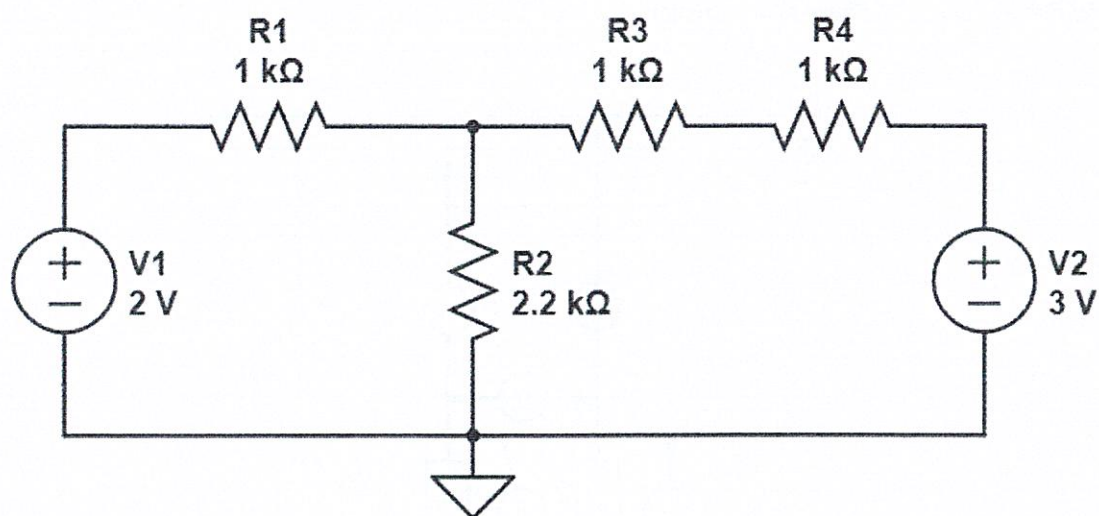


Figure 6: Superposition circuit diagram

Question 3

In AC circuit analysis, **RLC** refers to a circuit containing a **Resistor (R)**, an **Inductor (L)**, and a **Capacitor (C)**.

- (a) A series of RLC circuits containing a resistance of 12Ω , an inductance of 0.15H , and a capacitor of $100\mu\text{F}$ are connected in series with a 100V , 50Hz supply voltage. Determine:
- i. Illustrate the circuit diagram
(2 marks)
 - ii. The total circuit impedance, Z .
(5 marks)
 - iii. The type of this circuit
(2 marks)
 - iv. The total current, I_T .
(2 marks)
 - v. Voltage across the resistor, V_R .
(2 marks)
 - vi. Voltage across the capacitor, V_C .
(2 marks)
 - vii. Voltage across the inductor, V_L .
(2 marks)
- (b) A long coil of 400 turns is wound uniformly over a wooden ring having a length of 800 mm and a uniform cross-sectional area of 0.005 m^2 . If the current through the coil is 6.0 A . Calculate:
- i. The flux density, β .
(2 marks)
 - ii. The total flux, Φ .
(1 marks)

Question 4

Determine the circuit theorem below:

- (a) By using the Kirchhoff's law,
Refer Below - Figure7 : DC Circuit Diagram .

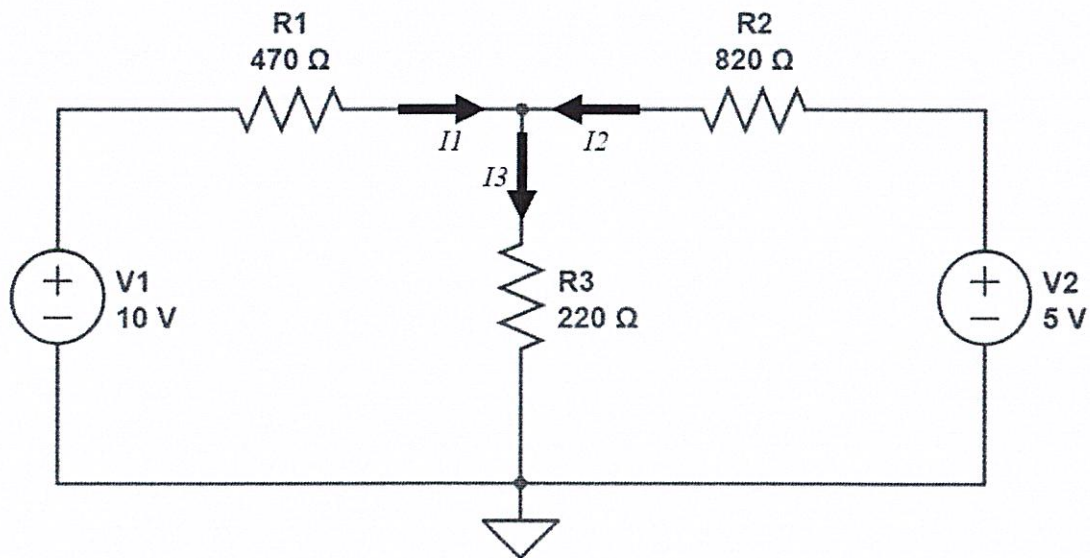


Figure 7: DC Circuit Diagram

- i. Identify the suitable DC circuit method/analysis to perform the calculation of current at each branch. (1 marks)
 - ii. Calculate the current flow through each resistor of R_1 , R_2 and R_3 . (9 marks)
- (b) Electrical motor and magnetism is a part of electrical system.
- i. Explain five properties of magnetic flux (5 marks)
 - ii. The figure below shows the internal structure of the DC motor. List four major components of the DC motor and how to differentiate between DC and AC motors. (5 marks)
Refer Below - Figure8 : The DC motor .

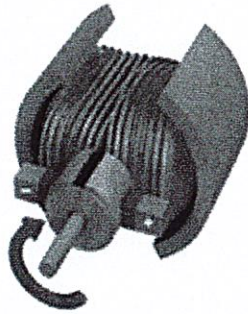


Figure 8: The DC motor

END OF EXAMINATION PAPER

FORMULAE

1. $L = \mu_o N^2 \frac{A}{l}$, self inductance

$$\mu_o = 4\pi \times 10^{-7}$$

2. $L = \frac{N\Phi}{I}$ inductance

3. $M = \frac{\pi\mu_o N_S N_P r_S^2}{2r_P}$, mutual inductance

4. $M = k\sqrt{L_P L_S}$, mutual inductance

5. $V_{emf} = -L \frac{di}{dt}$

6. $\Phi = BA$ flux

7. $B = \mu_o \frac{I}{2\pi r}$ for current flow

8. $B = \mu_o \frac{I}{2r}$ for short coil

9. $B = \mu_o \frac{NI}{l}$ for long coil

10. $H = \frac{NI}{l}$, field intensity

11. $V_X = \frac{R_X}{R_{eq}} (V_T)$, voltage divider

12. $I_X = \frac{R_{opposite}}{R_{eq}} (I_T)$, current divider

13. $Z = \sqrt{R^2 + (X_L - X_C)^2}$

14. $I_T = \sqrt{I_R^2 + (I_C - I_L)^2}$

