UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF CHEMICAL & BIOENGINEERING TECHNOLOGY

FINAL EXAMINATION
OCTOBER 2025 SEMESTER

COURSE CODE	:	CLD 20102
COURSE NAME	:	ELECTRICAL TECHNOLOGY
PROGRAMME NAME	:	DIPLOMA
DATE	:	28 JANUARY 2026
TIME	:	9.00 AM – 11.00 AM
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 consists of TWO sections.
4. Section A consist total of 60 marks. Answer ALL questions.
5. Section B consist of three questions. Answer TWO (2) questions only.
6. Please write your answer in the answer booklet provided.
7. Please answer all questions in English only.
8. Refer to the attached Formula/appendix.

THERE ARE 9 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

The circuit shown in Figure 1 has been connected to single phase power supply. The input voltage, V_S are adjusted to 120 V_{ac}, with frequency, f = 50 Hz. Calculate the total current, I_S.

(20 marks)

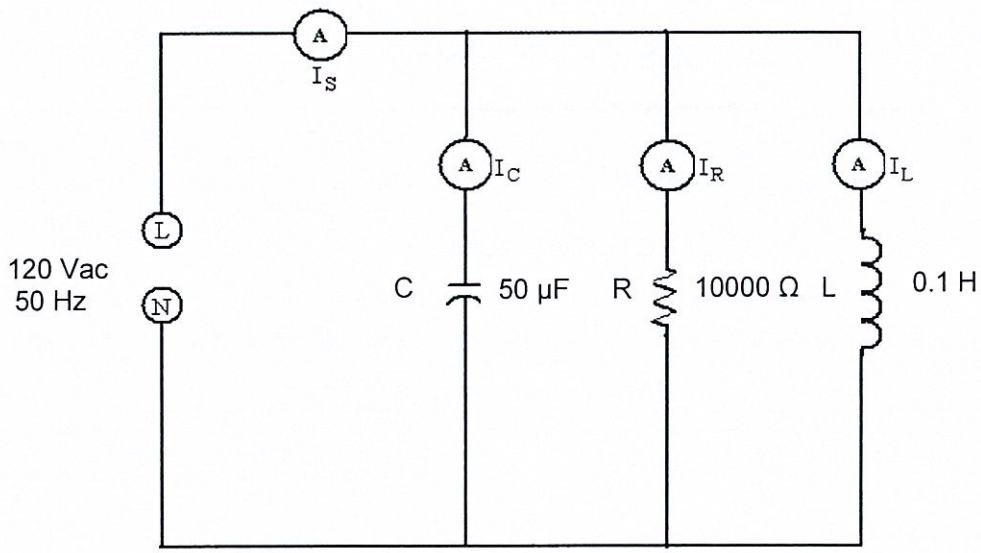

Figure 1 RLC Circuit in Parallel

Question 2

(a) List two sources of the magnetic field.

(4 marks)

(b) Describe two changes that can be made to the magnetic field environment to induce voltage.

(4 marks)

(c) List two factors that contribute to the strength of the magnetic field.

(4 marks)

(d) Explain how a capacitor works.

(4 marks)

(e) Explain two applications for electrolytic capacitors.

(4 marks)

Question 3

(a) Explain two differences between a fuse and a circuit breaker.

(4 marks)

(b) Explain two basic rules of electricity.

(4 marks)

(c) Describe two practices that should be followed by laboratory workers that may reduce the risk of injury or fire when working with electrical equipment.

(4 marks)

(d) An overloaded circuit is a significant source of potential house fires. Explain two possible causes due to which overloading may occur.

(4 marks)

(e) List two components in a circuit breaker.

(4 marks)

SECTION B (Total: 40 marks)

INSTRUCTION: Answer TWO questions only.

Please use the answer booklet provided.

Question 4

(a) Figure 2 shows a 60 μF capacitor connected in series with two capacitors, 20 μF and 100 μF respectively, which are connected in parallel.

i. Determine the capacitance of the combination, C_T. (4 marks)

ii. Determine the total charge, Q_T. (2 marks)

iii. Determine the charge, Q at C_3. (6 marks)

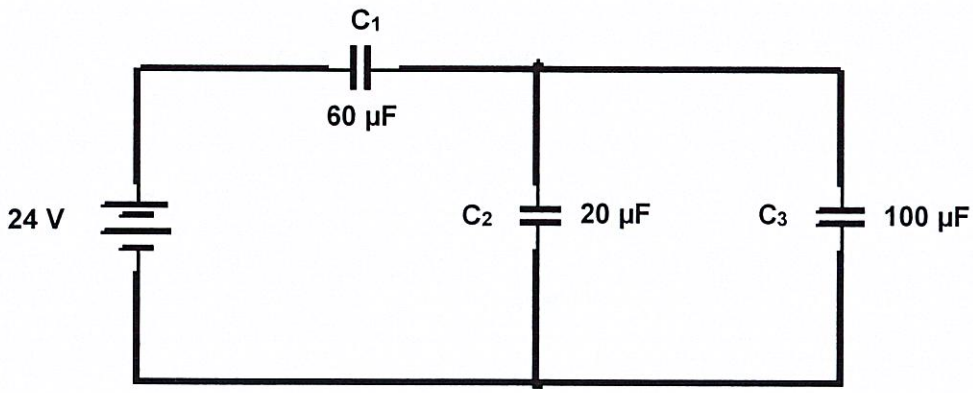

Figure 2 Capacitors in Series and Parallel

(b) Calculate the voltage drop, V at R_4, 8 kΩ resistor from Figure 3.

(8 marks)

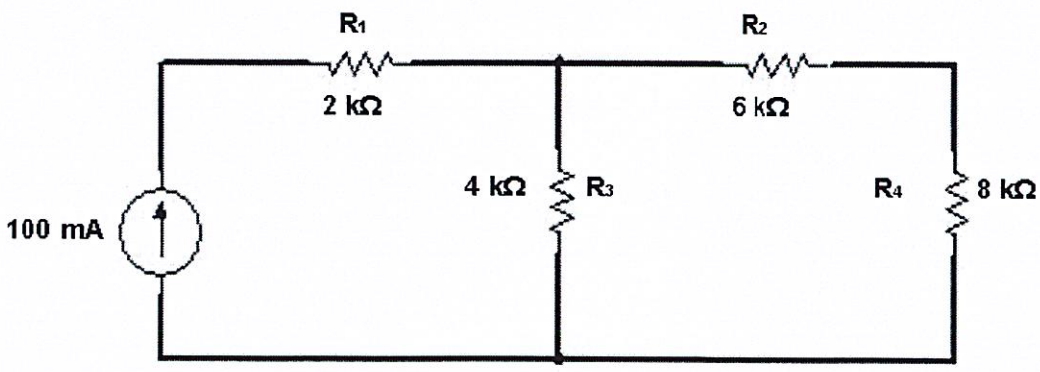

Figure 3 DC Circuit

Question 5

(a) In a three-phase delta connection system, the line voltage is 415 V. The non-inductive loads of 50 W, 150 W, and 200 W are connected between the three-line conductors as shown in Figure 4. Calculate:

i. The phase voltage, V_{P1}. (2 marks)

ii. The line current, I_{L2}. (4 marks)

iii. The phase current, I_{P3}. (3 marks)

iv. The load resistance, R_1. (6 marks)

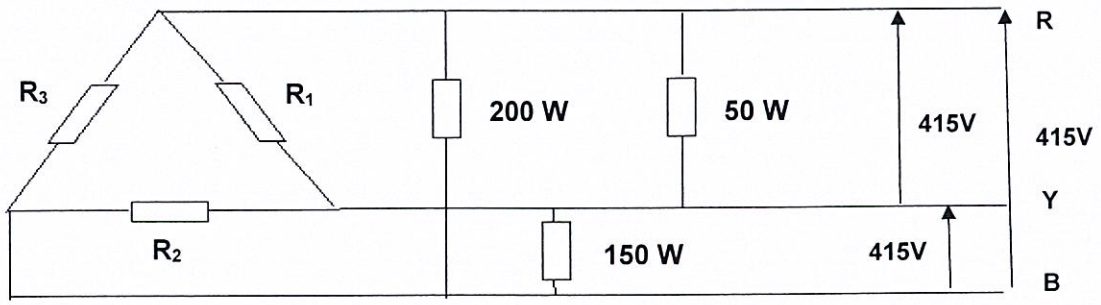

Figure 4 Delta Connection

(b) Two circular flat coils are co-axial as shown in Figure 5. The smaller (secondary) coil has 25 turns and is 20 mm in diameter. The larger (primary) coil has 200 turns and a diameter of 40 mm. Calculate the mutual inductance, M of the two coils. Assuming the magnetic field of the primary coil is uniform through the secondary coil.

(5 marks)

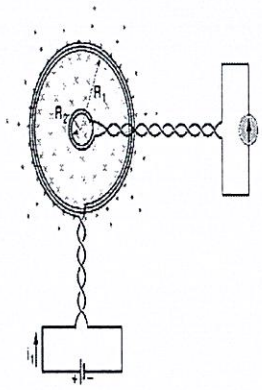

Figure 5 Circular Flat Coils

Question 6

(a) A flux of 0.5mWb is produced in a coil of 900 turns wound on a wooden ring by a current of 3A. Calculate:

i. The inductance of the coil, L.

(4 marks)

ii. The average e.m.f, V_{emf} induced in the coil when a current of 3A is switched off, assuming the current to fall to zero in 1 ms.

(4 marks)

iii. The mutual inductance, M between the coils, if a second coil of 600 turns with 80% efficiency was wound over the first coil.

(6 marks)

(b) Figure 6 shows the direction of current flow through a solenoid.

i. Identify the polarity (N and S) of the solenoid.

(2 marks)

ii. Sketch the direction of the magnetic field for the solenoid.

(4 marks)

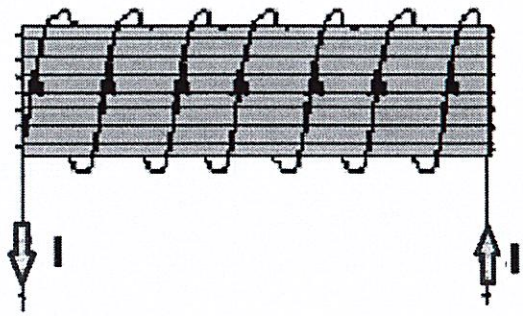

Figure 6 Solenoid

END OF EXAMINATION

FORMULAE

1. $L = \mu_o N^2 \frac{A}{l}$, self-inductance
   $\mu_O = 4\pi \times 10^{-7}$

2. $L = \frac{N\Phi}{I}$, self-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. $V_{emf} = -L\frac{di}{dt}$, induced voltage

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. $S = \frac{NI}{\Phi}$, reluctance

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

13. $I_x = \frac{R_{eq}}{R_x}(I_{source})$, current divider

14. $Z = \sqrt{R^2 + (X_L - X_C)^2}$, total impedance

15. $I_T = \sqrt{I_R^2 + (I_C - I_L)^2}$, total current

16. $X_L = 2\pi fL$, inductive reactance

17. $X_C = \frac{1}{2\pi f C}$, capacitive reactance

18. $I_L = I_P$, star connection
    $V_L = 1.73V_P$

19. $V_L = V_P$, delta connection
    $I_L = 1.73I_P$