CONFIDENTIAL

UNIVERSITI KUALA LUMPUR
Malaysian Institute of Marine Engineering Technology

FINAL EXAMINATION

JULY 2025 SEMESTER SESSION

SUBJECT CODE	:	**LED11603**
SUBJECT TITLE	:	**INTRODUCTION TO ELECTRICAL AND ELECTRONICS**
PROGRAMME NAME (FOR MPU: PROGRAMME LEVEL)	:	**DIPLOMA OF ENGINEERING TECHNOLOGY IN ELECTRICAL AND ELECTRONICS (MARINE)**
TIME / DURATION	:	**09.00 AM - 12.00 PM (3 HOURS)**
DATE	:	**22 DECEMBER 2025**

INSTRUCTIONS TO CANDIDATES

1. Please read **CAREFULLY** the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of **TWO (2)** sections; Section A and Section B.
4. Answer **ALL** questions in Section A, and **TWO (2)** questions **ONLY** in Section B.
5. Please write your answers on this answer booklet provided.
6. Answer **ALL** questions in English language **ONLY**.

THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

With reference to Basic Electricity and Electronics:

(a) Illustrate the Bohr atomic structure.

(5 marks)

(b) List the **FOUR (4)** best conductors.

(4 marks)

(c) State **THREE (3)** facts charging by induction.

(6 marks)

(d) Define the capacitance.

(2 marks)

(e) List the **THREE (3)** common electrical insulators.

(3 marks)

Question 2

With reference to Magnetism and Electromagnetism:

(a) Describe the magnetic poles of a bar magnet.

(4 marks)

(b) State the **THREE (3)** differences between bar magnets and solenoids.

(6 marks)

(c) Describe the electromagnet and give **ONE (1)** example.

(4 marks)

(d) Explain the concept of attractive and repulsive forces in a magnet.

(6 marks)

Question 3

With reference to Introduction to Semiconductors:

(a) Name **TWO (2)** most widely used semiconductive materials.

(4 marks)

(b) State the number of valence electrons of a conductor such as copper.

(2 marks)

(c) Illustrate the covalent bonds in silicon.

(4 marks)

(d) State the majority of current carriers in an N-type and P-type semiconductor.

(2 marks)

(e) Explain the structure of NPN Bipolar Junction Transistor (BJT).

(8 marks)

SECTION B (Total: 40 marks)

INSTRUCTION: Answer TWO (2) questions ONLY.
Please use the answer booklet provided.

Question 4

With reference to Basic Electricity and Electronics:

(a) Find R_{ab} for the circuit in Figure 1.

(6 marks)

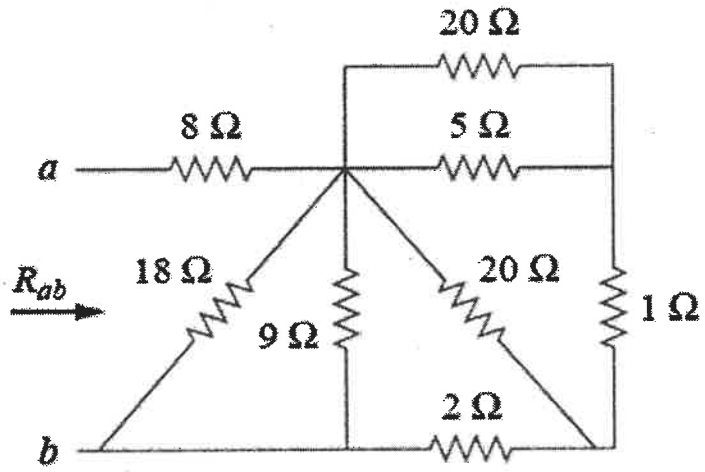

Figure 1

(b) Refer to the circuit shown in Figure 2, answers the following questions:

i. Determine v_1 and v_2.

(6 marks)

ii. Calculate i_1 and i_2.

(4 marks)

iii. Find the power dissipated in the 12Ω and 40Ω resistors.

(4 marks)

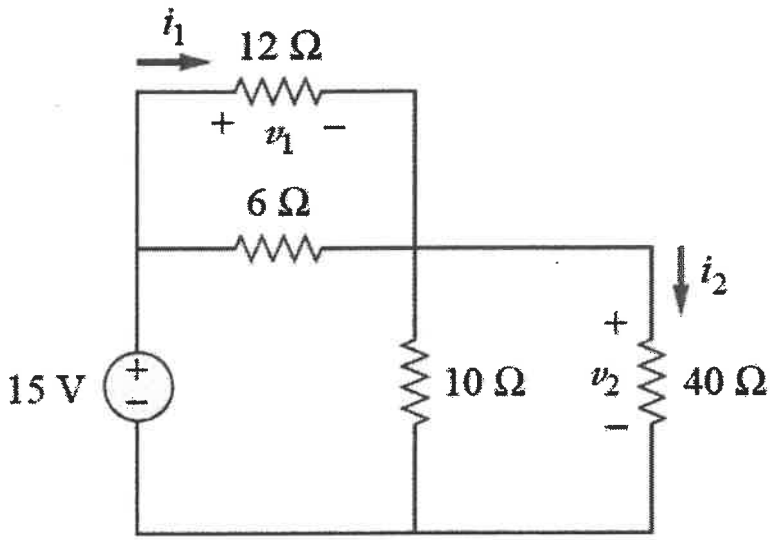

Figure 2

Question 5

With reference to Introduction to Semiconductor:

(a) Determine V_{CE}, V_{BE} and V_{CB} in circuit Figure 3. Given $\beta_{DC} = 100$.

(10 mark)

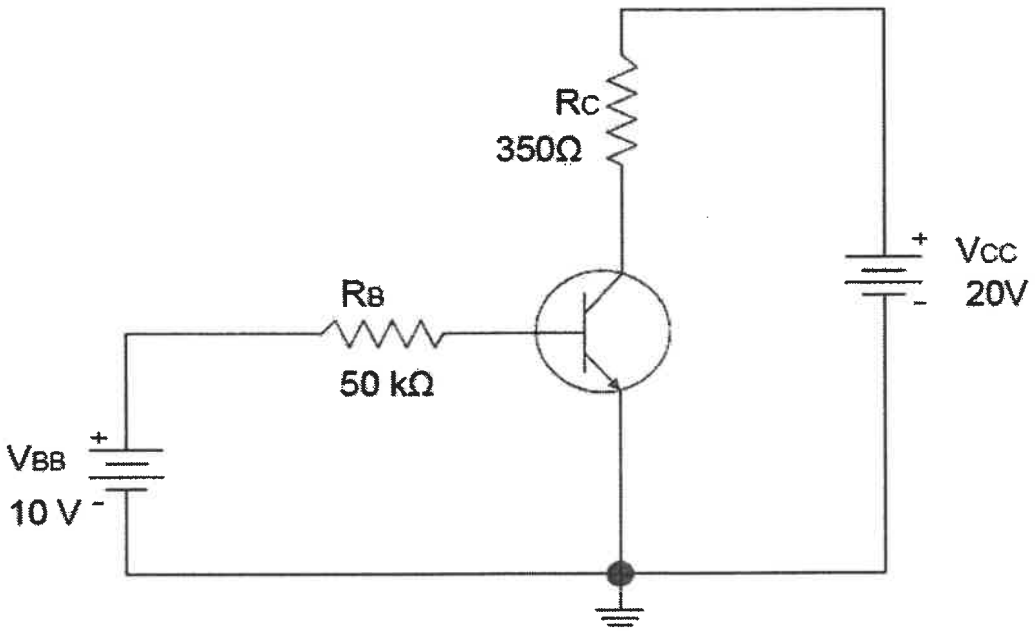

Figure 3

(b) Determine whether or not the transistors in Figure 3 are saturated by assuming $V_{CE} = 0.2V$ if the transistor is already saturated.

(5 marks)

(c) Determine the diode's forward voltage and forward current in Figure 4, assuming the ideal model.

(5 marks)

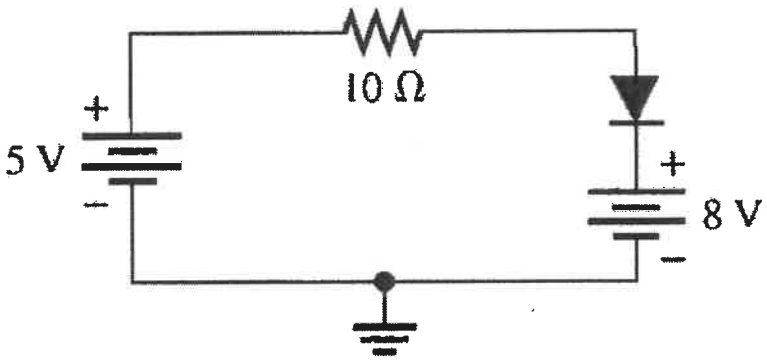

Figure 4

Question 6

With reference to Boolean Algebra and Logic Simplification:

(a) Determine a truth table for the following standard SOP expression:

$$X = ABC + \bar{A}\bar{B}C + AB\bar{C}$$

(5 marks)

(b) Use a Karnaugh map to find the minimum POS form for the following expression:

$$(A + B + C)(\bar{A} + \bar{B} + \bar{C})(A + \bar{B} + C)$$

(5 marks)

(c) Determine a logic circuit for the following logic expression using AND gates, OR gates, and inverters as needed:

$$X = \overline{ABC} + B(EF + \bar{G})$$

(10 marks)

END OF EXAMINATION PAPER

LIST OF FORMULA

LED11603 INTRODUCTION TO ELECTRICAL & ELECTRONICS (V1)

RULES OF BOOLEAN ALGEBRA:

1. $A + 0 = A$
2. $A + 1 = 1$
3. $A \cdot 0 = 0$
4. $A \cdot 1 = 1$
5. $A + A = A$
6. $A + \bar{A} = 1$
7. $A \cdot A = A$
8. $A \cdot \bar{A} = 0$
9. $\bar{\bar{A}} = A$
10. $A + AB = A$
11. $A + \bar{A}B = A + B$
12. $(A + B)(A + C) = A + BC$

END OF THE LIST