UNIVERSITI KUALA LUMPUR
Malaysian Institute of Marine Engineering Technology

FINAL EXAMINATION

JULY 2025 SEMESTER SESSION (7-WEEK)

SUBJECT CODE : **LED30902**

SUBJECT TITLE : **SHIPBOARD ELECTRO-TECHNOLOGY**

PROGRAMME NAME : **DET IN SHIP DESIGN**
(FOR MPU: PROGRAMME LEVEL)

TIME / DURATION : **9.00 AM - 11.30 AM**
(2 HOURS 30 MINUTES)

DATE : **17 SEPTEMBER 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.

4. Answer **ALL** questions in Section A, and any **TWO (2)** from Section B.

5. Please write your answers on answer booklet provided.

6. Answer **ALL** questions in English language **ONLY**.

THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS COVER PAGE.

SECTION A (Total: 60 marks)

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

Question 1 (CLO 1)

With reference to basic electronic system, circuit, components and units.

(a)   Electronic components are the elements of the circuit which help in its functioning of the electrical circuit or system. State the function of a resistor used in an electronics circuit.

(2 marks)

(b)   Many resistors have their electrical resistance shown by a set of color codes, or "bands," imprinted around their circumference. A standard color code associates each color with a specific decimal digit (0 through 9). Relate each of the following digits with its respective colors shown in Table 1.

(10 marks)

Table 1.

Specific decimal digit	Standard color code
0 =	
1 =	
2 =	
3 =	
4 =	
5 =	
6 =	
7 =	
8 =	
9 =	

(c)   Determine the nominal resistance values of these resistors, with the given colors band. The answer should also express the allowable tolerance in ohms. .

  i. Red, Orange, Blue, Gold =

  ii. Brown, Black, Green, Silver =

  iii. Blue, Black, Brown, Gold =

  iv. Yellow, Violet, Red, Silver =

(8 marks)

Question 2 (CLO 2)

With reference to ship electrical and electronic system.

(a) A ship's electrical system is designed to provide a safe and reliable electrical environment for its operation. Explain the main elements of a marine distribution system on shipboard.

(6 marks)

(b) The electrical power on a ship is usually generated at 440V or 690V, depending on the size of the ship. Explain the Emergency Power Source for a ship.

(6 marks)

(c) On most ships there are separate diesel generators to provide electricity to the ships' systems. State the Kirchhoff Voltage Law (KVL) as fundamental to circuit analysis on ship equipment.

(8 marks)

Question 3 (CLO 2)

With reference to AC and DC motor loads.

(a) An AC motor can be single-phase or three-phase. The important parts of an AC motor are the stator and rotor. State the working principle of an AC motor.

(5 marks)

(b) List **THREE (3)** advantages of AC motors.

(6 marks)

(c) Determine the SI units for true power, reactive power, and apparent power for electrical circuit system.

(9 marks)

SECTION B (Total: 40 marks)

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

Question 4 (CLO 2)
With reference to Ohms Law

(a) A circuit consists of a 10 Ω resistor and a 20 Ω resistor in series connected to a 12 V battery. Calculate the followings:

    i.   the total resistance.

(3 marks)

    ii.   the total current flows in the circuit.

(3 marks)

    iii.   the voltage across each resistor.

(4 marks)

(b) With reference to Figure 1, there are sets of resistors connected in series and parallel. By using Ohm's Law, calculate the followings:

    i.   equivalent resistance across the terminal of the supply

(3 marks)

    ii.   total current supplied by the source,

(3 marks)

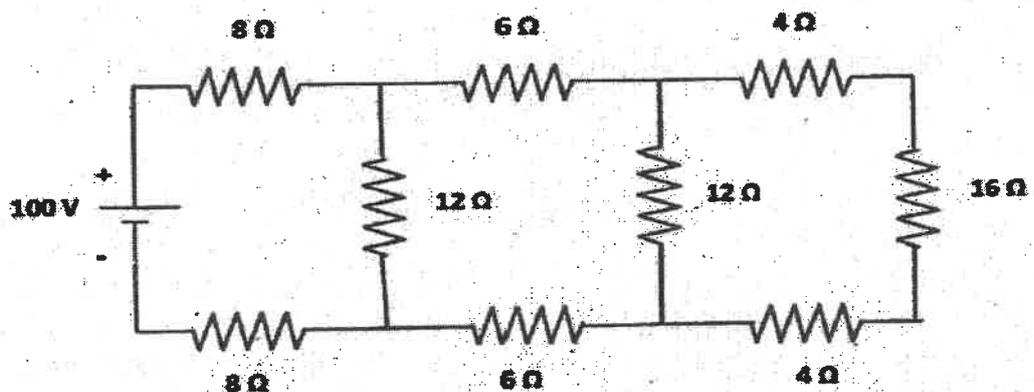   iii.   the power delivered to the 100V battery of the circuit.

(4 marks)

Figure 1.

Question 5 (CLO 2)

With respect to AC circuit single phase

(a) If an inductor with L = 250 mH, is connected to a voltage supply of 230 V with frequency of 50Hz, calculate the current flows in the circuit.

(5 marks)

(b) Assuming that a capacitor with C = 90 µF is connected to a voltage supply of 230 V with a frequency of 50 Hz, compute the current flows in the circuit.

(5 marks)

(c) A series RLC circuit as shown in Figure 2, containing a resistance of 12Ω, an inductance of 0.15H and a capacitor of 100uF are connected in series across a 100V, and its frequency of 50Hz supply. Calculate the followings:

    i.   total circuit impedance, Z in Ohms.

(3 marks)

    ii. the current flows in the circuits,

(3 marks)

    iii. Voltages across the Series RLC Circuit, V_R, V_L, V_C.
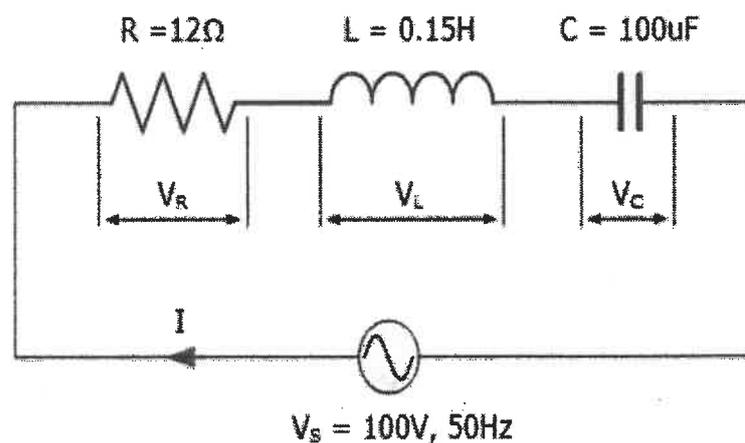
(4 marks)

Figure 2.

Question 6 (CLO 2)

With respect to power generation and distribution.

(a) Explain the main difference between a synchronous motor and an induction motor model.

(6 marks)

(b) An electric motor that is driven by an alternating current (AC) is known as an AC motor. If a motor operates at 230V with a current of 10A and a power factor of 0.8, compute the power of the motor.

(6 marks)

(c) For 3-phase AC motor has the output power of 1000W and its efficiency is 80%. Thus, calculate the input power of the motor.

(8 marks)

END OF EXAMINATION PAPER