CONFIDENTIAL

UNIVERSITI KUALA LUMPUR
Malaysian Institute of Marine Engineering Technology

FINAL EXAMINATION

FEBRUARY 2025 SEMESTER SESSION

SUBJECT CODE	:	**LMB31902**
SUBJECT TITLE	:	**MARINE ELECTROTECHNOLOGY 1**
PROGRAMME NAME (FOR MPU: PROGRAMME LEVEL)	:	**BACHELOR OF MARINE ENGINEERING TECHNOLOGY WITH HONOURS**
TIME / DURATION	:	**9.00 AM – 11.30 AM (2 HOURS 30 MINUTES)**
DATE	:	**24 JUNE 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. Answer **FOUR (4)** questions **ONLY**.
4. Please write your answers on the answer booklet provided.
5. Answer **ALL** questions in English language **ONLY**.
6. Answer should be written in blue or black ink except for sketching, graphic and illustrations.

THERE ARE 8 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

Total marks: 100

INSTRUCTION: Answer only FOUR (4) questions.
Please use the answer booklet provided.

Question 1

With reference to basic electrical safety

(a) Explain FIVE (5) causes of electrocution fatalities in the workshop area.

(10 marks)

(b) Basic personal protective equipment (PPE) is required on board ships to ensure the safety of the working crews. Explain FIVE (5) types of PPE that need to be worn in the working area based on safety requirements.

(15 marks)

Question 2

(With reference to AC circuit)

(a) Sine wave Electrical power on cargo ships is commonly generated at 440V. Using Figure 1 with a $R_1 = 10\Omega$,$X_L = 15\Omega$, $X_C = 12.5\Omega$ and ω =150 rad/s. Calculate the:

i. The frequency of the circuit

(3 marks)

ii. The value of inductor L

(3 marks)

iii. The value of capacitor C

(3 marks)

iv. The current

(3 marks)

v. Power factor

(3 marks)

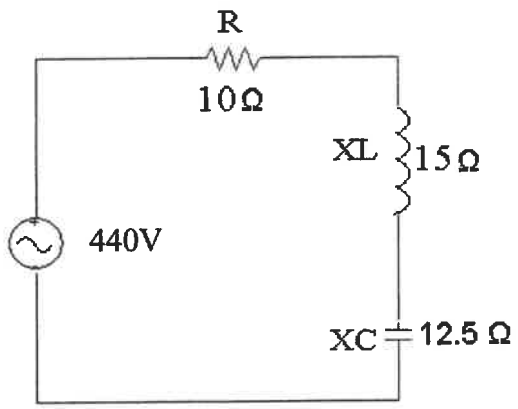


Figure 1

(a) A figure 2 circuit having a resistance of 20 Ω, an inductance of 0.3 H and a capacitance of 250μF in series are connected across a 240 V, 50 Hz supply. Calculate:

i. The inductive reactance (X_L),

(3 marks)

ii. The capacitive reactance (X_C),

(3 marks)

iii. The total impedance (Z),

(3 marks)

iv. The current flowing in the circuit (I_T),

(2 marks)

v. The voltages across the resistance (V_R), the inductance(V_L) and the capacitance(V_C),

(6 marks)

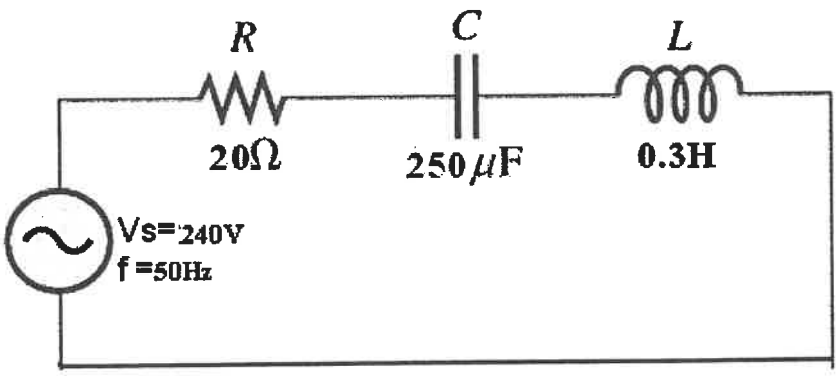


Figure 2

Question 3

With reference to the three-phase system

(a) Figure 3 shows the Delta-Delta system, calculates the:

i. Line voltage for source and load.

(4 marks)

ii. Phase voltage for source and load

(3 marks)

iii. Line current for source and load.

(3 marks)

iv. Phase current for source and load

(3 marks)

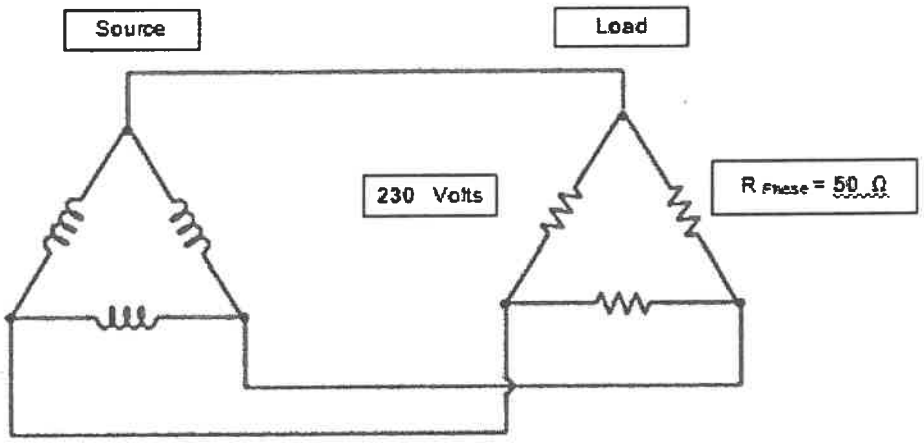


Figure 3

(b) Each phase coil of a wye-connected alternator generates an output of 120 V. The load connected to this three-phase alternator consists of three 10 Ω impedances connected in wye as shown in Figure 4. Each impedance has a power factor of 80 % lag. Determine the following:

i. Terminal voltage output of the alternator.

(3 marks)

i. Line current to the load bank

(3 marks)

ii. Three-phase power output of the alternator

(3 marks)

iii. Total kVA load on the alternator

(3 marks)

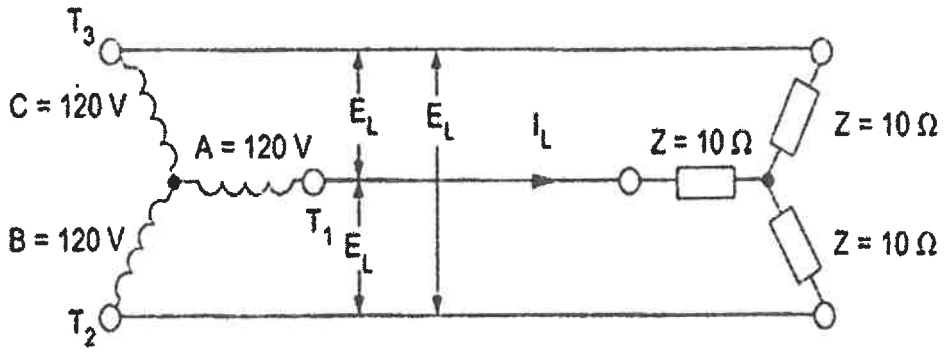


Figure 4

Question 4

With reference to power electronics

(a) Explain the operation of a single-phase full-wave uncontrolled rectifier with R load using the suitable circuit.

(9 marks)

(b) Sketch the waveform of the output voltage, V_O , input current $i_{D1\&D2}$ and voltage across the diode, $V_{D1\&D2}$ for the circuit in part (a). Use APPENDIX I.

(6 marks)

(c) The controlled single-phase full-wave rectifier circuit of Figure 4 has a resistive load with R = 50Ω and. The AC source is 120 V_{rms} at 60 H_z and the delay angle is 45^0 Determine:

i. The average load currents.

(4 marks)

ii. The RMS load current

(3 marks)

iii. The RMS source current

(3 marks)

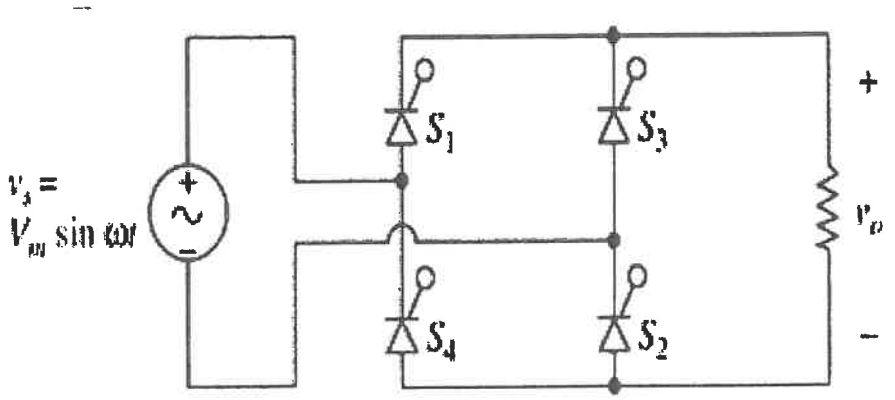


Figure 4

Question 5

With reference to high-voltage

(a) Explain FIVE (5) important requirements in the personnel protection rule to prevent accidentally touching live parts.

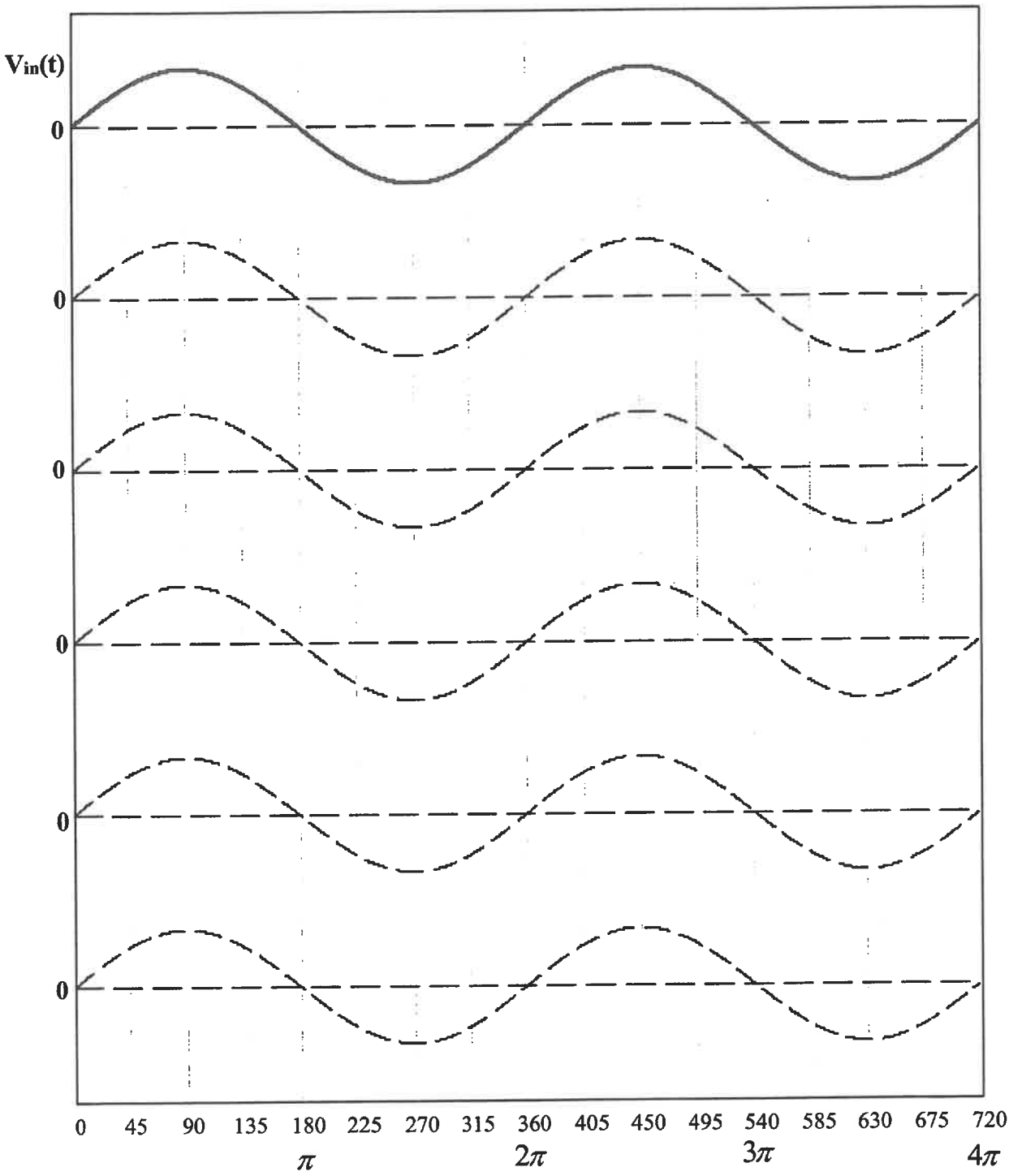
(15 marks)

(b) Explain FIVE (5) steps procedure to connect the IR tester to the circuit under test with safety earth connection ON.

(10 marks)

END OF EXAMINATION PAPER

APPENDIX I


Vin(t)
0
0
0
0
0
0
0 45 90 135 180 225 270 315 360 405 450 495 540 585 630 675 720
π
2π
3π
4π