



UNIVERSITI KUALA LUMPUR
Malaysian Institute of Marine Engineering Technology

FINAL EXAMINATION
JULY 2025 SEMESTER SESSION

SUBJECT CODE : LED21002

SUBJECT TITLE : ELECTRICAL POWER AND DISTRIBUTION

PROGRAMME NAME : DIPLOMA OF ENGINEERING TECHNOLOGY IN
(FOR MPU: PROGRAMME LEVEL) 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** question 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**.
 7. Write your answers **ONLY** in **BLACK** or **BLUE** ink.
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THERE ARE 4 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 - Electrical Power Distribution Boards and Electrical Equipment)**

- a) State **FIVE (5)** primary functions of a distribution board in an electrical power system.
(5 marks)
- b) Describe the differences between single-phase and three-phase distribution boards.
(5 marks)
- c) Explain the key marine environmental factors that can affect electrical devices onboard ships.
(5 marks)
- d) List **FIVE (5)** the electrical devices on vessels that comply with maritime safety standards.
(5 marks)

Question 2**(With Reference to - Power Distribution Boards)**

- (a) State the **FOUR (4)** main components of an electric power system.
(4 marks)
- (b) Sketch the simple diagram of a power system.
(3 marks)
- (c) Describe the purpose of a substation in a power system.
(5 marks)
- (d) List **EIGHT (8)** types of components of a distribution board (1 – 10) in the power system, as shown in Figure 1.
(8 marks)

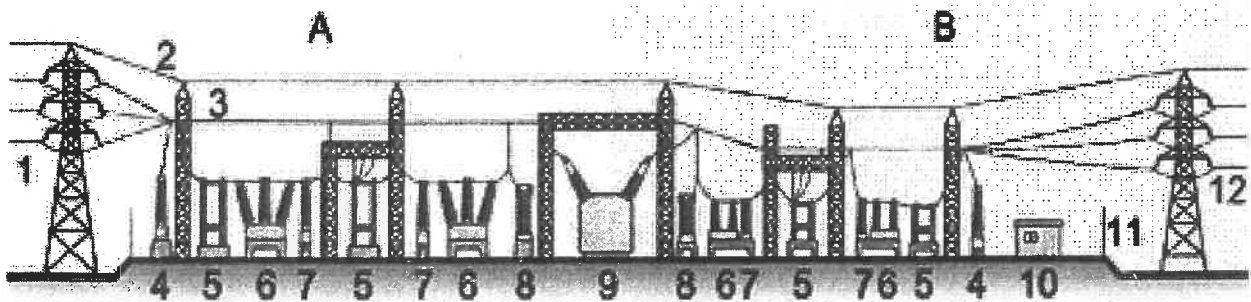


Figure 1

Question 3**(With Reference to - Electrical Devices for Power Distribution)**

- a) State the primary function of a transformer in a power distribution system. (3 marks)
- b) Explain the basic principle of a transformer and sketch the three main parts of a transformer. (6 marks)
- c) Calculate the voltage regulation of a synchronous generator with a no-load voltage of 550 V, a full-load voltage of 500 V, and operating at a lagging power factor of 0.9. (3 marks)
- d) A 150 kVA, 600 V/ 240 V, 50 Hz single-phase transformer has 30 turns on the secondary. Calculate:
- The approximate values of the primary and secondary currents. (4 marks)
 - Calculate the approximate number of primary turns. (2 marks)
 - The maximum values of flux. (2 marks)

SECTION B (Total: 40 marks)

INSTRUCTION: Answer TWO (2) questions only.

Please use the answer booklet provided.

Question 4

(With Reference to- Cables and Generator)

- a) Discuss the factors that influence the selection of cables in power systems. (4 marks)
- b) Brief the significance of cable insulation and the materials commonly used for insulation in power cables. (7 marks)
- c) A 400-V, 50 Hz, 30-hp, three-phase induction motor is drawing 40 A at 0.9 PF lagging. The stator copper losses are 1.5 kW, the rotor copper losses are 500 W, friction and windage losses are 400 W, core losses are 1200 W, and stray losses are negligible. Determine the following quantities:
- i. The air-gap power P_{AGP} (3 marks)
 - ii. The power converted P_{conv} . (2 marks)
 - iii. The output power P_{out} (2 marks)
 - iv. The efficiency of the motor. (2 marks)

Question 5

(With Reference to- Coupling, Load Sharing, and Changing Over Generators)

- a) Explain **TWO (2)** main types of coupling used in generator systems. (4 marks)
- b) Describes **TWO (2)** differences between the various synchronization methods in terms of speed and applications. (6 marks)
- c) Explain the significance of load sharing between generators. (5 marks)
- d) Identify common issues that can arise during generator coupling.

Question 6

(With Reference to- Synchronous Generator and Transformer)

a) A 100 kVA, 230-V, 60-Hz, 2-pole, Y-connected synchronous generator with a rated field current of 3 A was tested, and the following data was taken:

- From OC test – terminal voltage = 270 V at rated field current.
- From SC test – line current = 120 A at rated field current.
- From DC test – DC voltage of 5 V applied to two terminals, a current of 10 A was measured.

i. Calculate the speed of rotation in r/min.

(3 marks)

ii. Calculate the generated emf and the equivalent circuit parameters: X_s and R_a .

(10 marks)

b) A synchronous generator shows a no-load voltage of 600 V and full-load voltages of 580 V and 570 V at different loads. Calculate the voltage regulation for both full loads.

(7 marks)

End of Examination Paper