



**UNIVERSITI KUALA LUMPUR**  
**MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY**

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**FINAL EXAMINATION**  
**SEPTEMBER 2016 SEMESTER**

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**COURSE CODE** : LEB 40303

**COURSE NAME** : SHIP ELECTRICAL INSTALLATION

**PROGRAMME NAME** : BACHELOR OF MARINE ELECTRICAL ELECTRONICS  
(FOR MPU: PROGRAMME LEVEL) TECHNOLOGY

**DATE** : 17 JANUARY 2017

**TIME** : 9 AM

**DURATION** : 2 HOURS 30 MINUTES

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**INSTRUCTIONS TO CANDIDATES**

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1. Please **CAREFULLY** read 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** sections, Section A and Section B.
4. Answer **ALL** questions in Section A. For Section B, answer **THREE (3)** questions only.
5. Please write your answers on the answer booklet provided.
6. Answer all questions in English language **ONLY**.

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**THERE ARE 7 PAGES OF QUESTIONS, INCLUDING THIS PAGE.**

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**SECTION A (Total 40 marks)****INSTRUCTION: Answer ALL questions.****Please use the answer booklet provided.****Question 1**

- (a) Ships shall be designed, constructed and maintained in compliance with the structural, mechanical and electrical requirements of a classification society. Elaborate TWO (2) elements on the availability of the ship electrical installation in order to comply with the requirement by classification societies. **CLO 3**

(4 marks)

- (b) Explain the condition and important electrical equipment on board ship pertaining on normal operational and habitable condition. **CLO 2**

(5 marks)

- (c) Specify THREE (3) types of ship operational condition. **CLO 1**

(3 marks)

- (d) Generally the electrical equipment manufactured for shore based industries are not suitable for installation in marine environment. Specify the factors that contribute to this statement. **CLO 2**

(4 marks)

- (e) Control devices is one of the elements under ship's electrical power generation. Explain the function of this equipment. **CLO 3**

(4 marks)

## Question 2

- (a) Describe the ship electrical system. **CLO 1**

(6 marks)

- (b) Propulsion of the ship is one of the activities or operation that is concerned with maintaining steerage way and manoeuvrability of the ship. Specify FOUR (4) other activities that fall under this category. **CLO 2**

(4 marks)

- (c) Discuss the differences between the star connected three phase system and delta connected three phase system. **CLO 1**

(4 marks)

- (d) Determine TWO (2) types of voltage operate on each for the following equipment. **CLO 1**

i. Lighting

ii. Battery

(2 marks)

- (e) State TWO (2) conditions must be complied when the emergency source of electrical power is a generator. **CLO 3**

(4 marks)

**SECTION B (Total 60 marks)****INSTRUCTION: Answer THREE questions ONLY.****Please use the answer booklet provided.****Question 3****(a) Define**

- i. Primary essential services
- ii. Secondary essential services. **CLO 1**

**(4 marks)****(b) State FOUR (4) types of equipment for secondary essential services. CLO 1****(4 marks)****(c) Emergency electrical system must be independent from main electrical system. Elaborate your reasons. CLO 3****(2 marks)****(d) Explain the method of starting (driving) the generators on board ship. CLO 2****(4 marks)****(e) Many ship owners opt to install three generators on board ship in order to comply with International Maritime Regulation. Discuss the function of each generator.****CLO 3****(6 marks)**

**Question 4**

- (a) Discuss the differences between a large passenger ship and cargo ship in terms of their number of generators installed onboard, the amount of power and the types of services provided. **CLO 2**
- (8 marks)
- (b) One of the prime function of the shipbuilder is to decide the number and power rating of the generator. How is this being done. **CLO 2**
- (3 marks)
- (c) Explain the main elements of a marine distribution system. **CLO 1**
- (4 marks)
- (d) Define auxiliary services on board ship. **CLO 1**
- (5 marks)

**Question 5**

- (a) Explain the effect on equipment running at reduced voltage (eg. 440 V-rated and running at 380 V). **CLO 3**
- (4 marks)
- (b) Explain the effect on equipment running at increased frequency (eg. 50 Hz rated and running at 60 Hz). **CLO 3**
- (4 marks)

- (c) Explain why it is not possible to parallel or synchronise the emergency generator and main generator. **CLO 1**

(2 marks)

- (d) Define the acronym UPS. **CLO 1**

(2 marks)

- (e) With the aid of a diagram elaborate the operation of a continuous UPS dc supported system. **CLO 1**

(8 marks)

#### Question 6

- (a) The air circuit breaker of the EDG is interlocked with the bus coupler from the main switchboard. Elaborate the operation of the *Interconnector Feeder between Emergency Switchboard and Main Switchboard*. **CLO 3**

(8 marks)

- (b) Sketch and label the HV/LV ship electrical system based on the following data:

#### **CLO 1**

- i. Generator sets (4 nos) 11 kV, 60 Hz
- ii. Emergency Generator 440 V, 60 Hz
- iii. Auxiliary Generator 440 V, 60 Hz
- iv. Main Switchboard 11 kV
- v. Emergency Switchboard 440 V
- vi. Auxiliary Switchboard 440 V
- vii. 11 kV / 440 V Transformer (2 numbers)
- viii. 11 kV loads (2 numbers)
- ix. 440 V motors (2 numbers)

(12 marks)

END OF EXAMINATION PAPER