



SET 1

**UNIVERSITI KUALA LUMPUR**  
**Malaysian Institute of Marine Engineering Technology**

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**FINAL EXAMINATION**  
**SEPTEMBER 2016 SESSION**

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**SUBJECT CODE** : LMB 20403  
**SUBJECT TITLE** : FUEL AND LUBRICANT  
**LEVEL** : BACHELOR  
**DURATION** : 2 1/2  
**EXAMINER** : BAHKTIAR AFANDI

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**INSTRUCTIONS TO CANDIDATES**

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1. Please read the instructions given in the question paper **CAREFULLY**.
  2. This question paper is printed on both sides of the paper.
  3. Please write your answers on the answer booklet provided.
  4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
  5. This question paper consists of **TWO (2)** sections; Section A and B. Answer all questions in Section A. For Section B, answer **THREE (3)** questions only.
  6. Answer all questions in English Language.
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**THERE ARE 3 PAGES OF QUESTIONS**

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**SECTION A : 40 MARKS**

**INSTRUCTION : Answer ALL questions.**

**Please use the answer booklet provided.**

**Question 1**

With reference to **fuel oil properties** on board a merchant ship,

- a) Determine FOUR (4) properties or constituents that may be found in heavy fuel oil having high viscosity and high carbon content. (10 marks)
- b) Explain the effect of each properties or constituents above 1(a) to the engine problem. (10 marks)

**Question 2**

With reference to an **oil purifier** on board ship,

- a) With an aid of sketches, identify essential differences between purifiers and clarifiers. (10 marks)
- b) With an aid of sketches, illustrate the operation of **self-cleaning** purifier sliding bowl. (10 marks)

**SECTION B : 60 MARKS**

**INSTRUCTION : Answer only THREE questions.**

**Please use the answer booklet provided.**

**Question 3**

With reference to **cylinder liner wear** of a large marine diesel engine.

- a) Examine THREE (3) types of wear imparted on cylinder liner. (6 marks)
- b) Explain the reasons for maximum wear rate at top of piston. (6 marks)
- c) Illustrate the wear pattern as a result of using improper Total Base Number (TNB) lubricating oil. (8 marks)

**Question 4**

With reference to **fuel oil and lubricating oil** onboard ship,

- a) Describe the term microbial degradation. (5 marks)
- b) Explain how lubricating oil degradation (due to microbial growth) be noticed and describe its effects. (5 marks)
- c) Explain the process of fuel microbial degradation. (5 marks)
- d) Explain the prevention process of microbial degradation of distillate fuels and lubricating oil. (5 marks)

**Question 5**

With reference to a **Large 2-Stroke Slow Speed** diesel engine,

- a) Examine **FOUR (4)** phases of combustion that take place in engine cylinder of a diesel engine. (14 marks)
  
- b) With reference to **combustion of fuel** of a large marine diesel engine, explain **TWO (2) effects** of the following,
  - i. Late combustion (2 marks)
  - ii. Early combustion (2 marks)
  - iii. Low cetane number. (2 marks)

**Question 6**

- a) With aid of sketches, compare the different between **boundary** lubrication and a **hydrodynamic** lubrication. (16 marks)
  
- b) Examine **FOUR ( 4 )** characteristic of hydrodynamic lubrication. (4 marks)

**END OF QUESTION**