



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

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**FINAL EXAMINATION**  
**JANUARY 2016 SESSION**

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**SUBJECT CODE** : LDD 30203  
**SUBJECT TITLE** : SHIP DESIGN TECHNOLOGY  
**LEVEL** : DIPLOMA  
**TIME / DURATION** : 2 ½ HOURS  
**DATE** : MAY 2016

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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 **TWO (2)** questions only.
  6. Answer all questions in English Language.
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**THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.**

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**SECTION A (Total: 60 marks)****INSTRUCTION: Answer ALL questions.****Please use the answer booklet provided.****Question 1**

- (a) Describe the forces that are found to be acting on a ship.  
(4 marks)
- (b) Explain the various loads acting on a ship structure  
(4 marks)
- (c) With the aid of appropriate sketches explain what is still water bending moment  
(4 marks)
- (d) Sketch a typical cross section of an oil tanker showing 5 major structural components.  
(8 marks)

**Question 2**

- (a) Explain the purpose of having structural fire protection rules in ship construction ?  
(5 marks)
- (b) How are structural fire protection rules applied to a ship design?`  
(5 marks)
- (c) Explain five structural protection rules that must be applied during a ship design process.  
(10 marks)



**Question 3**

(a) A ship possesses various major structural components to ensure that she can function as intended. With the aid of proper sketches explain the following structural components.

- i) Keel
- ii) Bulbous bow
- iii) Double bottom
- iv) Watertight doors
- v) Stem

(10 marks)

(b) Bulkheads are an important structural components for a ship. Explain what is a bulkhead and how it strengthens the ship structure.

(5 marks)

(c) Explain with the aid of sketches, ship motions and how it affects the structural design of a ship

(5 marks)

**SECTION B (Total: 40 marks)**

**INSTRUCTION: Answer only TWO questions.**

**Please use the answer booklet provided.**

**Question 4**

(a) Ship structural design is an important process. Describe the ship structural design principle.

(5 marks)



- (b) Name THREE ( 3 ) methods of basic ship structural arrangements can be made used and explain each of them  
(5 marks)
- (c) Sketch a typical transverse cross section of a ship showing the following:  
i) Transverse members  
ii) Longitudinal members  
(10 marks)

### Question 5

- (a) What is a statutory body in the design and construction of merchant ships.  
(10 marks)
- (b) List down five ( 5 ) types of machinery systems that will affect the hull structure on a typical commercial hull  
(5 marks)
- (c) Explain what is meant by cofferdams and why are they very important.  
(5 marks)

### Question 6

- (a) An offshore supply vessel ( OSV ) is to be structurally design based on a set of rules given by a classification society. The principle particulars of the OSV are as follows:
- |                               |   |
|-------------------------------|---|
| Length between perpendiculars | $L_{BP} = 28.0$ Meters                              |
| Length waterline              | $L_{WL} = 29.0$ Meters @ scantling draft $T_{SC}$ ; |
| Length for scantlings         | $L_{SC} = 96\% \times L_{BP}$                       |
| Depth moulded                 | $D_{MLD} = 4.5$ meters                              |
| Scantling Draft               | $T_{SC} = 3.0$ Meters                               |
| Beam ( Breadth ) moulded      | $B_{MLD} = 8.0$ Meters                              |





Statutory rules as described by rules for building & classing steel Vessels < 90 m in length, 2011 by ABS requires the following:

Frame Spacing  $s = 508 + 0.83L$  ( where  $L = L_{sc}$  )

Thickness of bottom shell plating  $t = ((s\sqrt{h})/254) + 2.5$  mm

Thickness of side shell plating  $t = ((s\sqrt{h})/268) + 2.5$  mm

Thickness of deck plating  $t = ((s\sqrt{h})/254) + 2.5$  mm

Thickness of centre girder amidship  $t = 0.056L + 5.5$  mm

Where  $h = 4.0$  meter

From the ship information available and the rules provided, calculate the following:

- i) Frame spacing in mm
- ii) Thickness of bottom shell plating in mm
- iii) Thickness of side shell plating in mm
- iv) Thickness of deck plating in mm
- v) Thickness of centre girder amidship in mm

(10 marks)

- (b) From the calculation above, explain why there are differences in thickness plating between bottom shell, side shell and deck plating.

(5 marks)

- (c) Explain with the aid of appropriate sketches how the deck of a ship is strengthened to compensate for the weakness caused by manhole openings.

(5 marks)

**END QUESTION**

