



SET A

UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
SEPTEMBER 2016 SEMESTER

COURSE CODE : LMB 10203
COURSE NAME : NAVAL ARCHITECTURE FOR MARINE ENGINEERS
PROGRAMME NAME : BACHELOR
(FOR MPU: PROGRAMME LEVEL)
DATE : 20TH JANUARY 2017
TIME : 9.00 AM
DURATION : 2 ½ HOURS

INSTRUCTIONS TO CANDIDATES

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 (2)** sections; Section A and Section B.
4. Answer **ALL** questions in Section A. For Section B, answer any **TWO (2)** questions only.
5. Please write your answers on the answer booklet provided.
6. Answer all questions in English language **ONLY**.

THERE ARE 5 PAGES OF QUESTIONS, INCLUDING THIS PAGE.

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

(a) Explain the following terms:

[2 marks each]

- i) Conceptual design
- ii) Longitudinal Centre of Buoyancy (LCB)
- iii) Prismatic Coefficient, C_p
- iv) Explain Archimedes principles
- v) Why Does a Ship Floats?

(b) A ship float at a draught of 4.40m and has a waterline breadth of 12.70m. Calculate the underwater transverse area of midship section if C_M is 0.922.

[5 marks]

(c) A ship has the following details:

- Draught 3.63m
- Waterline length 48.38m
- Waterline breadth 9.42m
- C_m 0.946
- C_p 0.778

Calculate the volume of displacement.

[5 marks]

Question 2

(a) Explain the following terms :

- i) Longitudinal center of buoyancy (LCB)
- ii) Longitudinal center of floatation (LCF)
- iii) Longitudinal center of Gravity (LCG)
- iv) Vertical center of Gravity (VCG)
- v) Vertical center of buoyancy (VCB)

(5 marks)

- (b) An anchor handling tug 74m long and 11.5m beam is floating in sea water at a draught of 4.7m. Sectional areas up to the design draught are as follows:

Station	0	1	2	3	4	6	8	10	12	14	16
Area(m ²)	20.2	22.6	25.1	33.5	45.2	48.9	50.2	42.5	31.3	16.1	4.6

Calculate:

- i) Volume of Displacement
- ii) Displacement
- iii) LCB from amidships

(15 marks)

Question 3

- (a) Explain the following stability terms.

- i) A stable Ship
- ii) Unstable ship
- iii) Neutral ship
- iv) Angle of Loll
- v) Righting moment

[5 marks]

- (b) A ship of 6,000 tonnes displacement has $KG = 6\text{ m}$ and $KM = 7.33\text{ m}$. The following cargo is loaded:

- 1000 tonnes, $Kg\ 2.5\text{ m}$
- 500 tonnes, $Kg\ 3.5\text{ m}$
- 750 tonnes, $Kg\ 9.0\text{ m}$

The following cargo is then discharged:

- 450 tonnes of cargo $Kg\ 0.6\text{ m}$
- 800 tonnes of cargo $Kg\ 3.0\text{ m}$

Find the final GM.

[10 marks]

(c) It is required that the ship maintain the original GM. What can be done to maintain the original GM of 1.33 meters?

[5 marks]

SECTION B (Total: 40 marks)

INSTRUCTION: Answer only TWO questions.

Please use the answer booklet provided.

Question 4

A small product tanker 150m in length, 18m in breadth, MCT 1 cm 150 tonnes-metres, TPC 25 is drawing 6.35m F 6.65m A and loads the following:

LOAD

230 tonnes in No.1 hold	50m forward of the center of floatation
800 tonnes in No.3 hold	20m forward of the center of floatation
500 tonnes in No.4 hold	21m abaft of the center of floatation

UNLOAD

200 tonnes from NO.2 hold	36m forward of the center of floatation
105 tonnes from F.P tank	60m forward of the center of floatation

The centre of flotation is 5m abaft amidships. Calculate the new end drafts.

(20 marks)

Question 5

A vessel has the following GZ ordinates taken from GZ Cross Curves of Stability with an assumed KG of 8 meters at a displacement of 20,550 tonnes.

θ Heel in Deg	0°	15°	30°	45°	60°	75°	90°
GZ Ords (M)	0	1.10	2.22	2.60	2.21	1.25	0.36

When loaded and ready for her departure the displacement is 20,550 tonnes and KG is 9.52 meters.

- a) Calculate the actual GZ righting levers and draw the statical stability curve for this condition of loading
- b) Determine GZ maximum and the angle at which it occurs
- c) Determine the range of stability
- d) Calculate the dynamical stability up to 30°
- e) Determine the approximate GM from the statical stability curve.

(20 marks)

Question 6

(a) Explain what is meant by the following term.

- i) Frictional resistance
- ii) Wave-making resistance
- iii) Appendage resistance

[6 marks]

(b) Sketch a typical marine propeller and identify the following parts:

- i) Face
- ii) Back
- iii) Leading edge
- iv) Diameter
- v) Rake

[10 marks]

(c) With the help of an appropriate sketch, explain what is meant by propeller pitch?

[4 marks]

END OF QUESTIONS