UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
JANUARY 2016 SEMESTER

COURSE CODE	:	LDD20102
COURSE NAME	:	NAVAL ARCHITECTURE 1
PROGRAMME NAME (FOR MPU: PROGRAMME LEVEL)	:	DIPLOMA OF ENGINEERING TECHNOLOGY IN MARINE ENGINEERING
DATE	:	26 MAY 2016
TIME	:	02.00 PM – 04.30 PM
DURATION	:	2 HOURS 30 MINUTES

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 TWO (2) questions only.
5. Please write your answers on the answer booklet provided.
6. Answer all questions in English language ONLY.

THERE ARE 6 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

a) Define design spiral

(2 marks)

b) Sketch and label the following ship terminologies;

i. After Perpendicular (AP)
ii. Forward Perpendicular (FP)
iii. Amidships
iv. Length Between perpendicular (LBP)
v. Length Overall (LOA)
vi. Breadth
vii. Draught
viii. Freeboard

(8 marks)

c) There are SIX (6) motions of freedom of a ship. Using sketches, describe each of the motions.

(6 marks)

d) Define the lines plan and list the views found on a lines plan.

(4 marks)

Question 2

a) A barge 50 m long has a constant cross-section in the form of a trapezoid 15 m wide at the top, 9 m wide at the bottom and 5 m depth, It floats in sea water at a draught of 4 m. Calculate its displacement.

(5 marks)

b) A ship floating in sea water at a draught of 3.7 m has the waterplane area of 1680 m^2. Calculate the TPC and the changes in draught if a mass 260 tonnes is discharged from the ship.

(6 marks)

c) A ship has a displacement of 9860 tonnes and a block coefficient of 0.7 in sea water. The area of immersed midship section is 120 m^2. Calculate the length of the ship and the prismatic coefficient if beam = (0.15 x length) = (2.4 x draught).

(9 marks)

Question 3

a) A ship LBP 120m is floating in sea water. The waterplane has the following offsets at the draught of 6m.

Station	0	½	1	2	3	4	5	6	7	8	9	9½	10
1/2 B (m)	1.5	3.8	7.2	8.0	9.4	10.5	11.2	10.5	8.6	6.2	4.5	2.0	0

Calculate for a draught of 6m;

a) Waterplane area
b) LCF from amidships
c) Second moment of area about amidships, I_L
d) Second moment of area about LCF, I_{LCF}
e) Second moment of area about centerline, I_T

(15 marks)

b) Repeat question 2 but this time, calculate

a) LCF from AP
b) 2nd moment of area about AP, I_{AP}

(5 marks)

SECTION B (Total: 40 marks)

INSTRUCTION: Answer only TWO (2) questions.
Please use the answer booklet provided.

Question 4

a) Define buoyancy force.

(4 marks)

b) Explain the effects of density of fluid towards the buoyancy force.

(4 marks)

c) A box-shaped barge 75 m (L) x 6 m (B) x 4 m (D) arrived at Lumut Port (density 1.020t/m^3) carrying iron ore. Her draught was measured at 2.1 m. After unloading the iron ore, the draught was measured at 0.8 m. Calculate the weight of iron ore that has been unloaded.

(5 marks)

d) An empty cylindrical shaped tank is floating in sea water at a draught of 0.15 m with its axis vertical. The external diameter of the tank is 0.7 m, internal diameter 0.65 m, thickness of base 0.1 m and the overall height is 1.2 m. Calculate the final draught of the tank if 0.25 m^3 diesel oil (density 850kg/m^3) is poured into the tank.

(7 marks)

Question 5

The effective part of a transverse section of a ship amidships is represented by the steel material shown below.

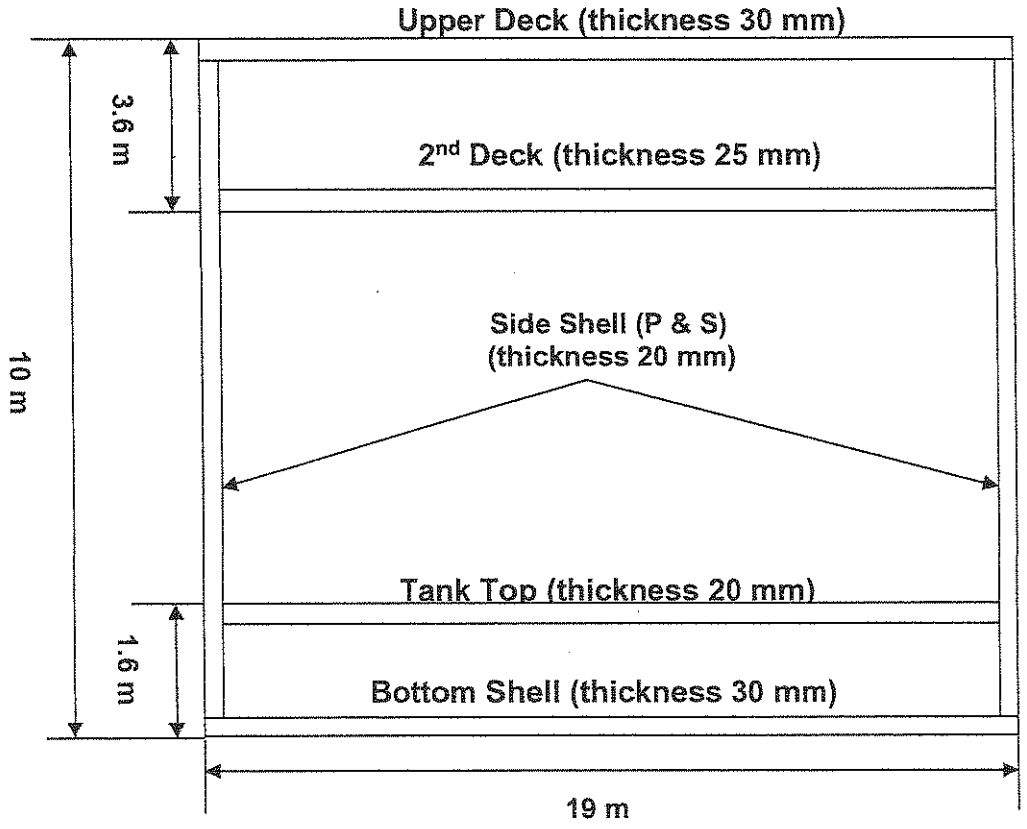
Calculate:

i) Height of neutral axis from Upper Deck, Y_D

ii) Second moment of area about Upper Deck, I_D

iii) Second moment of area about neutral axis, I_{NA}

iv) Section modulus at Upper Deck, Z_D and Keel, Z_K.



(20 marks)

Question 6

a) Define the transverse stability.

(2 marks)

b) Explain the effect of free surface correction on ship stability.

(6 marks)

c) An inclining experiment was carried out on a ship of 4200 tonnes displacement, where masses of 6 tonnes were moved transversely through distance 13 m. the deflection of a 7.5 m pendulum were 80, 82, 78, 84, 79, 80, 83 and 82 mm respectively. Calculate the metacentric height, GM and discuss the initial stability of the ship.

(6 marks)

d) Discuss the cross curves of stability.

(6 marks)

LIST OF FORMULAE

1) $Aw = (1/3 \times h \times \sum PA) \times 2$
2) $Volume = (1/3 \times h@w \times \sum PV)$
3) $LCF = \frac{h \times \Sigma\ 1^{st}\ Moment\ Area}{\Sigma\ PA}$
4) $LCB = \frac{h \times \Sigma\ 1^{st}\ Moment\ Volume}{\Sigma\ PV}$
5) $KB = \frac{w \times \Sigma\ 1^{st}\ Moment\ Volume}{\Sigma\ PV}$
6) $I_L = 1/3 \times h^3 \times \Sigma\ 2^{nd}\ Moment_{(L)} \times 2$
7) $I_T = 1/9 \times h \times \Sigma\ 2^{nd}\ Moment_{(T)} \times 2$
8) $I_{LCF} = I_L - Ay^2$
9) $Cm = \frac{Am}{B \times T}$
10) $C_W = \frac{A_W}{B \times L}$
11) $C_B = \frac{Volume}{L \times B \times T}$
12) $C_P = \frac{Volume}{Am \times L}$
13) $TPC = Aw \times \rho / 100$
14) $I_{NA} = I_{XX} - (Ay^2)$
15) $Z = I_{NA} / y$

END OF QUESTION