



UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
JANUARY 2017 SEMESTER

COURSE CODE : LNB20303

COURSE NAME : NAVAL ARCHITECTURE 1

PROGRAMME NAME : BACHELOR OF ENGINEERING TECHNOLOGY (HONS)
(FOR MPU: PROGRAMME LEVEL) IN NAVAL ARCHITECTURE & SHIPBUILDING

DATE : 12/07/2017 WED

TIME : 9.00 AM - 12.00 PM

DURATION : 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read CAREFULLY the instructions given in the question paper.
 2. This question paper has information printed on both sides.
 3. This question paper consists of TWO (2) sections; Section A and Section B. Answer ALL questions in Section A and THREE (3) questions from Section B.
 4. Please write your answers on the answer booklet provided.
 5. Write your answers only in BLACK or BLUE ink.
 6. Answer all questions in English.
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THERE ARE 9 PAGES OF QUESTIONS, INCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

INSTRUCTION: Answer ALL questions

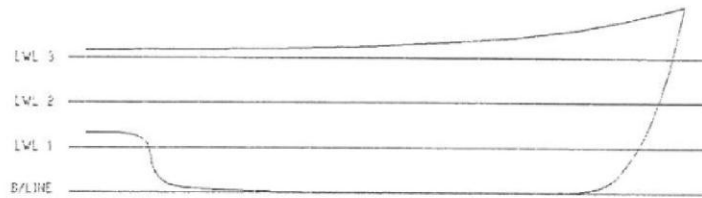
Please use the answer booklet provided.

Question 1

- (a) Ships alternatively can be categorized based on its usages/ functions. Briefly explain five of them (types of ship based on the usage/ function) (10 marks)
- (b) State the definition of freeboard (2 marks)
- (c) Discuss the differences between Sectional Area Curve and Bonjean Curve. Your answer must be supported with appropriate figures/ sketches. (8 marks)

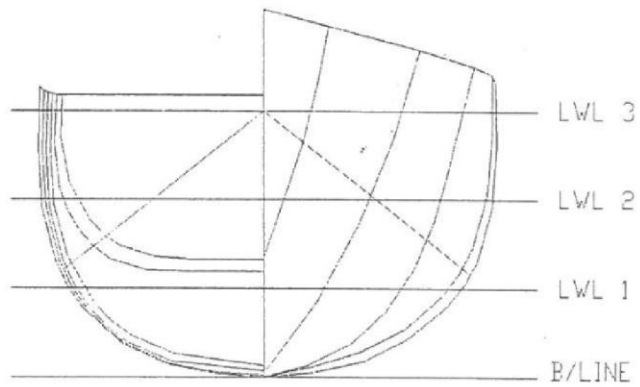
Question 2

- (a) Describe the differences between *trim* and *parallel sinkage* (4 marks)
- (b) Differentiate between Length of Overall (LOA), Length of Waterline (LWL) and Length between Perpendicular (LBP). Your answer must be supported with figure/ sketch. (6 marks)
- (c) Figure 1 shows the profile and body plan view of the ship. Using these two views as your reference, at waterline 1, 2 and 3, measure and fill the values of offset for station 1, station 2, station 7, and station 9 only. Fill up your offset as per table below. Standardize your measurement in mm unit.



PROFILE

C/L



BODY PLAN

Figure 1

St\WL	WL 1	WL 2	WL 3
1			
2	22.3 mm		
7			
9			17 mm

(10 marks)

SECTION B (Total: 60 marks)

INSTRUCTION: Answer only THREE questions.

Please use the answer booklet provided.

Question 3

- (a) Table 1 shows the example of Table of Offset. Referring to the Table 1, draw the Half Breadth Plan, showing only the Waterline 1, 2 and 3. Your drawing should be supported with appropriate labels.

Table 1: Table of Offsets

Station	HALF BREADTHS (cm)				HEIGHTS ABOVE BASELINE (cm)					
	WL1	WL2	WL3	SHEER	KEEL	B1	B2	B3	B4	SHEER
A.P	0.000	1.920	2.040	2.050	0.990	1.028	1.084	1.149	1.911	2.386
1	0.000	2.003	2.101	2.109	0.890	0.890	0.916	0.975	1.523	2.385
2	1.823	2.102	2.144	2.152	0.052	0.135	0.224	0.458	1.150	2.394
3	1.898	2.193	2.207	2.218	0.018	0.082	0.145	0.366	0.996	2.402
4	1.955	2.255	2.274	2.288	0.000	0.050	0.130	0.342	0.922	2.420
5	1.984	2.304	2.320	2.334	0.000	0.035	0.122	0.351	0.854	2.452
6	2.002	2.313	2.334	2.350	0.000	0.039	0.140	0.372	0.797	2.492
7	1.892	2.195	2.292	2.322	0.000	0.044	0.182	0.474	0.976	2.552
8	1.467	1.670	2.009	2.127	0.000	0.122	0.380	0.948	2.345	2.621
9	0.715	1.086	1.356	1.564	0.040	0.604	1.431	2.623	2.639	2.763
F.P	0.000	0.000	0.445	0.679	1.012	2.342	2.902	2.775	0.000	2.963

*all the data in the table is measured in cm unit

(10 marks)

- (b) A barge with same transverse sections throughout its length has 20 meters in length, beam of 8 meters and design water line (DWL) of 3 meters as shown in Figure 2.

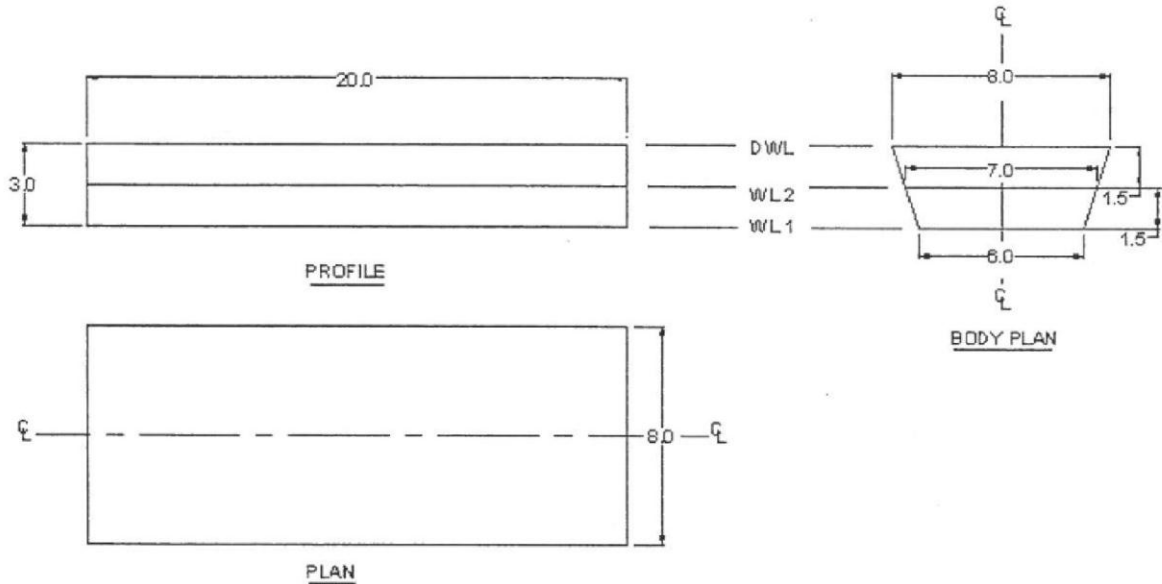


Figure 2 Lines Plan of 20m Barge

Calculate the following values for WL1 (baseline), WL 2 and DWL (Design Water Line) and organize your answers as per table shown in Table 2. Your answer must be supported with working calculation.

Table 2 Geometries Particular of 20m Barge

ITEM	WL 1 (BL)	WL 2	DWL
Waterplane Area (m^2)			
Volume Of Displacement (m^3)			420 m^3
Block Coefficient (C_B)			
Midship Coefficient (C_{Am})		0.93	

(10 marks)

Question 4

- (a) A tanker, with a length of 150 m, breadth of 22 m and draft of 9 m has the following waterplane areas (Table 3) at various waterlines as follows:

Table 3: Waterplane area

Waterline	0	1.5	3.0	4.5	6.0	7.5	9.0
Waterplane area, WPA (m ²)	300	1800	2000	2130	2250	2370	2370

By using Simpson's 2nd Rule, determine the volume displacement (∇) and vertical centre of buoyancy (VCB) at draft 9.0m.

(8 marks)

- (b) A ship with LBP of 180 m has the half ordinates as shows in Table 4. By using Simpson's 1st Rule, calculate:

- i) the longitudinal centre of floatation about amidships ($LCF_{\text{amidships}}$)
- ii) the second moment of area about amidships ($I_{\text{amidships}}$)
- iii) the second moment of area about LCF (I_{LCF})

Table 4: Half ordinates of 180 m ship

Station	0 (AP)	½	1	2	3	4	5	6	7	8	9	9½	10 (FP)
½ ordinate (m)	0	5	8	10.5	12.5	13.5	13.5	12.5	11	7.5	3	1	0

(12 marks)

Question 5

- (a) A survey vessel with a length of 67.5 meter and breadth 12 meter is floating at a draught of 1 meter on seawater (ρ_{sw} is assumed 1.025 tonnes/m³). By referring to the Hydrostatics Curves as shown in Figure 3, determine and calculate the following particulars:
- i) Displacement (Δ)
 - ii) Volume displacement (∇)
 - iii) Vertical Centre of Buoyancy (VCB)
 - iv) Block Coefficient (C_B)
 - v) Waterplane area (WPA)
 - vi) Waterplane area coefficient (C_{WP})
 - vii) Keel to Longitudinal Metacentre (KM_L)
 - viii) Centre of Buoyancy to Longitudinal Metacentre, BM_L

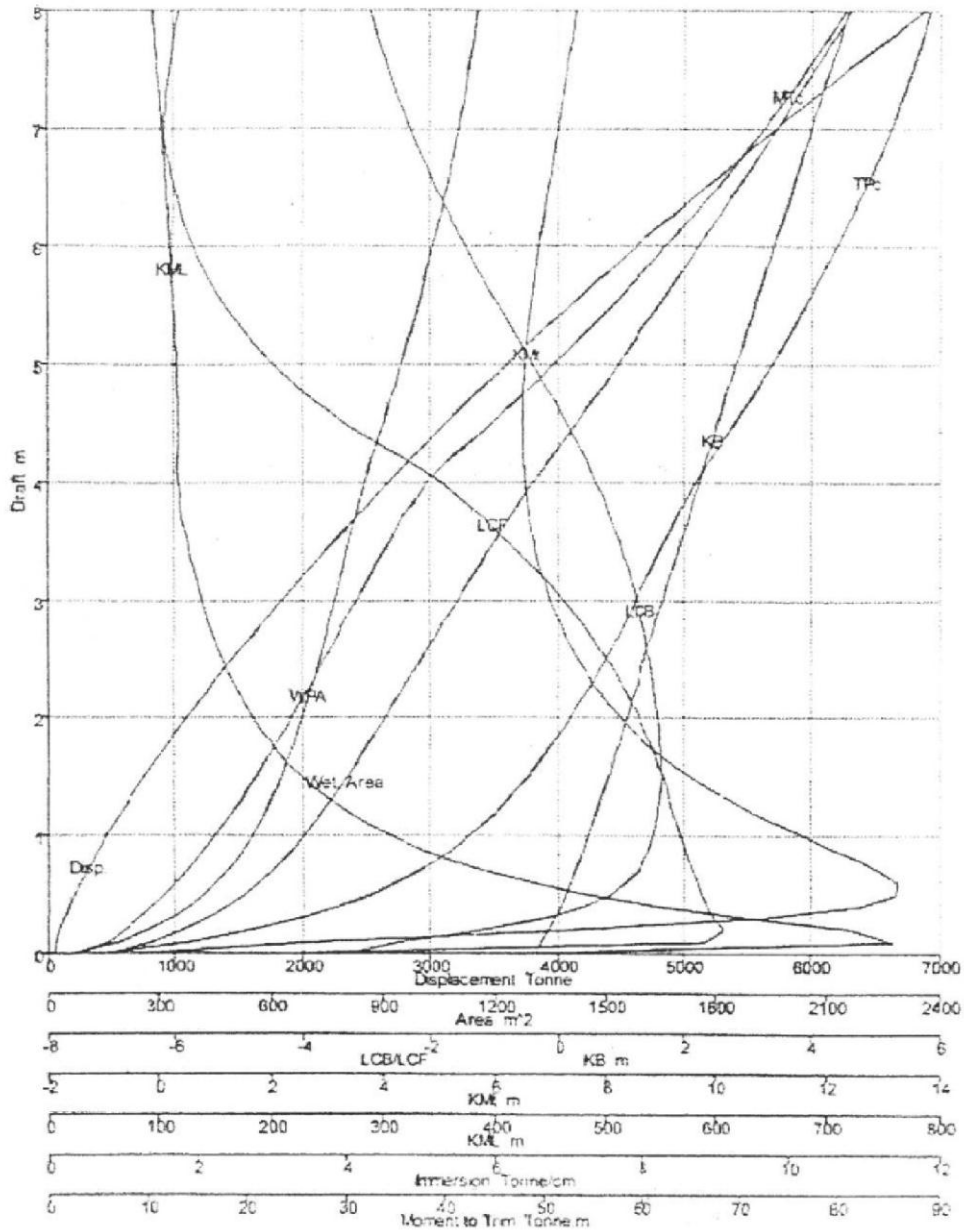


Figure 3 Hydrostatics Curves for 67.5 m Survey Vessel

(12 marks)

- (b) A ship with LBP = 100m has the following half breadths. At this draught the ship has the volume displacement of 10000m³ and VCB = 5.3m.
Calculate the transverse (BM_T)

Station	AP	1	2	3	4	5	6	7	FP
½ B	1.9	5.3	8.3	9.8	9.8	8.3	5.2	1.3	0

(8 marks)

Question 6

- (a) A 5600 tonnes USS SIMPSON (frigate) is underway on an even keel at a draft of 4.8m, with LBP = 124m and KG = 6.2 m on the centerline and KM = 10.5m. She discharged 31 tonnes of ballast water from a tank located 3.4m port of the centerline, 4 m above the keel. Then, 10 tonnes of fuel are pumped into the service tank located 1.5m starboard of the centerline, 2.7m above the keel.

- i) Calculate the new KG_{new} of the ship
- ii) Calculate the ship's angle of list

(8 marks)

- (b) A ship with Length between Perpendicular, LBP 100m floats at 3.2m and 4.4m at FP and AP respectively and has Longitudinal Centre of Floatation LCF 3m aft of amidships. Its TPC is 10 tonnes while MCTC is 100 tonnes-m. The following cargo is added and removed:

- LOAD : 20 tonnes cargo at 10 m forward of amidships
5 tonnes fuel at 10 m aft of amidships
- REMOVED : 50 tonnes cargo from 20 m forward of amidships
30 tonnes cargo from 15 m aft of amidships
10 tonnes cargo from 5m aft of amidships

Evaluate the final draughts at both perpendiculars (FP and AP) (C5)

(12 marks)

END OF EXAMINATION PAPER