الجامعة الوطنية
National University
Science & Technology للعلوم والتكنولوجيا
كلية عمان البحرية الدولية
International Maritime College Oman

ACADEMIC YEAR 2023 - 2024

Program	Year	Semester	Paper
MEO	4	1	Midterm Exam

MODULE NAME:	**Ship Construction and Stability III**		
MODULE CODE:	**MCONSTAB-III**	**EXAM DATE:**	**05/11/2023**
INSTRUCTOR's NAME:	**Dr. Nourhan Ghoneim**	**DURATION:**	**1.5 hrs.**

Questions to be answered on:	**Allowed tools:**	**Number of pages**
✓ Space provided on the question paper	Pen, Pencil & Calculator	(Incl. cover page): **7**

Points of attention:

- For each question, the maximum earned points are mentioned between brackets at the end of each question.
- Write very clearly! Answers that are not readable are not marked and don't get points!
- Make sure your answers are written to the point.
- All answers should be written **in English.**
- Write all the answers in **blue or black pen only.**
- Use the **pencil** only for **diagrams & graphs.**
- Show all the calculation steps in the given space.
- When finished submit the question paper, together with the answer scripts and the signed cover page to the invigilator.
- Any cheating/copying may result in an instant failing of the examination.

STUDENT NAME:

STUDENT ID:

FINAL MARKS	
	30
	10

Number of answer scripts:……..…….

Invigilator:……..……..

Student's signature: ……

Time of receipt:……..…..

Question 1: **[15 Marks]**

A ship floats in salt water on an even keel displacing 6200 tonnes. KG is 5.5 m, KM is 6.3 m, and there is 500 tonnes of cargo yet to be loaded. Space is available in No. 1 tween deck (KG 7.6 m, center of gravity 40 m forward of the center of flotation) and in No. 4 lower hold (KG 5.5 m, center of gravity 30 m aft of the center of flotation). MCT 1 cm is 200 tonnes m.
Find the following:

1. How much cargo to load in each space to complete loading trimmed 0.6 m by the stern, **[10 Marks]**
2. The final GM. **[5 Marks]**

Question 2: **[15 Marks]**

A ship arrives in port with drafts 6.8 m F and 7.2 m A. TPC is 15 tonnes. MCT 1 cm is 400 tonnes m. The center of flotation is amidships.

500 tonnes of cargo is then discharged from each of 4 holds as follows:

- The C.G. of No. 1 hold is 40 m forward of amidships
- The C.G. of No. 2 hold is 25 m forward of amidships
- The C.G. of No. 3 hold is 20 m aft of amidships
- The C.G. of No. 4 hold is 50 m aft of amidships

Also, 50 tonnes of cargo is loaded in a position whose C.G. is 15 m aft of amidships, and 135 tonnes of cargo C.G. 40 m forward of amidships.

Find the final drafts.

Given Formula

$$GG_1 = \frac{m \times d}{\Delta}$$

GZ = GM sin θ

$$GZ = \left(GM + \frac{1}{2} BM \tan^2\theta \right) \sin\theta$$

Trimming moment required = Change of trim X MCT 1 cm

$$BM = \frac{B^2}{12\,d}$$

$$BM_L = \frac{L^2}{12\,d}$$

$$\textbf{MCT 1 cm} = \frac{\Delta \times GM_L}{100\,L}$$

Moment of statical stabilty = W X GZ

Bodily sinkage (rise) $= \frac{w}{TPC}$

$$TPC = \frac{WPA}{97.56}$$

MLO & Bloom's Level of Complexity

Q #	MLO Addressed	Complexity Level	Mark	Remark
1	**MLO4**	Application / Evaluating		
2	**MLO2 / MLO3**	Understanding/ Analysing		

Good luck ….