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	3	1	Midterm Exam

MODULE NAME:	**Ship Construction and Stability 2**		
MODULE CODE:	**MCONSTAB-II**	**EXAM DATE:**	**07/11/2023**
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	
	35
	10

Number of answer scripts:……..…….

Invigilator:……..……..

Student's signature: ……

Time of receipt:……..…..

Question 1: **[15 Marks]**

Construct a metacentric diagram for a box-shaped vessel 70 m long and 10 m beam, for drafts between 1 m and 6 m. **[10 Marks]**

From the diagram find:

(a) The KM's at drafts of 1.5 m and 4.5 m, **[3 Marks]**

(b) The draft at which the minimum KM occurs. **[2 Marks]**

Question 2: **[10 Marks]**

A ship of 1500 tonnes displacement has KB 2.1 m, KG 2.7 m, and KM 3.1 m, and is floating upright in salt water.

Calculate the list if a weight of 10 tonnes is shifted transversely across the deck through a distance of 10 meters.

Question 3: **[10 Marks]**

A box-shaped vessel of 3200 tonnes displacement has GM 0.5 m, and beam 15 m, and is floating at 4 m draft.

Find the moments of statical stability at:

1. 5 degrees **[5 Marks]**
2. 25 degrees heel. **[5 Marks]**

Given Formula

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

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

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

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

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

Moment of statical stabilty = W X GZ

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

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

Moment of statical stabilty = Δ . GZ

MLO & Bloom's Level of Complexity

Q #	MLO Addressed	Complexity Level	Mark	Remark
1	**MLO1**	Application / Evaluating		
2	**MLO4**	Understanding/ Evaluating		
3	**MLO2**	Understanding/ Analysing		

Good luck ….