

Indian Maritime University
(A Central University, Govt of India)
End Semester Examinations – June 2026
Programme Name: B Sc (NS)
Semester: IV
Subject Code: UG21T6405
Subject Name: SHIP STABILITY – II

Date: 02.06.2026

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

General Instructions

- (i) All Sections (A, B & C) are to be attempted.
- (ii) All questions are compulsory.
- (iii) M-V-HINDSHIP-Particulars-shall be provided to the students
- (iv) Graph sheet shall be given for grain calculation
- (v) Non programmable scientific calculator may be permitted

Section A

Answer all the Questions (10 x 1) = 10 marks

1. Given initial drafts: F 8.5 m, A 9.1 m, LBP: 175m, W: 28000 t, MCTC 275 tm.
How much is the Initial Trimming Moment?

- a. 16500 m (Fwd) b. 16500 m (Aft) c. 16500 tm (Aft) d. 16500 t cm (Aft)

2. Longitudinal separation of LCG and LCB multiply by the displacement is called as _____

3. Angle of contraflexure in a curve of statical stability indicates:

- a. Angle of Maximum GZ
- b. Angle where the rate of change of GZ increases
- c. Angle of one radian i.e 57.3 degrees
- d. Angle at which deck edge immerses

4. KN curves are plotted for an assumed KG value of _____

5. Atwood's formula is used to find _____

6. A vessel is said to be at "angle of loll" when:

- a. GM is positive and vessel heels due to external forces

- b. GM is negative and vessel assumes a neutral equilibrium at some angle of heel.
- c. The vessel is in neutral equilibrium when upright but is in danger of capsizing.
- d. GZ curve shows maximum righting lever
7. Highest grain shift risk occurs in the _____
- a. Partially filled compartment
- b. Compartment loaded to the hatchway
- c. Fully filled compartments
- d. empty compartment
8. Filled to hatchway compartments are applied with the multiplier of _____ for getting ahm.
9. Righting moment of M.V.Hindship at an angle of heel 15 deg in condition no. 7 is:
- a. 3854.09 tm b. 15416.378 tm c. 0.208 m d. 0.832 m
10. KM (T) of MV. Hindship at 8.05m SW draft is _____

Section B

Answer all the questions (5 x 2) = 10 marks

11. Calculate the trimming moment when the ship moves 200 t of cargo from #1 lower hold (HG = 75.37m forward, KG 2.50m) to the main deck (HG=45.92m forward, KG 12.53m) if the COF is 3.75m aft of midship.
12. Give procedure to find initial GM(Fluid) using the GZ curve.
13. Write four formulas for calculating righting moment
14. Write the 3 Stability Criteria for Carriage of Grain in Bulk
15. M.V.Hindship floating at her winter draft in salt water, proceeds to water of RD 1.009. Calculate her freeboard.

Section C

Answer all the five questions (5 x 10 marks = 50 marks)

16. An oil tanker has LBP 285m, MCTC 652.36 tm, TPC 52.15, HF 5.67m forward, floats at 15.6m forward and 16.75m aft. 400t of oil is yet to be loaded. Some ship side repairs are to be effected for which the forward draft is to be maintained at 15.6m. Find where it must be loaded from COF and final drafts?
17. Draw & explain the GZ curve for an unstable vessel at her angle of loll and explain.

18. A vessel is unstable and lolled at 10 deg to starboard. Find the minimum quantity of cargo to be shifted by a shore crane, from the upper deck to the lower hold, through a vertical distance of 13m to make the ship stable. KB = 4.60m, KM = 10.076m, Disp. = 14752 t.

19. A vessel has loaded grain, SF 1.6 m³/ tonne, to a displacement of 13,700 tonnes. In the loaded condition the corrected KG is 7.20 m. Total VHM for assumed shift of grain cargo is 5468 m⁴. Using λ_0 & λ_{40} and the GZ curve, determine the angle of list in the event of a shift of grain.

Heel (θ)	KN (m)
0	0
5	0.72
10	1.47
15	2.21
20	2.91
30	4.15
40	5.22
50	6.07

20. M. V. "Hindship" at a hydrostatic draft of 5.76m in FW is listed 0°50' to port. KG 7.68m, FSC 0.09m, a parcel of cargo weighing 80t is shifted from 1m to port of CL to 4.5m to port of CL. Calculate the final list.
