

**Indian Maritime University**  
**(A Central University, Govt of India)**  
**Supplementary Examinations – March/April 2025**

**Programme Name: BSc Nautical Science**

**Semester: III**

**Subject Code: UG21T5302**

**Subject Name: Ship Stability - I**

Date: 19.03.2025

Duration: 03 Hrs

Max Marks: 70

Pass Marks: 35

General Instructions

- (i) All Sections (A, B & C) are to be attempted.
- (ii) Options, if any, are specified in respective section.
- (iii) M. V. Hindship Trim and Stability particulars.
- (iv) Non-programmable scientific calculators are allowed.

Section A

Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable.

1. Given WPA is 2000 m<sup>2</sup>, RD 1.015, Calculate TPC. (20.30 t, 20.25 t, 20.50 t, 25.625 t)
2. TPC of a ship in SW is 30, TPC in DW of 1.018 is ----- (28.75, 30.54, 29.47, 29.80)
3. When a ship discharges weight, The COG moves ----- (Towards, away, parallel, vertical) in relation to the discharged weight
4. When the COG is below the metacentre, the vessel is said to have----- (Neutral Equilibrium, Stable Equilibrium, Unstable equilibrium, Longitudinal Equilibrium)
5. The Water Plane Area of a ship is 785 m<sup>2</sup>. If C<sub>w</sub> is 0.789 & maximum breadth of waterplane is 10 m, what is the length of the vessel? (100 m, 99.5 m, 99.0 m, 98.5 m)
6. A line drawn perpendicular to the new buoyancy force is -----



7. A vessel of 18000 t displacement is 210 m long & 18 m wide & is floating in SW at a draft of 6 m. Find her block coefficient ( $C_b$ ): (0.754, 0.764, 0.774, 0.784)

8. For a tank, FSC is 0.054m when it has diesel of RD 0.85. If it is replaced with SW, then the new FSC will be ----- (more than 0.054m, less than 0.054m, equal to 0.054m)

9. By how much of 50 t has to be shifted transversely to upright a vessel with Initial Listing moment 450 tm (5m, 7m, 9m, 12.5m)

10. 200T weight is transferred to starboard by 15m and down by 5m, how much listing moment is created?

### Section B

Five Questions of 02 Marks each

11. Give two major differences between the behavior of a stiff ship & a tender ship.

12. A ship whose  $W=10,000T$ , shifts a weight vertically upward which causes  $GG_1$  0.25m. It is planned to shift a weight of 100t to compensate the  $GG_1$  shift. How far the weight should be shifted downward.

13. What do you understand by a "Displacement" curve? What is the purpose of the curve?

14. Find GM Fluid when  $W=6000t$ ,  $KM=7.4m$ ,  $KG=6.6m$ ,  $i=1200m^4$  is partly filled with FW.

15. Calculate hydrostatic draft of M.V.Hindship given present drafts are F: 8.0m and A: 9.2m.

### Section C

All five questions to be answered.

16. a Calculate the distance of COF from Aft for a vessel having a water-plane consisting of a rectangular middle part  $L=80m$ ,  $B=10m$  and triangular bow 10m broad & 6m in the F & A direction. ( 5 marks)

b. A ship of 10,200 tonnes displacement,  $KG$  7.50m, loads 1800 tonnes of cargo ( $Kg$  7.0m). A parcel of 200 t is now shifted vertically upwards such that the final  $KG$  is 7.55 m. Calculate distance shifted . (5 marks)



17. A vessel is floating in dock water of RD 1.005 with her starboard WNA mark 30 mm below, and her port WNA mark 60 mm below water line. If her summer SW draft is 8.4m, TPC is 30 and FWA is 160 mm, calculate how much cargo can be loaded to bring the vessel to her summer draft in SW.

18. A ship's displacement is 12,500 t, KG 8m, and KM 9.2m. There are two identical deep tanks each having dimensions L: 10 m, B: 12m, D: 12m. The Port side tank is full of SW & Starboard tank is empty. Initial List is 9 deg Port. Calculate the list after 1/3rd of the port tank is deballasted. ( 10 Marks)

19. (a) Define formula for list by using diagram (3 marks)

(b) A ship of W 16000t, KM 7.5m, KG 6.0m, TPC 25, is listed to  $3^\circ$  to port. The present mean draft is 8.6m and it is to finish loading at 8.8 m F & A. Space is available at 5 m off the centre line, on either side. State how much cargo must be stowed on either side to finish upright. (7 marks)

Q.20 M.V.Hindship arrives at port of Chennai in condition no.5, discharges the entire cargo from 1 TD, 3 TD & 5 TD. The entire HFO from the settling and service tanks P & S & No. 5 DB (S) is shifted to no. 4 DB tank centre. Find the final GM (Fluid). ( 10 Marks)

*[Handwritten signature]*