

**Indian Maritime University**  
**(A Central University, Govt of India)**  
**End Semester Examinations – June 2023**  
**Programme Name: B Sc (NS)**  
**Semester: III**  
**Subject Code: UG 21T5302**  
**Subject Name: Ship Stability Paper-I**

Date: 07.06.2023

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

General Instructions

- (i) All Sections (A, B & C) are to be attempted.
- (ii) Scientific Calculator is permitted.
- (iii) (Hindship Trim & Stability Particulars, permitted)

**Section A**

**All questions of 1 mark each**

Choose the most correct answer.

1. Relative density of a liquid is the number of times it is heavier than \_\_\_\_\_.
2. The volume of all enclosed spaces above the water line is called \_\_\_\_\_.
3. WNA loadline is applicable to ships whose length is \_\_\_\_\_.
4. Centre of Gravity is otherwise called as centre of \_\_\_\_\_.
5. LCB or AB is the distance between Centre of Buoyancy and \_\_\_\_\_.
6. For a box shaped vessel TPC & displacement curves are plotted. Select the correct answer.
  - i) Both the curves are inclined straight lines.
  - ii) The displacement curve is a horizontal straight line whereas the TPC curve is an inclined straight line.
  - iii) The displacement curve is an inclined straight line whereas the TPC curve is a horizontal straight line.
  - iv) Both the curves are horizontal straight lines.
7. A ship loaded to her summer draft in RD of 1.000 has a load displacement of 16000 t. What is the DWT available?
  - i) 390 t      ii) 400 t      iii) 420 t      iv) 450 t

8. By how much of 40 t has to be shifted transversely to upright a vessel with Initial Listing moment 300 tm

- i) 5m      ii) 7.5m      iii) 10m      iv) 12.5 m

9. If a vessel with displacement 12500 t, KM 8.5m & KG 8.0 m, is listed 4 deg , her listing moment will be?

- i) 433 tm    ii) 436 tm    iii) 437 tm    iv) 439 tm

10. If  $C_b$  is 0.75,  $C_w$  is 0.80 and  $C_m$  is 0.85, what is the value of the Prismatic coefficient ( $C_p$ )?

1. i) 0.680      ii) 0.941      iii) 0.638      iv) 0.882

### **Section B**

#### **Five Questions of 02 Marks each.**

11. State the principle of floatation. How is it useful in finding displacement of the ship?

12. Define TPC and derive a formula for calculating it.

13. Briefly explain Transverse Metacentric Height.

14. What is Free Surface Effect? State the formula for FSC.

15. Find the Displacement and TPC of M.V.Hindship at a hydrostatic draft of 5.6m in water RD 1.015.

### **Section C**

#### **Answer all the questions. (10 Marks Each)**

16.

a) Briefly explain FWA and DWA

b) A vessel displaces 16000t at her summer load draft in SW. If she is now floating in DW of RD 1.015 with her summer loadline on the water, calculate how much DWT is available. (5+5 marks)

17. Differentiate between Stiff and tender vessels. (10 marks)

18. a. Sketch the midship transverse section of a box shaped vessel to show stable equilibrium when upright and heeled to a small angle.

b. If a ship displacing 12000t, heeled by  $6^\circ$ , has a righting lever of 0.1m, find the moment of statical stability. If the KM is 8.2m, find the KG.

(5+5 marks)

19. A ship of 15000t W, KM 9.0m, KG 8.7m is listed  $10^\circ$  to port. She now loads 150t of cargo 7m above the keel and 4m to starboard of the centre line. Find the final list.

(10 marks)

20. M.V.Hindship floating in condition No.5, discharges the entire cargo from No.1 TD, No.5 Poop Deck and refrigerated cargo spaces. No.4 DB tank(C) is filled with water ballast. FSC in final condition is 0.0895m. Calculate her GM(Fluid)

(10 marks)

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TOLAM

