Indian Maritime University

(A Central University, Govt of India)

End Semester Examinations – December 2023

Programme Name: B Sc (NS)

Semester: III

Subject Code: UG 21T5302

Subject Name: Ship Stability Paper-I

Date: 06.12.2023 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

Choose the correct answer.

1. Given WPA is 2500 m^2, RD 1.010, Calculate TPC.

i) 25 t ii) 25.25 t iii) 25.50 t iv) 25.625 t

2. Displacement of vessel is 20000 t, KG 7.0m, 200 t shifted from UD (Kg 10m) to Lower hold (Kg 5m). Final KG =?

i) 7.05 m ii) 7.025 m iii) 6.925 m iv) 6.95m

3. DWT of a vessel is given by the formula:

i) DWT of a ship = Present displacement - Light displacement
ii) DWT of a ship = Load displacement - Present displacement
iii) DWT of a ship = Load displacement - Light displacement
iv) DWT of a ship = Load displacement + Light displacement

4. Righting Lever (GZ) is formed when:

i) The vessel is in stable equilibrium.
ii) The vessel has -ve Metacentric height
iii) The KM of vessel is less than the distance of COG from keel.
iv) All options are correct.

5. Capsizing Lever (-GZ) is formed when:

v) The vessel is in unstable equilibrium.
vi) The vessel has -ve Metacentric height
vii) The KM of vessel is less than the distance of COG from keel.
viii) All options are correct.

6. The Length of a ship at water line is 102m, the maximum beam is 10m, and Cw = 0.76. Find the TPC at this draft in SW

i) 7.55 t ii) 7.75 t iii) 7.85 t iv) 7.95 t

7. A vessel of 17500 t displacement is 200 m long & 20 m wide & is floating in SW at a draft of 5 m. Find her block coefficient (Cb):

i) 0.754 ii) 0.822 iii) 0.854 iv) 0.875

8. A box shaped vessel 105 m long, 12 m wide and 9 m high. If draft is 6m, find RB%.

i) 22 % ii) 24 % iii) 30 % iv) 33.33%

9. 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

10. If a vessel with displacement 12500 t, KM 8.5m & KG 7.5 m, is listed 5 deg , her listing moment will be?

i) 1094 tm ii) 1089 tm iii) 1245 tm iv) 1296 tm

Section B

Answer all the questions. (02 Marks each)

11. With the help of a neat diagram define waterplane coefficient (Cw).

12. Define Reserve buoyancy of a vessel & state the formula to find RB%.

13. If the summer draft of a vessel is 12.96 m and Load displacement is 40,000 t, TPC 30 t, calculate the distance between "F" and "W" marks.

14. The displacement of a vessel is 15000 t, KM 7.5m, KG 6.9m. A rectangular tank with dimensions L 12m, B 8m is partly filled with Oil of RD 0.88. Calculate GM(F).

15. Calculate hydrostatic draft of M.V.Hindship given present drafts are F: 7.8m and A: 9.0m.

Section C

Answer all the questions. (10 Marks each)

16. a. A ship is 120 m long, 15 m wide, and has a load draft of 6 m in SW. Cb= 0.754 & Cw= 0.82. If Light displacement is 2351.2 t, calculate her DWT. (5 Marks)

b. In a vessel of 10,009 tonnes displacement, KG 8.7 m, calculate how many tonnes of cargo that can be loaded on Upper deck (KG 12m) so that final KG becomes 9 m? (5 marks)

17. a. A vessel is lying in a river berth of RD 1.015. Her Summer freeboard is 1.7 m and present freeboard is 1.8 m. Load displacement is 7200 t, TPC is 12 t/cm. Calculate DWT available. (5 Marks)

b. Define Stable equilibrium and illustrate it with the help of a neat labelled diagram. (5 Marks).

18. A ship's displacement is 7500 t, KG 5m, and KM 5.8m. A DB tank on the starboard side is 20m long, 6 m wide and 1 m deep and is full of FW. Calculate the list after 60 t of this water has been consumed. (10 Marks)

19. M.V. Hindship in condition No.4, consumes the entire DO from 5 DB tank Port, Cg 5 m off the centre line. Calculate the resulting list.

20. M.V. Hindship, when floating in Condition No. 4, shifts 900 t of cargo from 2 Hold to No. 4 Hold. The entire D.O from No. 5 DB (P) was consumed. Final FSM 1221 tm & Final KG 7.296 m. Assume final KM is 8.428m.

Calculate:

a) Final LCG (5 Marks)

b) Final GM (Fluid) (5 Marks)