

Indian Maritime University
(A Central University, Govt of India)

Supplementary Examinations – September/October 2024

Programme Name: B Sc Nautical Science

Semester: IV

Subject Code: UG21T5402

Subject Name: Ship Stability Paper II

Date: 26.09.2024

Max Marks: 70

Duration: 03 Hrs

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) MV Hindship stability tables to be used where necessary.
- (iv) Non programmable scientific calculators allowed.

Section A

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

1. Trim is difference between

- a) Mean and Aft drafts.
- b) Midship and forward drafts.
- c) Forward and aft drafts.
- d) All of the above.

2. When a ship is at rest in calm waters,

- a) COB and COF will be in same vertical line.
- b) COG and COB will be in same vertical line.
- c) COG and COF will be in same vertical line.
- d) None of the above.

3. When a ship moves to a different density, the trim might change.

- a) True.
- b) False.

4. The KG used to calculate the righting lever "GZ" in the KN formula is

- a) Fluid KG.
- b) Solid KG.

5. Righting moment is expressed by

- a) $W \times GM$ (S).
- b) $W \times GM$ (F).
- c) $W \times GZ$.
- d) $W \times KG$ (F).

6. In Simpson's second rule, if "h" is the common interval, the constant "K" used in formula "Area = K x h x sum of products" is

- a) 3/8.
- b) 1/3.
- c) 1/12.
- d) 1/36.

7. In "Grain" stability, the upsetting lever at 0° is calculated by dividing the volumetric heeling moment by Displacement and

- a) Density of the grain loaded.
- b) Stowage factor of the grain loaded.
- c) Angle of repose of the grain loaded.
- d) None of the above

8. At angle of loll, the vessel is in

- a) Neutral equilibrium.
- b) Stable equilibrium.
- c) Unstable equilibrium.
- d) None of the above.

9. In calculation of MCTC of box shaped vessels, the value of GM_L can be replaced with BM_L ,

- a) True.
- b) False.

10. If "L" and "B" are length and breadth of a box shaped vessel, "V" is u/w volume, the BM_T can be expressed by,

- a) $(L \times B^3) / (12 \times V)$.
- b) $(B \times L^3) / (12 \times V)$.
- c) $(L^3 \times V^3) / (12 \times B)$.
- d) $(V \times B^3) / (12 \times L)$.

Section B

Answer all Five Questions (5x2marks= 10marks)

11. With regards to stability of the ship, state 2 main hazards of carrying grain in bulk.
12. If FSC = 0.100 m, KG = 8.200 m, KN @ 30° = 7.300 m. Find GZ @ 30° heel.
13. Write down 4 parameters from the statical stability curve which helps to know the stability of the vessel.
14. A vessel has an initial GM of -0.300 m & BM of 5.000 m. Find the angle of loll.
15. A box shaped vessel is of Length = 20m, Breadth = 6m, draft = 3m and KG = 1.8m. Find GM.

Section C

Answer all Five Questions (5x10marks= 50 marks)

16. A ship is 150 m long, MCTC = 300 tm, TPC = 30. COF is 4 m abaft amidships (HF 4 m aft). Present drafts are 6.1m fwd and 8.3m aft.
Find the final drafts if the following operations are carried out:
 - a) 4000 T loaded 24 m abaft H (HG 24 m aft)
 - b) 2000 T cargo loaded, HG 50 m fwd.
 - b) 1000 T discharged from HG 30 m fwd. 10marks
17. Half-breadths of a ship's water plane from aft, at equal intervals of 20 m are: 5, 5.88, 6.75, 6.63 & 4 m. Find area of the water plane and position of COF. 10marks
18.
 - a) State the "Intact stability requirements" of carrying Grain cargo in bulk, w.r.t ship stability. 5marks
 - b) State the remedial actions to take when experiencing Angle of Loll. 5marks
19. MV Hindship floating in water RD 1.025 at a draft of F 7.23 m, A 7.93 m, loads 940 T and sails to another port consuming 130 T of fuel and FW. Find her arrival hydrostatic draft at the second port in water RD 1.009. 10 marks
20. MV Hindship at a hydrostatic draft of 5.76 m in FW is listed 0°50' to port. KG 7.68 m, FSC 0.09 m. A parcel of cargo weighing 80 T is shifted from 1m to port of CL to 4.5 m off the CL to port. Calculate the final list. 10 marks

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