Indian Maritime University

(A Central University, Govt of India)

End Semester Examinations – December 2023

Programme Name: B. Sc. Nautical Science

Semester: IV

Subject Code: UG21T5402

Subject Name: Ship Stability Paper II

Date: 21.11.2023 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 x GM (S).
b) W x GM (F).
c) W x GZ.
d) W x KG (F).

6. In Simpon'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 0^0 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) $(LxB^3) / (12xV)$.
b) $(BxL^3) / (12xV)$.
c) $(L^3xV^{3)} / (12xB)$.
d) $(VxB^3)/ (12xL)$.

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 @ 30^0 = 7.300 m. Find GZ @ 30^0 heel.

13. If Displacement is 4000 T, GM = 0.400 m, BM = 3.400 m. Find the moment of statical stability when she heels 24^0, assuming the she is "wall sided".

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 $0^050'$ 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. 10marks

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