Indian Maritime University

(A Central University, Govt of India)

Mar/Apr'26 SE

Programme Name: B Sc Nautical Science

Semester: 4

Subject Code: UG21T5402

Subject Name: Ship Stability Paper II

Date: 17.04.2026	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.

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. Angle of loll is caused when the initial metacentric height is ----------

Section B

Five Questions of 02 Marks each

11. With regards to stability of the ship, state 2 main hazards of carrying grain in bulk.

12. Narrate what happens to the vessel hydrostatic particulars when a vessel moves from one density to another density

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

Five Questions of 10 Marks each.

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 6.1 m fwd
and 8.3 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.

17. (a) A ship is upright and is loaded with a full cargo of timber with timber on deck. During the voyage the ship develops a list, even though stores, fresh water and bunkers have been consumed evenly from each side of the centre line. Discuss the probable cause of the list and the method which should be used to bring the ship to the upright. 5 Marks

(b) Derive the formula for angle of loll 5 marks

18. Answer both a) and b).
a) State the "Intact stability requirements" of carrying grain cargo in bulk, w.r.t ship stability. 6 Marks

b) State the remedial actions to take when experiencing angle of loll. 4 Marks

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.

20. MV Hindship at a hydrostatic draft of 5.76 m in FW is listed $0^0 50'$ to port. KG 7.68 m, FSC 0.09 m. A parcel of cargo weighing 80 T is shifted from 1 m to port of CL to 4.5 m off the CL to port. Calculate the final list.