INDIAN MARITIME UNIVERSITY

(A Central Univ2ersity Government of India)

Sep/Oct'25 SE

Diploma in Nautical Science

Semester II

Ship Construction and Stability – II

Subject Code: UD11T5204

Max. Marks: 70 **Pass Marks: 35**
Date: 12.09.2025 **Time: 3 hours**

Note: Section A (20 Marks) – Q1 & Q2 are compulsory.

Section B (50 Marks) - Answer any 5 questions from Q3 to Q9

Use of Non-programmable Scientific Calculator & M.V. Hindship Stability Particulars booklet are permitted.

Section - A

1. MCQ / Fill in the blanks / True or False (1 x 10 = 10 Marks)

(1) When a weight is removed (discharged) the centre of gravity of the ship moves:

(a) Directly towards the centre of gravity of removed weight.

(b) Directly away from the centre of gravity of removed weight.

(c) In the direction parallel to the removed weight.

(d) None of the above.

(2) KM of ship considered constant for small angle of heel up to:

(a) 10 Degrees (b) 05 Degrees (c) 15 Degrees (d) 20 Degrees

(3) When a vessel is heeled, if she tends to continue heeling further she is said to be in

(a) Stable Equilibrium (b) Unstable Equilibrium (c) Neutral Equilibrium (d) None of these.

(4) The vertical Distance between centre of gravity and the Metacentre is known as

(a) Transverse Metacentre (b) Metacentric Height (c) Righting Lever (d) None of these.

(5) Final Displacement of the ship divided by final moment about the keel gives final KG. (True / False).

(6)In Machinery Spaces additional arrangements are required so that any water may be discharged through at least:

(a) One bilge Suction (b) Two bilge suction (c) Three bilge suction
(d) None of these.

(7)A type of fairlead used to prevent chafing and to give a direct lead of a mooring line to windlass, winch or capstan

(a) Panama Leads (b) Old man or dead man (c) Mooring Bits
(d) Multi Angle Fairleads.

(8) Frames are 'L' shape bar fitted under deck. (True / False).

(9) Panting Beams are fitted in Aft Peak Tank. (True / False).

(10) Floors are found in

(a) Fore Peak Tank (b) Tank top (c) Inside DB Tanks (d) Inside Accommodation

Q.2 Define the following (2 x 5 = 10 Marks)

(a) Righting Lever

(b) Angle of Loll

(c) Free Surface Effect

(d) Gross Tonnage & Net Tonnage

(e) Bilge Keel

SECTION – B

Q.3 M.V Hindship arrives at a port in water of RD 1.012 with drafts F 6.15m, A 7.22m. Her sailing draft in water of RD 1.025 was F 5.33m, A 5.98m. Calculate the weight of cargo discharged at that port, if 120t of fuel and fresh water were consumed in the port. (10 Marks)

Q.4 A ship of displacement 18000t, KM 9.2m, KG 7.9m is listed 8 degrees to stbd. It then works cargo as follows:

Loads 1400t of cargo KG 4.2m, 6.0m to port.

Loads 1200t of cargo KG 7.5m, 4.8m to stbd.

Discharges 950t KG 6.2m, 1.6m from stbd.

Find how many tonnes of ballast must be transferred transversely to upright the vessel, if P & S tanks are 12m apart. (10 Marks)

Q.5 (a) A ship of 9000t displacement has KB 3.8m, KM 6.8m, and KG 6.1m. Find the moment of statical stability at 20degree heel, assuming that the deck edge remains above water. (05Marks)

(b) Explain with sketch stable equilibrium and Unstable Equilibrium of ship. (05Marks)

Q.6 Sketch and label a profile view of a Container ship Showing Holds, D.B Arrangement, Peak tank arrangement, Engine Room & Cell Guide arrangement. (10 Marks)

Q.7(a) Describe the content of General Arrangement Plan. (2 x 5 Marks)

(b) Explain Hogging & Sagging, Describe loading condition which give rise to hog & sag.

Q.8(a) Describe the Bilge Pumping and Piping System of a cargo ship. (2 x 5 Marks)

(b) A ship of displacement 6000t has a tank 15m long, 12m wide and 4m deep which is empty. KM is 7.5m and KG 6.9m. Find the GM fluid if 450t of oil of RD 0.85 is received in it.

Q.9(a) Sketch and Illustrate standard steel sections for (2 x 5 Marks)

(i) Flat Plate (ii) Offset Bulb Plate (iii) Equal Angle (iv) Unequal Angle (v) Channel.

(b) Draw a sketch of typical Forecastle Anchoring arrangements showing the following:

(i)Hawse Pipe (ii) Spurling Pipe (iii) Cable Stopper (iv) Bitter End (v) Chain Locker.