Indian Maritime University

(A Central University, Govt of India)

Mar/Apr'26 SE

Programme Name: DNS

Semester: 1

Subject Code: UD11T6206

Subject Name: SHIP CONSTRUCTION AND SHIP STABILITY - II

Date: 05.03.2026	Max Marks: 70
Duration: 03 Hrs	Pass Marks: 35

General Instructions

(i) All Sections (A, B & C) are to be attempted.

Section A

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

1. The ship's plating subjected to fluctuating pressure and work in and out, this phenomena is popularly known as
   (A) Free surface effect
   (B) Sloshing
   (C) Pounding
   (D) Panting

2. Racking stress can be reduced by
   (A) Removing brackets used in ship structure.
   (B) Allowing the wave to hit sideways
   (C) Using beam knees
   (D) Grounding the ship

3. If the metacentric heights of two floating ships, A and B, are 1m and 1.5m respectively, which statement is correct?
   (A) Body B is more stable than Body A.
   (B) Body A is more stable than Body B.
   (C) Both are equally stable
   (D) Both are unstable.

4. Find the odd one out of these structural components -
   (A) International shore coupling
   (B) Jet and spray nozzles
   (C) Fire main line

(D) Oily water separator

5. Which of the following will increase free surface effect
   (A) No liquid in the tank
   (B) Larger, wider tank
   (C) Narrow and small tank
   (D) Deeper liquid in the tank

6. What is the primary cause of list
   (A) External forces of wind and wave
   (B) A intentional and tempory tilt, by turning the ship.
   (C) Uneven weight distribution with in the vessel.
   (D) Rolling of ship

7. A ship is said to be "heeled" under which of the following conditions
   (A) When it has a permanent inclination to one side due to a cargo shift
   (B) When it is temporarily inclined by an external force, such as a strong wind or a wave
   (C) When its center of gravity is permanently off the centerline
   (D) When it is in a capsizing condition

8. If a heavy weight already on board is shifted upwards, how does the ship's stability changes
   (A) The center of gravity (G) moves downward, and the metacentric height (GM) increases
   (B) The center of gravity (G) moves upward, and the metacentric height (GM) decreases
   (C) The center of gravity (G) moves horizontally, causing a list
   (D) The center of gravity (G) remains unchanged

9. The pressure exerted by a liquid at any point within a tank is dependent on all of the following, except:
   (A) The density of the liquid
   (B) The depth of the point from the free surface
   (C) The acceleration due to gravity
   (D) The shape and volume of the tank.

10. Bilge is a place where
   (A) It is a short form of Bow Intakes Loaded as Garbage and Effluent.
   (B) Surplus liquids collect and pumped out at regular intervals
   (C) The excess cargo is kept to prevent pollution.
   (D) The sludge, garbage, etc. Polluting substances are kept.

Section B

Five Questions of 02 Marks each

11. What is meant by 'pounding' and list which parts of the ship are affected.
12. Why save all and drip trays are used?
13. What is wall sided formula?
14. How the localised loading occurs in a ship? What are its effects?
15. What is the use of bilge piping system for cargo area?

Section C

Five Questions of 10 Marks each. All are compulsory.

16. Explain with a net sketch, the anchoring arrangement of a ship showing all its main components. [10 marks]

17. A) What is hogging and sagging. Explain them in static and dynamic context. [6 marks]
B) What is racking stress? What are its causes? [4 marks]

18. (A) Calculate the righting moment of a ship of displacement 19617 tonnes at an angle of heel 10 degrees if its metacentric height GM is 1.5 meters. [3 marks]
(B) Define Stiff and Tender ships. Compare and contrast the various characteristics of stiff and tender ships [4 marks]
(C) Define Stable, unstable and neutral equilibrium [3 marks]

19. A) A ship at a displacement of 14240 tonnes, had a free surface correction (FSC) of 0.087 meter. Find the FSC, after having discharge of 3210 tonnes of cargo. Assume tank soundings remain unchanged. [5 marks]
B) Sketch the midship transverse section of a listed ship and find Tanθ in terms of displacement and GM. [5 marks]

20. Write short notes on -- [2.5X4 = 10 marks]
A) Consequence of Free surface effect
B) Metacentric height
C) Loadicator of a ship
D) Fire main line

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