

Register No.:

389

April 2024

Time - Three hours
(Maximum Marks: 100)

- [N.B. 1. Answer all questions under Part-A. Each question carries 3 marks.
2. Answer all the questions either (A) or (B) in Part-B. Each question carries 14 marks.]

PART - A

1. Define density.
2. What is centre of gravity?
3. What is amidships?
4. State Simpson's second rule.
5. What is stable equilibrium?
6. What is the method to reduce free surface effect?
7. What is centre of flotation?
8. What are the causes of bilging?
9. What is the function of propeller?
10. What is rudder?

[Turn over.....

PART – B

11. (a) The waterplane area of a ship is 1730 m^2 . Calculate the TPC and the increase in draught if a mass of 270 tonne is added to the ship.
(Or)
(b) Explain the shift in centre of gravity due to movement of mass.
12. (a) Explain (i) water plane area (ii) midship section area.
(Or)
(b) The equally spaced half ordinates of a watertight flat 27 m long are 1.1, 2.7, 4.0, 5.1, 6.1, 6.9 and 7.7 m respectively. Calculate the area of the flat using Simpson's second rule.
13. (a) A box barge of length L and breadth B floats at a level keel draught d . Calculate the height of the transverse metacentre above the keel.
(Or)
(b) A ship of 12,000 tonne displacement has a second moment of area about the centerline of $72 \times 10^3 \text{ m}^4$. The vessel is found to have an angle of loll of 13° . Calculate the metacentric height.
14. (a) Explain the following: (a) centre of flotation (b) longitudinal metacentric height.
(Or)
(b) 500 tonne of oil fuel and stores are used in a ship while passing from sea water of density 1.025 t/m^3 into river water of density 1.000 t/m^3 . If the mean draught remains unchanged, calculate the displacement in river water.
15. (a) A ship travels at 14 knots when the propeller, 5 m pitch, turns at 105 rev/min. If the wake fraction is 0.35, calculate the apparent and real slip.
(Or)
(b) A ship with a metacentric height of 0.4 m has a speed of 21 knots. The centre of gravity is 6.2 m above the keel while the centre of lateral resistance is 4 m above the keel. The rudder is put hard over to port and the vessel turns in a circle 1100 m diameter. Calculate the angle to which the ship will heel.
