

V23/T01071/EE/20160708

Time : 3 Hours

Marks : 80

Instructions :

1. All Questions are Compulsory.
 2. Each Sub-question carry 5 marks.
 3. Each Sub-question should be answered between 75 to 100 words. Write every questions answer on separate page.
 4. Question paper of 80 Marks, it will be converted in to your programme structure marks.
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1. Solve any **four** sub-questions.
 - a) Define Buoyancy and Centre of Buoyancy. Define TPC (Tonne Per Centimeter immersion). The waterplane area of a ship is 1730 m^2 . Calculate the TPC and increase in draught if a mass of 270 tonne is added to the ship. 5
 - b) Define Similar Figures. Explain the relations between diameters, areas and volumes of similar figures. A ship 110 m long displaces 9000 tonne and has a wetted surface area of 2205 m^2 . Calculate the displacement and wetted surface area of a 6 mtr model of the ship. 5
 - c) Explain Simpson's rule for the calculation of areas and volume. The TPC values for a ship at 1.2 m intervals of draught commencing at the keel are 8.2, 16.5, 18.7, 19.4, 20, 20.5 and 21.1 respectively. Calculate the displacement at 7.2 m draught. 5
 - d) Explain the factors that contribute to the Total Resistance of the ship. Give Fraude's approximate formula for the calculation of Frictional Resistance. 5
 - e) Define :
 - i) Speed-length ratio
 - ii) Admiralty coefficient and
 - iii) Fuel coefficientExplain in detail. 5
2. Solve any **four** sub-questions.
 - a) What are (i) Metacentric Height and (ii) Righting Lever? Explain with sketches conditions of (i) Stable equilibrium, (ii) Neutral equilibrium and (iii) Unstable equilibrium. 5
 - b) Derive a formula for finding out 'BM' at small angle ' ϕ ' of heel. 5

- c) What are (i) Cross curves of stability and (ii) Curve of statical stability? What information do you get from the curve of statical stability and how can you calculate the initial GM from it? 5
- d) Define (i) trim, (ii) centre of floatation and (iii) mean draught. Explain what is an angle of loll. 5
- e) State (i) a formula for calculating the change in mean draught due to change in density, (ii) a formula for calculating the change in trim due to change in density when the vessel enters from sea water to fresh water and (iii) a formula for calculating the change in trim due to change in density when the vessel enters from fresh water to sea water. 5

3. Solve any **four** sub-questions.

- a) Why is the movement of the ship restricted to 35 degree max. on both sides of the ship? 5
- b) What is wake, wake fraction of a ship? Explain real and apparent slip of propeller blade. 5
- c) What is self propulsion point? 5
- d) State the standard loading conditions for strength of ship. 5
- e) What is cavitation of propeller? What are its effects? 5

4. Solve any **four** sub-questions.

- a) Write notes on different types of rudders. 5
- b) Sketch different types of rudders. 5
- c) Discuss the force on rudder section in open water condition and its components. Define coefficients of lift, drag, normal force. 5
- d) What are the advantages of a balanced rudder over two other types of rudders? Why is angle of turn for the rudder is limited to 35 degrees? 5
- e) Discuss the rolling of a ship in resisting fluid in still condition. 5

