

**B.Tech. Degree VI Semester Regular/Supplementary Examination in
Marine Engineering April 2021**

**MRE 1607 NAVAL ARCHITECTURE-II
(2013 Scheme)**

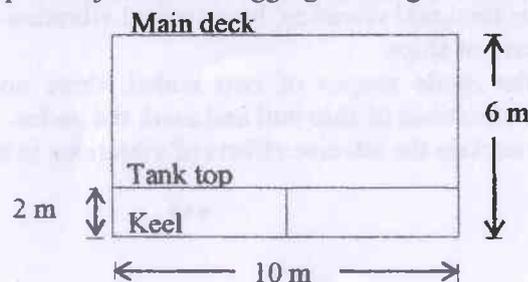
Time: 3 Hours

Maximum Marks: 100
(5 × 20 = 100)

- I. (a) What do you mean by 'balancing ship in a wave'? Explain its purpose and the procedure to do it. (8)
- (b) A ship of uniform rectangular cross section has the following particulars. Length = 150 m, breadth = 22 m and total weight = 27000 t. Out of the total weight, 21000 t is uniformly distributed over the entire length of the ship. The remaining weight is uniformly distributed over a length of 30 m amidships. Prepare shear force curve and bending moment curve for the still water condition. (12)

OR

- II. (a) Explain various steps for determining the distribution of load, shear force and bending moment along the length of a ship. With help of neat sketches, compare feature of bending moment curves for sagging and hogging conditions of a ship. (8)
- (b) Figure given below shows the midship section of a ship having breadth = 10 m and depth = 6 m. Assume that all plates and sections are of 12 mm thickness. Determine the bending stresses at the main deck and the keel if the ship is subjected to a sagging bending moment of 35 MNm. (12)



- III. (a) Briefly describe the following: (8)
- (i) Ring propeller
 - (ii) Voith Schneider propeller
 - (iii) Controllable pitch propeller
 - (iv) Kort nozzle
- (b) Describe the blade element theory of screw propeller. (12)

OR

- IV. (a) With the help of neat sketches explain the following for a left handed screw propeller: (8)
- (i) Leading edge
 - (ii) Trailing edge
 - (iii) Root
 - (iv) Tip
 - (v) Rake
 - (vi) Skew
 - (vii) Face
 - (viii) Back
- (b) Explain cavitation of propellers. What are the effects of cavitation on the performance of a propeller? What are the methods to reduce cavitation? (12)

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- V. (a) Explain the parameters influencing the force acting on a rudder. How do you estimate the torque and bending moment acting on a rudder stock? (10)
- (b) Describe the following for a balanced type rudder with the help of neat sketches: span, chord, thickness, root, tip, leading edge, thickness chord ratio, taper ratio and aspect ratio. (10)
- OR**
- VI. (a) Briefly describe various manoeuvres carried out during trials for testing the manoeuvrability of ships. (10)
- (b) With the help of neat sketches, explain various types of rudders used in ships. (10)
- VII. (a) Describe trochoidal wave theory. (10)
- (b) Explain the forces caused on ship parts by rolling and pitching. (10)
- OR**
- VIII. (a) Describe any two active and two passive antirolling devices used in ships. (10)
- (b) Explain wave spectrum. What is its relevance? (10)
- IX. Answer any four. (4×5=20)
- (a) Explain the main sources of excitation for vibration in ships.
- (b) What are the aspects to be considered during design stage of a ship for reduction of vibration?
- (c) With reference to hull vibrations, explain following terms: mode shape, natural frequency, amplitude, cycle and node.
- (d) Explain resonance in the context of hull vibrations.
- (e) Describe torsional vibration, longitudinal vibration and vertical vibration in the case of ships.
- (f) Draw the mode shapes of two noded, three noded and four noded vertical vibrations of ship hull and mark the nodes.
- (g) Briefly explain the adverse effects of vibrations in ships.
