B.Tech. Degree VI Semester Examination in Marine Engineering May 2018

MRE 1607 NAVAL ARCHITECTURE II
(2013 Scheme)

Time : 3 Hours   Maximum Marks : 100

$(5 \times 20 = 100)$

I.   (a)   Draw the sheer force diagram and bending moment diagram for a wooden   (5) block of uniform rectangular cross section having a length of 1 m, breadth of 0.2 m and depth of 0.2 m. The block weighs 200 N and has uniform density. Assume that the block is floating in fresh water.

      (b)   Explain how you will generate the curves of weight, buoyancy, sheer force and   (15) bending moment for a conventional ship type with the help of neat sketches.

OR

II.   (a)   How do you estimate the wave bending moment along the length of a ship?   (5) What is the use of this information?

      (b)   A barge of uniform rectangular cross section having length = 45 m,   (15) breadth = 15 m is floating on an even keel draft of 2 m is seawater. Two masses, 30 tonne each, are added at a distance of 10 m from each ends (i.e. forward and aft) and a weight of 50 tonne is added uniformly over the 25 m amidships. Draw the sheer force diagram and indicate the maximum sheer force.

III.   (a)   Differentiate between a fixed pitch propeller and a controllable pitch propeller.   (5)

      (b)   What is a right handed propeller? Briefly explain the following for a right   (15) handed propeller and mark them on a neat sketch: (i) Skew   (ii) Rake (iii) Leading edge   (iv) Trailing edge   (v) Diameter   (vi) Face (vii) Back   (viii) Boss.

OR

IV.   (a)   Explain the cavitation of ship's propellers.   (5)

      (b)   Thrust developed by a propeller having diameter = 5.4 m, pitch ratio = 0.875   (15) and blade area ratio = 0.46 is 860 kN at 1.87 revolutions per second when the real slip = 28% and propeller efficiency = 68%. Calculate the following for the above loading condition. (i) Thrust power   (ii) Delivered power.

V.   (a)   Discuss the various aspects regarding positioning of rudder in a ship.   (5)

      (b)   Briefly explain the following for a rudder with the help of neat sketches: (15) (i) Root (ii) Tip (iii) Leading edge (iv) Trailing edge (v) Span (vi) Chord (vii) Mean thickness (viii) Geometric aspect ratio (ix) Thickness chord ratio (x) Taper ratio (xi) Area.

OR

VI.   (a)   What is meant by balancing of rudders? Explain the classification of rudders   (10) based on this.

      (b)   A vessel turns in a radius of 300 m at a speed of 20 knots under the action of a   (10) rudder force of 1.5 MN. If the draught of the ship = 5 m, KG = 6 m and GM_T = 2m, find the approximate angle of heel during the steady turn. Assume the centre of lateral resistance to be at half the draft above the keel.

VII. (a) Briefly explain the various oscillatory motions associated with a ship at sea. (5)

      (b) Explain any two types of antirolling devices with the help of neat sketches. (15)

OR

VIII. (a) Explain wave spectra. (5)

      (b) Explain the sinusoidal wave theory. (15)

IX. (a) List down the various ways to reduce vibration in ships. (5)

      (b) Explain the various disturbing forces causing vibration in ships. (15)

OR

X. (a) Briefly explain the various adverse effects of vibrations in ships. (6)

     (b) Explain the following with reference to the vibration in ships (i) Amplitude (ii) Cycle (iii) Exciting frequency (iv) Natural frequency (v) Node (vi) Antinode (vii) Mode (viii) Resonance. (14)

***