B. Tech Degree VI Semester Examination in Marine Engineering   July 2010
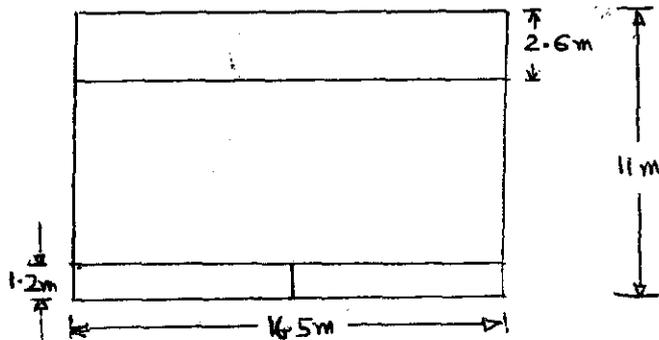
MRE 607 NAVAL ARCHITECTURE II

Time : 3 Hours   Maximum Marks : 100

I. (a) How do you determine the bending moment distribution curve along the length of a ship? (5)

(b) The midship section of a ship of breadth 16.5m and depth 11m is shown in the figure below. All plates and girder are of 12.5mm thickness. Determine the minimum section modulus. (15)

OR

II. (a) Sketch and describe the general characteristics of shear force and bending moment distribution curves along the length of a ship. (5)

(b) A ship with uniform cross section is 120m long, 18m wide and 11m deep. The total weight of the ship is 16860t of which 13860t is evenly distributed over the entire length of the ship. The remaining weight is evenly distributed over 40m length amidships. Determine the weight distribution curve, buoyancy distribution curve, load curve, shear force curve and bending moment curve. (15)

III. (a) Derive the equation of motion of a ship for unresisted rolling in still water. Write down the expression for free rolling period and explain the terms. (10)

(b) A ship of 9900t displacement has GM = 1m and a still water rolling period of 15 seconds. Calculate the new rolling period when a mass of 100 tonnes is loaded at a pposition 10m above the ship's centre of gravity. (10)

OR

IV. (a) Explain the various roll stabilizers. Make neat sketches. (10)

(b) Write down the equations for the following properties of sinusoidal waves and explain the terms involved.

(i)   Wave number   (ii)   Wave velocity
(iii) Wave length   (iv)   Wave period
(v)   Surface profile   (10)

V. (a) Describe propeller cavitation. What are the methods to reduce cavitation? (10)

(b) Draw neat sketches of a right handed screw propeller and indicate leading edge, trailing edge, hub, shaft, root, tip, rake and skew. (10)

OR

VI. (a) Describe the various types of propellers used for ship propulsion. (10)

(b) A ship at a speed of 15 knots has the following particulars : Ps = 3050kW, rpm = 95, propeller thrust = 358 kN, apparent slip = 0. For a wake fraction of 0.45 and a thrust deduction factor of 0.20 determine the real slip and effective power. (10)

VII.	(a)	Describe the common types of rudders with the help of neat sketches. How are they classified?	(10)
	(b)	Explain the various kinds of motion stability associated with ships. Make neat sketches.	(6)
	(c)	Define mean span, mean chord, thickness ratio and taper ratio for a rudder.	(4)

OR

VIII.	(a)	Explain angle of heel due to force on rudder.	(6)
	(b)	Write short notes on ideal section and location of a rudder.	(4)
	(c)	How do you calculate the forces on rudder and torque on rudder stock?	(10)

IX.   Write short notes on *any four*

(i)   Frequency of encounter

(ii)   Strength, Duration, Fetch, Sea and Swell.

(iii) Wave spectrum

(iv)   Angle of heel when turning.

(v)   Zig-zag maneuver

(vi)   Wake

(vii) Propulsive Co-efficient (PC) and Quasi-propulsive Co-efficient. (QPC)   (4 x 5 =20)

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