B.Tech Degree VI Semester Examination in Marine Engineering May 2012

MRE 607 NAVAL ARCHITECTURE II

Time: 3 Hours   Maximum Marks: 100

I.   (a)   Sketch the buoyancy curve of a ship of normal hull form for still water condition. Explain how the ordinates of the curve can be obtained.   (7)

      (b)   Explain how the weight curve of a ship can be obtained. Draw a typical sketch.   (7)

      (c)   A rectangular barge of uniform construction is loaded with homogeneous cargo in all holds. Obtain the buoyancy curve, weight curve and load curve for the still water condition. (Total weight of hull and cargo is W and length of barge is L).   (6)

OR

II.   (a)   Sketch a typical load curve of a ship in still water. Explain how shear force curve can be obtained. Make a sketch of shear force curve corresponding to the load curve and explain the features.   (7)

      (b)   Explain how the longitudinal bending moment curve can be obtained from shear force curve. Make a sketch and explain the features.   (7)

      (c)   Explain with sketches how the buoyancy curve changes from that of still water condition in cases of sagging wave and hogging wave condition.   (6)

III.   A rectangular barge has hull weight of 5000t. It has found holds of equal length. A homogenous cargo of 10000t is distributed in four holds as follows: 3000t each in central holds and 2000t each in end holds. Assuming hull weight to be uniformly distributed over length determine the following:
             (i)   Buoyancy curve
             (ii)   Weight curve
             (iii)   Load curve
             (iv)   Shear force curve
             (v)   Bending moment curve $(5 \times 4 = 20)$

OR

IV.   A ship has a midship section as shown. Calculate the section modulus at deck and bottom. How much longitudinal bending moment this cross section can resist if the permitted bending stress is 200MPa?   (20)
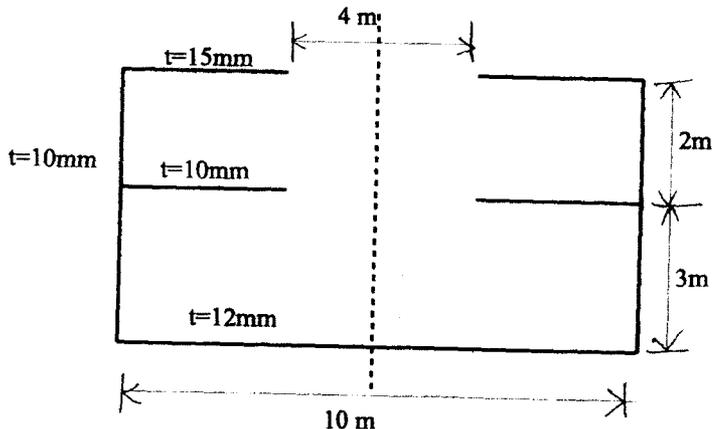
V.	(a)	Explain how the thrust required to push the ship forward is generated from a screw propeller.	(6)
	(b)	Define pitch, pitch ratio, apparent slip and real slip of a screw propeller.	(6)
	(c)	A propeller has a pitch of 4.2m, pitch ratio of 0.8 and rpm of 120. Speed of ship is 14 Km and wake fraction is 25%. Calculate apparent slip and real slip.	(8)

OR

VI.	(a)	Distinguish between fixed pitch propeller, variable pitch propeller and controllable pitch propeller.	(6)
	(b)	Explain thrust power, shaft power, delivered power and effective power.	(6)
	(c)	A propeller has pitch of 4.5m and pitch ratio of 0.75. Hub radius is 0.2 R. Calculate pitch angle at root and tip of blade.	(8)

VII.	(a)	Explain with neat sketches features of different types of rudders used in ocean going ships.	(10)
	(b)	With the help of neat sketches explain leading edge, trailing edge, root, tip, mean span, mean chord, aspect ratio, taper ratio and thickness chord-ratio of a rudder.	(10)

OR

VIII.	(a)	Explain the action of a rudder in turning the ship. How do you estimate the angle of heel while turning? Discuss the situation when the rudder angle is suddenly reduced to zero while turning.	(10)
	(b)	Write down the expression for rudder force and explain the terms. How do you calculate the torque on rudder stock?	(10)

IX.	Write short notes on *any four* of the following:	
	(i)	Anti-rolling devices
	(ii)	Effect of waves on bending moment of ships in sea
	(iii)	Describe the irregular sea by spectrum method
	(iv)	Trochoidal waves
	(v)	Period of encounter
	(vi)	Parameters influencing rolling period of ship
	(vii)	Sea state

$(4 \times 5 = 20)$

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