INDIAN MARITIME UNIVERSITY

(A Central University, Govt.of India)

May/June 2015 End Semester Examinations

SEMESTER – VI, B.TECH (MARINE ENGINEERING)

NAVAL ARCHITECTURE - II (T 1605)

Date:20.06.2015 **Max.Marks:100**

Time:-3 Hrs **Pass Marks:50**

PART – A (3 x10 = 30 Marks)

(Compulsory Questions)

1. a) State the difference between Right Handed & Left Handed Propeller

   b) What do you understand by Sagging & Hogging of a Ship.

   c) With respect to the action of rudder of a ship, explain the significance of Zigzag manoeuvring.

   d) What is a Trochoidal Wave and explain its significance.

   e) Explain the difference between Real Slip & Apparent Slip of a propeller.

   f) Explain why the rudder of a ship is fitted at the aft end & not at the forward end of the ship.

   g) Draw a free hand sketch of wave profile of an irregular wave system as well as a histogram (Normal Distribution) of the wave height data against frequency of occurrence.

   h) When a ship is floating in an inclined condition, identify, with reason, the areas where the bending moment is maximum.

   i) Differentiate between Taylor's wake fraction & Froude's wake fraction.

   j) Explain why the rudder movement in a ship is restricted to 35 degrees.

PART – B **(5 x14 = 70 Marks)**

(Answer any five of the following)

2. Experiments on a model propeller of diameter 30 cms. run at 500 rpm, gives the following results:-

J	0	0.2	0.4	0.6	0.8	1.0	1.2
KT	0.715	0.62	0.50	0.37	0.25	0.14	0.03
KQ	0.13	0.114	0.094	0.072	0.05	0.032	0.014

Plot the curve of efficiency of the model propeller against J and hence find the maximum efficiency and the corresponding speed of advance.

3. A single screw ship with a speed of 15 knots has a rectangular unbalanced rudder, which is 4.6 m. deep and 3.05m wide. Determine the diameter of the rudder stock, assuming maximum allowable stress of 77.22 MN/ sq. metre and a rudder angle of 35 degrees for ahead condition. The following data are available:- Normal Rudder Force = 18.0 a $v^2 \emptyset$ Newton, when a=area of rudder in sq.m; v = speed of ship in m/s, & $\emptyset$ = angle of helm in degrees. And position of c.o.p from the leading edge = 0.35 x breadth.

4. A ship of 135 m length has a displacement of 12500 t and a radius of gyration about the longitudinal axis of 9.24 metre. Find the natural period of roll, taking the added mass to be 20% of the actual mass of the ship. **(7)**
   Derive any formula used **(7)**

5. Considering a ship being static in still water, draw the typical curves of distribution of weights, buoyancy, and the curves of corresponding shear force and bending moment .

6. A ship of 12400 t displacement is 120 m long17.5 m beam floats at a draught of 7.5m. The propeller has a face pitch ratio of 0.75 and when running at 100 r.p.m, produces a ship speed of 12 knots with a real slip of 30%. Calculate the apparent slip, pitch and diameter of the propeller. The wake fraction Wt(Taylor) may be found from the expression given by Wt=O.5Cb—0.05.

7. A vessel travelling at 17 knots turns with a radius of 450m, when the rudder is put hard over. Given that, KG=7.0m & KM=7.45m & KB=4.0m. If the centripetal force is assumed to act at the centre of buoyancy, calculate the angle of heel. **(10)**
   Derive the formula used **(4)**

8. A box barge of uniform construction is 32 metre long and displaces 352 t when empty .It is divided by transverse bulkheads into four equal compartments. Cargo is loaded in each compartment and level stowed.as given:- No.1 Hold—192 t, No.2 hold—224t, No.3 hold—272t & No.4 hold-176t.Construct the Load & Shearing force diagrams. State the position and magnitude of maximum bending moment.

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