



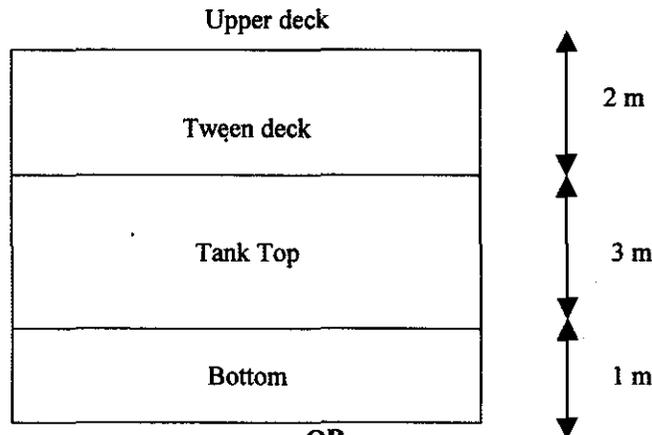
B. Tech Degree VI Semester Examination in Marine Engineering, November 2008

MRE 607 NAVAL ARCHITECTURE – II

Time : 3 Hours

Maximum Marks : 100

- I. (a) Sketch and explain the general nature of vertical shear force and vertical bending moment distribution along the length of the ship. (5)
- (b) The figure shows the midship section of a ship of breadth = 10 m and depth = 6 m. All plate thicknesses are 15 mm. This cross section is subjected to a sagging bending moment of 6000 t-m. Calculate the bending stresses at upper deck, tween deck, tank top and bottom plates. State whether tensile or compressive. (15)



OR

- II. (a) Differentiate between still water bending moment and wave bending moment. Can there be hogging in both the cases? (5)
- (b) A vessel with constant cross section is 140 m long, 20 m wide and 13 m deep. The total weight is 25830 t of which 20830 t is distributed uniformly along the length. The rest of the weight is spread over 40 m length amidships. Obtain the weight curve, buoyancy curve; shear force curve and bending moment curve. Obtain also the shear force and bending moment at 60 m from one end. (15)
- III. (a) Derive the equation of motion for free rolling of a ship. Write down the expression for free rolling period. Explain how loading and unloading affect rolling period. (10)
- (b) A ship of 5000 t displacement has $GM = 0.5$ m. The period of roll in still water is 20 seconds. A mass of 100 t is discharged from a position 14 m above centre of gravity of ship. Find the new period of roll. (10)
- OR
- IV. (a) Compare the features of sinusoidal waves and trochoidal waves. Write down the expression for a travelling sinusoidal wave and explain the terms. How is the wave velocity related to wave length? (10)

(Turn Over)

- (b) Explain six degrees of freedom and motions associated with them. Which of them are periodic oscillations and why they must be controlled? (10)
- V. (a) Sketch a typical rudder and define span, chord, aspect ratio, taper ratio, leading edge, trailing edge, root, tip etc. (10)
- (b) Which are the common types of rudders? Make neat sketches. How do you classify them? (10)
- OR**
- VI. (a) Explain the turning action of ship and the role of rudders. (10)
- (b) What are the parameters affecting the rudder forces? How do you calculate the rudder torque? (10)
- VII. (a) Explain various powers of the power train of ships starting from main engine and state various efficiencies. What are propulsive coefficient (PC) and quasi propulsive coefficient (QPC)? (10)
- (b) Explain various propeller types. (10)
- OR**
- VIII. (a) Draw neat sketches of a right handed screw propeller and show leading edge, trailing edge, root, tip, hub, shaft, skew and rake. (10)
- (b) A propeller has a diameter of 5 m and pitch ratio of 0.8. The ship's velocity is 14 kn. at 120 rpm. Wake fraction is 22%. Calculate apparent and real slip. (10)
- IX. Write short notes on any four : (4 x 5 = 20)
- (i) Wave spectrum
 - (ii) Period of encounter
 - (iii) Balancing of rudder
 - (iv) Roll stabilizers
 - (v) Cavitation of propellers
 - (vi) Admiralty coefficient, fuel coefficient and their uses.
