

## ***B. Tech Degree V Semester Examination in Marine Engineering January 2011***

### **MRE 507 NAVAL ARCHITECTURE I**

Time : 3 Hours

Maximum Marks : 100

- I. (a) Briefly describe the following ship types with the help of neat sketches :  
 (i) L.P.G carriers (ii) Crude oil tankers  
 (iii) Container ships (iv) Bulk carriers. (10)
- (b) With the help of neat sketches explain any four offshore structures used for oil exploration or oil production. (10)
- OR**
- II. (a) Explain statutory ship surveys. What are the important certificates to be carried in a ship? (15)
- (b) Explain dynamic positioning systems. (5)
- III. (a) Construct the lines plan of a vessel having a triangular cross section. (10)
- (b) Explain the various form co-efficients used to describe the hull geometry. (5)
- (c) Show that Simpson's first rule can be used to calculate the area of a square shape. (5)
- OR**
- IV. The half ordinates of load water plane of a ship 162 m long floating in seawater ( $\rho = 1.025 \text{ t/m}^3$ ) are as follows :
- |                       |   |               |   |   |   |    |    |    |   |                |   |
|-----------------------|---|---------------|---|---|---|----|----|----|---|----------------|---|
| Station               | 0 | $\frac{1}{2}$ | 1 | 2 | 3 | 4  | 5  | 6  | 7 | $7\frac{1}{2}$ | 8 |
| $\frac{1}{2}$ ord (m) | 0 | 2             | 4 | 6 | 8 | 10 | 10 | 10 | 8 | 6              | 2 |
- Find : (i) Area of water plane (ii) LCF  
 (iii) TPC (iv)  $I_T$   
 (v)  $I_L$  about a transverse axis through LCF (20)
- V. (a) A vessel of constant triangular cross section has a depth of 12 m and a breadth at the deck of 15 m. Calculate the draught at which the vessel will become unstable if the centre of gravity is 6.675 m above the keel. (8)
- (b) Explain the components of ship's resistance. Explain Reynold's Number and Froude Number and their effects on resistance. (12)
- OR**
- VI. (a) Explain the procedure and purpose of Inclining Experiment. What are the precautions to be taken for the inclining experiment? (11)
- (b) Explain the following :  
 (i) Shaft power (ii) Delivered power  
 (iii) Effective power (iv) Quasi propulsive co-efficient  
 (v) Hull efficiency (vi) Shaft transmission efficiency (9)

A box shaped vessel 40 m long 8 m wide and 6 m deep floats in salt water ( $\rho = 1.025 \text{ t/m}^3$ ) on an even keel at 3 m draught.  $GM_t = 1 \text{ m}$ . Find the new  $GM_t$  if an empty compartment 4 m long and situated amidships is bilged. (10)

A box shaped vessel 40 m x 6 m x 3 m is floating in salt water ( $\rho = 1.025 \text{ t/m}^3$ ) on an even keel at 2 m draught. Find the new draughts forward and aft if a mass of 35 t, located at a position 6 m aft of the forward end, is discharged from the ship. (10)

**OR**

Explain how do you calculate the draught forward and aft of a rectangular barge if a compartment at its forward end is bilged. (10)

Explain factor of subdivision and permeability. (4)

A ship of 6000 t displacement, having a trim of 0.3 m by the stern, enters a dry dock.  $KM = 7.5 \text{ m}$ ,  $KG = 6 \text{ m}$  and  $MCT_{1\text{cm}} = 90 \text{ tm}$ . The centre of floatation is 45 m from aft. Find the effective metacentric height at the critical instant before the ship takes the blocks overall. (6)

Write short notes on any five of the following :

- (i) Effect of suspended mass on ship's C.G.
- (ii) Tchebycheff's rule
- (iii) MARPOL
- (iv) Ro - Ro ships
- (v) Dynamical stability
- (vi) Admiralty Co-efficient and fuel co-efficient
- (vii) Floodable length curves
- (viii) Alternation of draught and trim due to change in density. (5 x 4 = 20)

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