

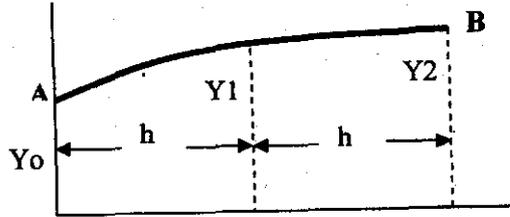
**B.Tech. Degree V Semester Examination in Marine Engineering
March 2008**

MRE 507 NAVAL ARCHITECTURE I

Time: 3 Hours

Maximum Marks: 100

- I a) Briefly describe the ship types. Bulk Carriers, Container Ships, Crude Oil Tanker and General Cargo Ships (5)
 b) Explain various activities related to offshore technology. (5)
 c) Explain the role of classification societies and statutory bodies regarding the safe construction and operation of ships. (10)
- OR**
- II a) Describe LNG and LPG carriers and the containment systems. (5)
 b) Explain various oil production systems. (5)
 c) Explain periodic survey. (10)
- III a) Explain with the help of neat sketches half breadth plan, profile and body plan. (5)
 b) Compute the area under the curve AB and its centroid using Simpson rules. (5)



- c) A ship of 6000t displacement has $KG = 6.0\text{m}$ and $KM = 7.5\text{m}$. The following cargo operation is performed. Find the value of KM after the operation. (5)

Mass of Cargo (t)	Operation	KG of cargo (m)
1000	Loaded	2.5
500	Loaded	3.5
750	Loaded	9.0
450	Discharged	0.6
800	Discharged	3.0

- d) Define TPC_{1cm} , C_B , C_P , C_M and C_W . (5)
- OR**

- IV a) Sketch the lines plan of a submarine whose hull is made up of a cylindrical portion and two hemispherical portions at the ends. (5)
 b) A ship of 5000t displacement has $KG = 4.5\text{m}$ and $KM = 5.3\text{m}$. A cargo of 2000t is loaded at a height of 3.7m from keel and 1000t is loaded at 7.5m above keel. A deck cargo is to be loaded at a height of 9.0 above keel. How much deck cargo can be carried if the minimum GM to be maintained is 0.3? (5)
 c) Compute the section area by Simpson's rule and trapezoidal rule. Water line spacing is 3.0 m. (5)

WL No.	0	1	2	3	4	5
$\frac{1}{2}$ breadth [m]	3.0	19.1	22.3	23.7	24.2	24.4

- d) A cargo load W has to be discharged from the bottom (port side) using ship's own derrick. The ship lies with its starboard side to the quay. Describe how the CG of the ship changes position during the operation. (5)

- V a) Define the following :
- i) Metacentre
 - ii) Metacentric radius
 - iii) Metacentric height
 - iv) Heeling moment
 - v) Righting moment
- b) When a ship of 12000t displacement is heeled to 6.5° the moment of statical stability is found to be 600 t-m. Calculate initial metacentric height. (5)
- c) Briefly explain the components which make the total resistance of ships. (5)
- d) Explain :
- i) Effective power
 - ii) Delivered power
 - iii) Brake power
 - iv) Quasi-propulsive coefficient
- OR
- VI a) What is the purpose of conducting an inclining experiment? Briefly explain the procedure. (5)
- b) Compare static stability and dynamic stability. (5)
- c) Explain how the resistance of ship is related to speed, wetted surface area and length of the ship. (5)
- d) A 6000t destroyer develops a total power of 44.74MW at 30km. If effective power is 50% of this power, calculate the bare hull resistance. (5)
- VII a) Define moment to change trim by one centimeter (MCT_{1cm}). (5)
- b) A ship has following particulars : $\Delta = 6000t$, $L_{BP} = 126.0m$; $MCT_{1cm} = 120t\cdot m$, draft aft = 6.5m; draft for 'd' = 5.5m, LCF = 3m aft of midships. A mass of 120t already on board is shifted forward by 45m. Find new drafts. (5)
- c) What are the effects of flooding? (5)
- d) A box shaped vessel is 64m long and is floating on an even keel at 3.0m draft. A compartment amidships is 20m long and contains cargo having permeability of 25%. Calculate mean draft if this compartment is bilged. Compare this with the case when the compartment was empty. (5)
- OR
- VIII a) Define trim, trim forward, trim aft, forward draft marks and aft draft marks. (5)
- b) Define floodable length. (5)
- c) A ship 90 m long is floating at drafts 4.5m for d and 5.0m aft. The LCF is 1.5m aft of midships $TPC = 10t$, $MCT_{1cm} = 120t\cdot m/cm$. A mass of 450t is loaded at a distance of 14m forward of midships. Find new drafts. (5)
- d) A box shaped vessel 75m long, 10m wide and 6m deep if floating in sea water on even keel draft of 4.5m . Calculate the trimming moment produced if a forward compartment 5m long and empty is bilged. (5)
- IX Write short notes on any FIVE of the following :
- i) Marpol regulations
 - ii) Statutory certificates
 - iii) Conditions of equilibrium for surface ship and submarine
 - iv) Froude's law of comparison
 - v) Admiralty coefficient and feel coefficient
 - vi) Tchebycheff's rule
 - vii) Free surface effect
 - viii) Stability at large angles.
- (5 x 4 = 20)

