B.Tech Degree V Semester Examination in Marine Engineering December 2011

MRE 507 NAVAL ARCHITECTURE I

Time : 3 Hours Maximum Marks : 100

(5 x 20 = 100)

I. (a) Describe Bulk carriers, Tankers and Container ships.
(b) Describe ship's survey.

OR

II. (a) Explain the roles and functions of Classification societies and IMO.
(b) Explain various offshore oil rigs and platforms.

III. (a) Show that the area of a right angled triangle with base 'b' and altitude 'h' can be found exactly by using Simpson's first rule.
(b) A ship of length 150m, breadth of 21m and draft of 8.8m has displacement of 21,000t. Area of load waterplane is 2300m^2 and area of immersed midship section of 150 m^2. Calculate waterplane area coefficient (C_w), block coefficient (C_B), prismatic coefficient (C_p) and midship section area coefficient (C_M).

OR

IV. (a) Explain waterplane area coefficient (C_w), block coefficient (C_B), prismatic coefficient (C_p), midship section area coefficient (C_M) and centre of floatation (F).
(b) The half ordinates in meters of a water plane of a ship 120m long are as follows:

Stn.	0	½	1	1½	2	3	4	5	6	7	8	8½	9	9½	10
½ord	1.2	3.5	5.3	6.8	8.0	8.3	8.5	8.5	8.4	8.2	7.9	6.2	6.2	3.5	0

Calculate (i) water plane area (ii) longitudinal centre of floatation.

V. (a) The TPC values of a ship at regular intervals of draft are shown below. Calculate the displacement in sea water and vertical position of centre of buoyancy at a draft of 9m.

Draft (m)	keel	1.5	3.0	4.5	6.0	7.5	9.0
TPC	4.0	6.1	7.8	9.1	10.3	11.4	12.0

(b) What is wetted surface area and explain how this is obtained. What is the use of this quantity? Describe any one approximate formula for obtaining wetted surface area.

OR

VI. (a) Explain how areas of similar figures and volumes of similar bodies vary. A ship 100m long has 9000t displacement and has wetted surface area of 2200m^2. Calculate the displacement and wetted surface area of a 6m model of the ship.
(b) A ship of 4000t displacement has its centre of gravity 6m above keel. Find the new displacement and new centre of gravity of ship when masses 1000t, 200t, 5000t and 3000t are added at positions of 0.8m, 1.0m, 5.0m and 9.5m respectively above the keel.

VII. (a) With the help of neat diagram explain metacentre, metacentric radius, metacentric height and righting lever of a ship. Demonstrate the conditions of stable and unstable equilibrium.

(b) Using Froude's formula calculate frictional resistance of a ship at 15kn speed and power required to overcome this resistance.
(given data: wetted surface area = $5000m^2$; f=0.422; n=1.825.)

OR

VIII. (a) Explain frictional resistance, residuary resistance and total resistance of a ship. Which are the factors influencing them?

(b) A rectangular box shaped barge floating in salt water on even keel has the following data: Length=65m; breadth = 12m; depth=8m; draft=4m; KG=4m. Calculate the steady heeling moment required to heel the ship to 5°.

IX. (a) Explain trim, mean draft, draft markings and MCT 1cm.

(b) A box shaped vessel 40m long, 6m wide floats at even keel draft of 2m. An empty compartment at midships 10m long is bilged. Find the new GM if it originally had a GM of 0.6m.

OR

X. (a) Explain floodable length curves and its importance.

(b) A ship has following data: Displacement=6000t; length=126m; draft forward = 5.5m; draft aft=6.5m; LCF=3m aft of midships; MCT 1cm = 240t-m; A mass of 120t already on board is shifted forward a distance of 45m. Find new drafts.

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