B.Tech. Degree V Semester Examination in Marine Engineering December 2013

MRE 507 NAVAL ARCHITECTURE I

Time: 3 Hours

Maximum Marks: 100

(5 x 20 = 100)

I. (a) Describe any four ship types with regard to their method of construction, cargo carried, speed and deadweight ranges.

   (b) Describe the purpose of periodical survey and how often they are conducted.

OR

II. (a) Explain briefly the rigs used for oil explorations and production.

   (b) What are LNG and LPG carriers? Discuss their importance in global market. Explain the constructional features of their cargo containment systems.

III. (a) Explain various coefficients of form of a ship with the help of neat sketches.

   (b) A ship of 8000t displacement floats in sea water of 1.025t/m3 and has a TPC of 14. The vessel moves into harbour water of 1.015t/m^3 and loads 300t of oil fuel. Calculate change in mean draft.

OR

IV. (a) A ship of length 170m has the following half ordinates in meters:

Station	0	1	2	3	4	5	6	7	8	9	10
$\frac{1}{2}y$	1.1	7.8	12.1	13.4	13.9	14	13.8	13.5	11.9	7.2	0

   Calculate the centroid of water plane and TPC.

   (b) A ship has the following data: L_{BP}=200m, breadth = 22m, draft = 7m, prismatic coefficient = 0.75, area of water plane = 3500m^2, displacement in sea water of density 1.025t/m^3 is 23000t. Calculate-
   (i) block coeff. (ii) water plane area coeff. (iii) midship section coeff.

V. (a) A ship has 10000t displacement before unloading. A cargo parcel of 60t is lifted from tween deck and unloaded. The tween deck is 2.5m below and the head of the crane 7.5m above the main deck. Calculate the position of vertical C.G of the ship when:
   (i) cargo is just lifted from tween deck
   (ii) cargo is at main deck level, still held by crane
   (iii) cargo unloaded

   (b) The wetted surface area of a ship is twice that of a similar ship. The displacement of the latter is 2000t less than the former. Determine the displacement of the latter.

OR

VI. (a) What is wetted surface area? How do you calculate the wetted surface area of a ship? How are the wetted surface areas of two similar ships related?

   (b) A ship of 6000t displacement has KG=6m, KM=7.3m. The following cargo operations are performed in a port. Find the final GM.

Cargo weight (t)	C.G. of cargo weight (m)	operation
1000	2.5	loaded
500	3.5	loaded
750	9.0	loaded
450	0.6	unloaded
800	3.0	unloaded

(P.T.O.)

VII.   (a)   A vessel with a cross section of isosceles triangle floating with its apex down has the following particulars: L=32m, B=8m, D=5m, draft=4m and KG=3.7m. Find initial metacentric height (transverse).

      (b)   A propeller has a pitch of 5.5m. When rotating at 80rpm the ship speed is 13.2kn, speed of advance 11kn, propeller efficiency 70% and delivered power 3000kW. Calculate (i) real slip   (ii) wake fraction   (iii) propeller thrust.

OR

VIII.   (a)   Explain dynamical stability and its importance.

      (b)   A ship 15000t displacement has a shaft power of 4500kW at 14.6kn. The shaft power is reduced to 4120kW and the fuel consumption at the same displacement is 541kg/h. Calculate the fuel coefficient for the ship.

IX.   (a)   Define floodable length, permeability, factor of subdivision and criterion of service.

      (b)   A box shaped vessel with L=90m, B=10m, depth=6m floats in salt water at an even keel draft of 3m. Find new drafts if a weight of 60t already on board is shifted a distance of 40m aft.

OR

X.   (a)   Define trim, mean draft, trim aft, trim forward amd MCT_{icm}.

      (b)   A box shaped vessel 75m long, 10m breadth, 6m depth is floating in salt water at an even keel draft of 4.5m and with a KG=3.1m. A forward compartment 5m long is bilged. Find new drafts forward and aft.

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