B. Tech Degree V Semester Examination in Marine Engineering, November 2009

MRE 507 NAVAL ARCHITECTURE – I

Time : 3 Hours   Maximum Marks : 100

I.   (a)   Describe atleast five important merchant ship types stating their characteristics
             and purposes.   (10)
      (b)   Explain various offshore activities.   (5)
      (c)   What is the role of ship's classification society?   (5)

OR

II.   (a)   Draw neat sketches of cross section through cargo holds of a bulk carrier and a crude
             oil carrier. Why do they have their respective shapes?   (10)
      (b)   What do you understand by dynamic positioning?   (5)
      (c)   What are periodic surveys?   (5)

III. (a)   Construct the lines plan of a submarine which is spherical in shape.   (8)
      (b)   Show that Simpson's first rule can be used to calculate the area of a square shape.   (6)
      (c)   A boat has 3.5 m breadth and 1.2 m depth at midship and floats at 0.6 m draft. Half
             breadth at this draft is 1.3 m. Calculate the area of immersed cross section of the boat.   (6)

OR

IV.   The half ordinates in meters of a water plane 120 m long are as follows :

Stn	AP	½	1	1 ½	2	3	4	5	6	7	8	8 ½	9	9 ½	FP
½ ord	1.2	3.5	5.3	6.8	8	8.3	8.5	8.5	8.5	8.4	8.2	7.9	6.2	3.5	0

             Calculate :   (i)   Water plane area
                             (ii)   LCF
                             (iii) Transverse moment of inertia of water plane
                             (iv)   Longitudinal moment of inertia of water plane.   (20)

V.   (a)   Define : block coefficient, prismatic coefficient, water plane area coefficient, midship
             section area coefficient and TPC.   (10)
      (b)   Explain the procedure and purpose of inclining experiment.   (10)

OR

VI.   (a)   Define : metacentric radius and metacentric height.   (4)
      (b)   A ship of 5000t displacement has a rectangular tank 6 m long and 10 m wide.
             Calculate virtual reduction in transverse metacentric height if this tank is partly full
             of oil of relative density 0.8.   (6)
      (c)   A vessel of 8000t displacement has 75t of cargo on deck. It is lifted by a derrick whose
             head is 10.5 m above the centre of gravity of cargo and placed in the lower hold 9 m
             below and 14 m forward of its original position. Calculate the shift in centre of gravity
             of ship when the cargo is :
                             (i)   Just clear of deck
                             (ii)   In its final position.   (10)

(Turn Over)

VII.	(a)	Explain frictional resistance and residuary resistance. Which are the non-dimensional numbers related to them?	(5)
	(b)	What is Froude's law of comparison?	(5)
	(c)	A 120 m ship floats on even keel draft of 5.5 m. MCT 1 cm is 80t-m, TPC is 13 and LCF is 2.5 m forward of midships. Calculate the new drafts when mass of 110t is added 24 m aft of midships. .	(10)

OR

VIII.	(a)	What is effective power? How is it related to wetted surface area and speed of ship?	(5)
	(b)	Explain Admiralty coefficient and Fuel coefficient.	(5)
	(c)	A rectangular barge 30 m long, 8 m beam and 6 m deep floats at a level keel draft of 3 m. Find the floodable length at midship assuming 100% permeability.	(10)

IX.　　　　　Write short notes on *any four* :

　　　　　　　　　(i)　　　Stability while docking
　　　　　　　　　(ii)　　Dynamical stability
　　　　　　　　　(iii)　　Liquified gas carriers
　　　　　　　　　(iv)　　Statutory certificates
　　　　　　　　　(v)　　　Floodable length curves
　　　　　　　　　(vi)　　Free surface effect
　　　　　　　　　(vii)　　IGC code.　　　　　　　　　　　　　　　　　(4 x 5 = 20)

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