BT-MRE-V(S)/12.17- 1734 Reg. No. | | | | | | | | |

B

B.Tech. Degree V Semester Supplementary Examination in Marine Engineering December 2017

MRE 507 NAVAL ARCHITECTURE I

(Prior to 2013 Scheme)

(Non-programmable scientific calculator is permitted)

Time: 3 Hours Maximum Marks: 100

(5 × 20 = 100)

I. (a) Briefly describe the classification of commercial ships. (12)

(b) Explain the role of classification societies in the shipping industry. (8)

OR

II. (a) Briefly describe the classification of offshore platforms. (12)

(b) Describe various periodical surveys conducted for a ship. (8)

III. (a) Explain various form coefficients used for describing hull geometry. (10)

(b) A ship is having a length of 162 m and is divided into eight stations in its lines plan. The half ordinates of the load water plane of the ship at various stations are as follows: (10)

Station number	0	½	1	2	3	4	5	6	7	7½	8
½ ordinates (m)	0	2	4	6	8	10	10	10	8	6	2

Find (i) water plane area (ii) LCF and (iii) TPC.

OR

IV. (a) Explain the effect of addition and removal of masses on centre of gravity of a ship. (6)

(b) Describe a ship's lines plan. What are its uses? (6)

(c) Consider a ship having a mass displacement of 5000 tonnes. A deck cargo, having a mass of 30 tonnes, is lying on its upper deck. A derrick on the ship is used to shift the deck cargo from the upper deck to a tank top located at a distance of 5 m below the upper deck. Analyse the shift on the location of the ship's centre of gravity at various stages during the entire shifting operation. Assume the height of derrick head above the centre of gravity of deck cargo as 4 m. (8)

V. (a) Describe the procedure to conduct an inclining experiment. (6)

(b) Explain free surface effect. (6)

(c) Briefly describe various components of ship resistance. (8)

OR

VI. (a) Explain dynamical stability of ships. (6)

(b) Briefly describe curves of statical stability of ships with the help of neat sketches. (4)

(c) Explain the following: (10)

(i) Ship correlation factor (ii) Admiralty coefficient (iii) Fuel coefficient (iv) Effective power (v) Froude's law of comparison.

(P.T.O.)

VII. (a) Explain the change in draft of ships while moving from sea water to fresh water. (8)

(b) Consider a box shaped vessel, having length = 75 m, breadth = 10 m and depth = 6 m, floating on an even keel in salt water at a draft of 4.5 m. Assume that its forward most compartment, having a length of 5 m and extending over the full breadth and full depth of the vessel, is bilged. Find the new drafts of the vessel at forward and aft. Assume permeability of the compartment as 100%. (12)

OR

VIII. (a) Explain the effect of docking and grounding on transverse stability of ships. (10)

(b) Consider a box shaped vessel having length = 40 m, breadth = 6 m and depth = 3 m floating on an even keel draft of 2 m. If a mass of 25 tonnes, located at 10 m forward of midship, is to be removed from the vessel find the new drafts of the vessel at forward and aft. Assume MCT_{1cm} = 8.4 tonne-m. (10)

IX. (a) Explain angle of list and angle of heel. How can you correct these? (6)

(b) Calculate the initial transverse metacentric height of a box shaped vessel, having length = 48 m, breadth = 10 m and depth = 8 m, floating on an even keel draft of 4 m. (6)

(c) Write down the expression for Attwood's formula. Explain the terms involved in the formula. (3)

(d) The transverse moment of inertia of water plane area of a ship about its centerline is 70000 m^4. If the initial metacentric height = -0.05 m and mass displacement of the ship = 11000 tonnes, calculate its angle of loll. (5)

OR

X. (a) Explain factor of subdivision. (2)

(b) A ship is floating on an even keel in sea water at 6 m draft. A box shaped compartment, having 20 m length, 10 m breadth and 4 m depth, located amidships at the bottom of the ship contains a cargo with permeability of 25%. Calculate the new draft of the ship if this compartment is bilged. Assume TPC = 20 tonnes. (6)

(c) A box shaped vessel having length = 60 m, breadth = 10 m and depth = 6 m is floating in sea water with a draft of 4 m at the forward end and 4.4 m at the aft end. Density of seawater = 1.025 t/m^3. A mass of 30 tonnes is to be loaded on the ship such that the aft draft of the vessel will remain unchanged from its present value of 4.4 m. Find the longitudinal location for loading the mass. Assume $GM_L = BM_L$. (12)

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