INDIAN MARITIME UNIVERSITY

(A Central University, Government of India)

End Semester Examination December 2017

Programme: B.Tech (Marine Engineering) **Semester:** V

Subject Name: Naval Architecture I **Subject Code:** UG11T2506/1506

Date: 15.12.2017 **Maximum Marks:** 100

Time: 3 Hours **Pass Marks:** 50

PART - A

All questions are compulsory (10x3=30 Marks)

1.

a) What is the difference between list and loll? What actions are required to correct loll?

b) What is statical stability curve? How can you find metacentric height from it?

c) With respect to flooding of compartment of a ship, what is the relevance of 'Bulkhead Deck" and the "Margin Line"?

d) What is Froude's law of comparison with respect to residuary resistance of ship?

e) Distinguish between "Light Displacement "and "Dead Weight" of a ship.

f) A weight on the main deck of a ship is lifted clear off the deck by the ship's crane, what will be the effect of it on the metacentric height of the ship and state the reason.

g) What is the effect of grounding on the ship's stability?

h) What are various types of equilibrium for a floating body?

i) What is free surface effect and how it can be reduced?

j) Define specific fuel consumption and its significance.

PART – B

Answer any five out of the following seven questions.

(5x14 =70 Marks)

2. (a) A box barge 30 m long and 8m beam floats at a level keel draught of 3m and has a mid length compartment 6m long. Calculate the new draught if

this compartment is bilged. Permeability of the bilged compartment is 75 %. (7 Marks)

(b) A box-shaped vessel is 24m x 5m x 5m and floats on an even keel at 2m draught KG = 1.5 m. Calculate the initial metacentric height. (7 Marks)

3. The areas of equidistantly spaced vertical sections of a vessel's underwater form 400 metres long and starting from forward are as follows:

   30 , 226.4, 487.8, 731.6, 883.0, 825.5, 587.2, 262.1 and 39.8 sq m.

   Calculate her displacement in salt water and the longitudinal centre of buoyancy. (14 Marks)

4. A box-shaped vessel floats upright on an even keel in fresh water of density 1000 kg per cu. m, and the centre of buoyancy is 0.50 m above the keel. Find the height of the centre of buoyancy above the keel when the vessel is floating in salt water of density 1025 kg per cubic metre. (14 Marks)

5. A box barge 120 m long and 8 m beam floats at an even keel draught of 3 m and has an empty compartment 6 m long at the extreme fore end. The centre of gravity is 2.8 m above the keel. Calculate the final draughts if this compartment is bilged. (14 Marks)

6. A ship initially upright has a displacement of 6420 tonnes and KM of 7.42 m. An inclining weight of 10 tonnes is moved transversely across the deck through a distance of 12.4 m. Deflection in pendulum 8.0 m in length is observed to be 14.2 cm. Calculate the effective KG of the ship in inclined condition. (14 Marks)

7. The residuary resistance of a model 7 m long is 20 N when towed at 3.5 knots. Calculate the power required to overcome the residuary resistance of a similar ship 140 m long at its corresponding speed. (14 Marks)

8. A ship 100 m in length floats at draughts forward 7.00 m and aft 6.80 m. Calculate the final draughts if 150 tonnes is loaded 20 m forward of aft perpendicular given that TPC is 15 and MCTC is 150 tm and LCF is 45 m forward of aft perpendicular. (14 Marks)

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