INDIAN MARITIME UNIVERSITY

(A Central University, Government of India)

End Semester Examinations December 2018

B. Tech (Marine Engineering)

Semester: V

Naval Architecture - I (UG11T2506)

Date: 08.01.2019 Maximum Marks: 100

Time: 3 Hours Pass Marks: 50

PART – A

(All Questions are compulsory) Marks: 10 x 3 =30

1. (a) Define - TPCI
   (b) How to Calculate wetted surface area by using Denny's formula?
   (c) Define - VCB & LCB
   (d) Explain – Angle of loll
   (e) Define – Tender ship and Stiff ship.
   (f) What is meant by free surface effect?
   (g) Define-MCTI
   (h) What is meant by Reserve buoyancy?
   (i) Define- Permeability
   (j) Explain-Frictional Resistance and Residuary Resistance of a Ship

Part – B **Marks: 5 x 14 =70**

(Answer **any 5** of the following 7 Questions)

2. a)A rectangular bulkhead is 10 m wide and 8 m deep. It is loaded on one side only with oil of relative density 0.8. Calculate the load on the bulkhead if the oil is;
   i) Just at the top of the bulkhead
   ii) Top of the sounding pipe 3m height. (6)

   b)A ship 135m long,18m beam and 7.6m draught has a displacement of 14000 tonne. The area of the load water plane is 1925 m^2 and the area of the immersed midship section is 130m^2 . Calculate a) C_w b) C_m c) C_b d) C_p (8)

3. a)A Ship of 4000 tonne displacement has its centre of gravity 1.5 m aft of mid ship and 4 m above the keel. New cargo 200 tonne is added 45 m forward of midship and 12 m above the keel. Calculate the new position of the centre of gravity. (8)

b)A box barge 30 m long and 8 m beam floats at a level keel draught of 3 m and has a mid-length compartment 6 m long. Calculate the new draught it this compartment is bilged;

i) with permeability 100 %

ii) with permeability 75 % (6)

4. A vessel of constant triangular cross-section has a depth of 12 m and a breadth at the deck of 15 m.
Calculate the draught at which the vessel will become unstable if the centre of gravity is 6.675 m above the keel. (14)

5. A vessel of 8000 tonne displacement has 75 tonne of cargo on the deck. It is lifted by a derrick whose head is 10.5 m above the centre of gravity of the cargo and placed in the lower hold 9 m below the deck and 14 m forward of its original position. Calculate the shift in the vessel's centre of gravity from its original position when the cargo is:

i) Just clear of the deck

ii) At the derrick head

iii) In its final position (14)

6. A ship 120 m long and 9100 tonne displacement floats at a level keel draught of 6.50 m in fresh water of 1.0 t/m^3 . MCTI cm 130 tonne-m,.TPC in sea water 16.5, LCB 2.30 m forward of midship. LCF 0.6 m aft of midship.

Calculate the new draughts if the vessel moves in to sea water of 1.025 t/m^3 without change in displacement. (14)

7. A ship 150 m long has draughts of 7.70 m forward and 8.25 m aft, MCTI cm 250 tonne-m, TPC 26 and LCF 1.8 m forward of midship. Calculate the new draughts after the following masses have been added:

50 tonne, 70 m aft of midship
170 tonne,36 m aft of midship
100 tonne, 5 m aft of midship
130 tonne, 4 m forward of midship
40 tonne, 63 m forward of midship (14)

8. A 6 m model of a ship has a wetted surface area of 7 m^2 , and when towed in fresh water at 3 knots, has a total resistance of 35 N. calculate the effective power of the ship, 120 m long, at its corresponding speed.
n= 1.825: f from formula: SCF =1.15. (14)