

INDIAN MARITIME UNIVERSITY
(A Central University, Government of India)
End Semester Examination Dec 2019/Jan 2020
B.Tech (Marine Engineering)
Semester -V
UG11T3506- Naval Architecture -I

Date: 20.12.2019

Time: 3 Hours

Max Marks: 70

Pass Marks: 35

Part – A (compulsory)

Answer the following (10x2=20 Marks)

1. Bonjean Curves.
2. Simpson's Second Rule of Integration.
3. Angle of Loll.
4. Transverse metacentre and metacentric height.
5. Displacement, Lightship Weight and Deadweight of a Ship.
6. Free Surface Effect.
7. MCT1.
8. Floodable Length and Permissible Length.
9. Permeability.
10. Section Modulus of Ship.

Part – B

Answer any 5 out of 7 questions (5 x 10= 50 marks)

11. (a) A ship 150-meter-long, has a 20-meter beam, has a Load draft of 8 meters, whereas the light draft is 3 meters. Block coefficient at loaded draft is 0.766 and at light draft is 0.688. Find the Deadweight of the ship. (05 Marks)

(b) A box shaped vessel with main dimensions Length 100 m, Breadth 13 m and Depth 8 meters is floating at 4 m draft even keel in Fresh Water. If the KG value is given as 4 meters, find the GM value of the vessel in that condition. (05 Marks)
12. (a) A vessel displacing 6200 tonnes KG=8m. Distribute 9108 tonnes of cargo between spaces KG 0.59m and 11.45m, so that the vessels completes loading with KG 7.57m. (05 Marks)

(b) Cargo hold transverse bulkhead is rectangular in shape having 15m breadth & 10m deep. On one side of the bulkhead Cargo of density 2.5 t/m³ is filled completely and on the other side sea water is half filled? Find the resultant force acting on the bulkhead. (05 Marks)

13. A rectangular shaped ship of 140 m long having its lightweight of 12,600 tonnes evenly distributed over the entire length. Another load of 280 tonnes is distributed evenly amidships for a length of 40m. Draw following curves to obtain maximum value of Bending Moment along with its location:
- Weight distribution curve
 - Buoyancy distribution curve
 - Load curve
 - Shear force curve
 - Bending moment curve. (10 Marks)
14. (a) A ship of 180m long has $\frac{1}{2}$ widths of waterplane of 1, 7.5, 12, 13.5, 14, 14, 13.5, 12, 7 and 0m respectively. Calculate waterplane area, TPC. (05 Marks)
- (b) A box barge 60m long and 10m wide floats at an even keel draught of 4 meters. It has a compartment of located amidships and 12 m. long. Calculate the new draughts if this compartment is laid open to sea, when the permeability is 60%. (05 Marks)
15. In an inclining experiment, a mass of 12.5 tonnes was moved 10 metres across the deck and caused a plumb line, 12 metres long to move out 320 mm. A double bottom tank in the ship was full of water, during the experiment. Mass of water in the tank is 450 tonnes and had its centre of gravity 0.9 metres above the keel, without which the ship would have been in the light condition. If the ship's displacement at the time of experiment was 3750 tonnes and her KM was 9.0 meters, find:
- The KG at the time of experiment. (05 Marks)
 - The light KG (05 Marks)
16. A ship 100 m long arrives in port with draughts of 3m at FP and 4.3 m at AP. The hydrostatic particulars are TPC=10, MCTC= 120 tonnes-m/cm, LCF= 3m aft of amidships. 80 tonnes of cargo is now loaded at a position of 24 m forward of amidships and 40 tonnes of cargo is discharged from 12m aft of amidships. Find out new draughts. (10 Marks)
17. A ship of 8000 tonnes displacement has KM=7.5m, KG=7.0m. A double bottom tank is 12m long, 15m wide and 1m deep. The tank is divided longitudinally at the center line and both sides are full of salt water. Calculate the angle of list, if one side is pumped out until it is half empty. (10 Marks)
