

B.E/B.Tech Degree Examination, December 2020

Seventh Semester

MR16703 – Stability of Ships

(Regulation 2016)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions**PART A - (8 X 2 = 16 marks)**

1. Load on immersed plane is given by (a) ρgh (b) πr^2 (c) $Aw/ L \times B$ (d) ρgAH
2. The S.F value at the point of maximum BM is (a) maximum (b) minimum (c) zero (d) infinity
3. Co-efficient forms relate to (a) shape to basic dimensions (b) form of ship to basic dimensions (c) MCT1cm (d) TPC
4. For a ship with TPC 14, addition of 28 tons of mass would increase the (a) length by 2 cm (b) breadth by 2 cm (c) draught by 2 cm (d) mean draught by 2 cm
5. State the Simpson's II rule for 'n' ordinates.
6. What is righting moment?
7. With respect to rectangular tank which type of division would help in reduction of FSE?
8. What is fresh water allowance?

PART B - (4 X16 = 64 marks)

09. (a) A rectangular bulkhead 17m wide and 6m deep had a head of sea water on one side **(16)** only, of 2.5m above the top of the bulkhead. Calculate:
- (a) the load on the bulkhead
 - (b) the pressure at the top and bottom of the bulkhead.

(OR)

- (b) A bulkhead 12m wide and 9m high is secured at the base by an angle bar having **(16)** 20mm diameter rivets on a pitch of 80mm. The bulkhead is loaded on one side only to the top edge with sea water. Calculate the stress in the rivets.
10. (a) (i) A ship of 3000t displacement had 500 t of cargo on board. This cargo is lowered **(8)** by 3m and an additional cargo of 500 t is loaded 3 m vertically above original position of the ship's Centre of Gravity. Determine the alteration in the position of the Centre of Gravity.
- (ii) Explain precautions before the conduct of inclining experiment. **(8)**

(OR)

- (b) A ship has a full load draught of 10m. The water plane area of the ship, at equal intervals commencing from the keel to the water level draught are 865, 1785, 1965, 2040, 2100, 2145 & 2210m² respectively. Calculate: (a) Displacement (b) TPC **(16)**

11. (a) A block of wood of uniform density has a constant cross-section in the form of a triangle, apex down. The width is 0.5m and the depth 0.5m. It floats at a draught of 0.45m. Calculate the metacentric height. **(16)**

(OR)

- (b) The waterplane area of a ship at 8.40m draught is 1670m². The areas of successive waterplanes at 1.40m intervals below this are 1600, 1540, 1420, 1270, 1080, 690m² respectively. Calculate the displacement in fresh water at 8.40m draught and the draught at which the ship would lie in sea water with the same displacement. **(16)**

12. (a) (i) A ship of 5000 tonne displacement, 96 m long, floats at draughts of 5.60m forward and 6.30m aft. The TPC is 11.5, GM_L 105m and centre of floatation 2.4m aft of midships. Calculate: (a) the MCT1cm (b) the new end draughts when 88 tonne are added 31m forward of midships. **(8)**

- (ii) Show that fresh water allowance is given by $\frac{\Delta}{40TPC}$ **(8)**

(OR)

- (b) A ship 90m long displaces 5200 tonne and floats at draughts of 4.95m forward and 5.35m aft when in sea water of 1023 kg/m³. The waterplane area is 1100m², GM_L 95m, LCB 0.6m forward of midships and LCF 2.2m aft of midships. Calculate the new draughts when the vessel moves into fresh water 1002 kg/m³. **(16)**