CBCS SCHEME

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15MR51

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Naval Architecture

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. The half ordinate planes of a water plane 180m long are as follows:

Section :	AP	1/2	1	2	3	4	5	6	7	8	9	9½	FP
1/2 ord :	0	5.0	5	8	10.5	13.5	13.5	12.5	11.0	7.5	3	1	0 m

Calculate the arc of the water plane. **(12 Marks)**

b. A rectangular double bottom tank 12m long and 10m wide is full of sea water. Calculate the head of water above the tank top if the load due to the water pressure on the tank top is 9.6 MN. **(04 Marks)**

OR

2 a. The immersed cross-sectional area of a ship are 120m long. Commencing from the aft are 2, 40, 79, 100, 103, 104, 104, 103, 97, 58 and 0m^2. **(12 Marks)**

b. Define the following terms, aft perpendicular, forward perpendicular, length between perpendiculars, relative density. **(04 Marks)**

Module-2

3 a. Explain with the help of a heat sketch i) C_w ii) C_m iii) C_b iv) C_p. **(12 Marks)**

b. A ship of 4000 tonne displacement has its centre of gravity 6m above the keel. Find the new displacement and position of the centre of gravity when masses of 1000, 200, 5000, and 3000 tonne are added at positions 0.8, 1.0, 5.0 and 9.5m above the keel. **(04 Marks)**

OR

4 a. A ship 135m long, 18m beam and 7.6m draught has a displacement of 14,000 tonnes. The area of the load water plane is 1925m^2 and the area of the immersed midship section 130m^2. Calculate: i) C_w ii) C_m iii) C_b iv) C_p. **(12 Marks)**

b. A ship of 8500 tonne displacement is composed of masses 2000, 3000, 1000, 2000 and 5000 tonnes at positions 2, 5, 8, 10 and 14m above the keel. Determine the height of the centre of gravity of the ship above the keel. **(04 Marks)**

Module-3

5 a. Explain with neat diagrams :
i) Stable equilibrium
ii) Unstable equilibrium
iii) Neutral equilibrium **(12 Marks)**

b. A ship whose wetted surface area is 5150 m^2 travels at 15 knots. Calculate the frictional resistance and the power required to overcome this resistance. Given: f = 0.422 n = 1.825. **(04 Marks)**

OR

6 a. What is residuary resistance? Explain 3 types of residual resistance with the percentage of losses. **(10 Marks)**

b. A plate drawn through fresh water at 3m/s has a frictional resistance of 12N/m^2. Estimate the power required to overcome the frictional resistance of a ship at 12 knots if the wetted surface area is 3300m^2 and the index of speed is 1.9. **(06 Marks)**

Module-4

7 a. Define:
i) Buoyancy
ii) Reserve Buoyancy
iii) Permiability and explain briefly. **(09 Marks)**

b. 215 tonne of oil fuel and stores are used in a ship while passing from sea water of 1.026 t/m^3. If the mean draught remains un altered, calculate the displacement in the river water. **(07 Marks)**

OR

8 A ship 125m long has a light displacement of 4000 tonne with LCG 1.60m of midships. The following items are now added:

Item	LCG
Cargo 8500 T	3.9m fwd of midships
Fuel 1200 T	3.1m aft of midships
Water 200 T	3.6 aft of midship
Stores 100 T	30.5m fwd of midship

At 14000 tonne displacement the mean draught is 7.8m, MCTI cm 160 ton-m, LCB 2.00m forward of midships and LCF 1.5m aft of midships. Calculate the final draught. **(16 Marks)**

Module-5

9 a. Explain the phenomenon of cavitation and its effects on the ships propellers. **(08 Marks)**

b. The total resistance of a ship at 13 knots is 180kN, the QPC is 0.70, shaft losses 5% and the mechanical efficiency 87%. Calculate the indicated power. **(08 Marks)**

OR

10 a. Explain the relation between the various powers effecting the propeller and the ship and efficiency. **(08 Marks)**

b. A rudder has an area of 15m^2 with its centre of effort 0.9m from the centre of stock. The maximum rudder angle is 35° and is designed for a service speed of 15 knots. Calculate the diameter of the ruddar stock, if the maximum allowable stress in the stock is 55 MN/m^2. [Assume K = 580]. **(08 Marks)**

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