CBCS SCHEME

Fifth Semester B.E. Degree Examination, July/August 2022
Naval Architecture

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*
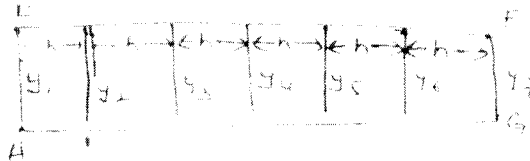
Module-1

1. a. What is Tonne Per Centimeter Immersion? Derive $TPC_{SW} = 0.01025\ AW$ **(08 Marks)**
   b. A fore peak bulk head is 4.8m deep and 5.5m wide at the deck. At regular intervals of 1.2m below the deck, the horizontal widths are 5.0 , 4.0 , 2.5 and 0.5m respectively. The bulk head is flooded to the top edge with sea water on one side only, calculate i) Area of bulk head ii) Load on the bulkhead   iii) Position of centre of pressure.   **(12 Marks)**

OR

2. a. Write the Simpson's formula to calculate the arc of the following Fig. Q2(a) EFGH.   **(08 Marks)**

Fig. Q2(a)

   b. The immersed cross sectional areas through a ship 180m long, at equal intervals are 5, 118, 233, 291, 303 , 304, 304, 302, 283, 171 and 0 m² respectively. Calculate the displacement of the ship in sea water of 1.025 tonne/m³.   **(12 Marks)**

Module-2

3. a. Define Coefficient of form. What is C_w , C_m and C_b?   **(08 Marks)**
   b. A ship 135m long, 18m beam and 7.6m draught has displacement of 14000 tonne. The area of the load water plane is 1925m² and the area of the immersed midship section 130m². Calculate i) C_w ii) C_m iii) C_b iv) C_p.   **(12 Marks)**

OR

4. a. What is Centre of Gravity? Explain LCG and V.C.G.   **(08 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 9.5 above the keel.   **(12 Marks)**

Module-3

5. a. Derive $BM = \dfrac{v \times 99}{\nabla \tan\theta}$ **(08 Marks)**
   b. A box barge of length L and breadth B floats a level keel drafted. Calculate the height of the transverse meta centre above the keel.   **(12 Marks)**

OR

6. a. What is Admiralty coefficient? Derive the formula for calculating power using Admiralty coefficient.   **(10 Marks)**
   b. A ship of 14000 tonne displacement has Admiralty coefficient of 450. Calculate the Shaft Power required at 16 knots.   **(10 Marks)**

Module-4

7 a. Define the term : i) Trim   ii) Mean draft   iii) Permeability   iv) Reserve buoyancy.
(08 Marks)

   b. A ship 120m long floats at draughts of 5.50m forward and 5.8m aft : MCT1cm 80 tonne m , TPC 13. LCF 2.5 m forward of midships. Calculate the new draughts when a mass of 110 tonne is added 24m aft of midships.
(12 Marks)

OR

8 A ship 125m long has a displacement of 4000 tonne with LCG 1.6m aft of midships. The following items are now added :
Cargo 8500 tonne   LCg 3.9m forward of midship.
Fuel 1200 tonne   LCg 3.1m aft of midship.
Water 200 tonne   LCg 7.6m aft of midship.
Stones 100 tonne   LCg 30.5m forward of midship.
Calculate the Final draft.
(20 Marks)

Module-5

9 a. Explain the following terms : i) Wake   ii) Pitch   iii) Theoretical speed
   iv) Real slip.
(08 Marks)

   b. A propeller of 4.5m pitch turns at 120 rev/min and drives the ship at 15.5 knots. If the wake fraction is 0.030, calculate the apparent slip and the real slip.
(12 Marks)

OR

10 a. Explain i) Propeller Cavitations   ii) Built in propeller   iii) Solid propeller.
(10 Marks)

   b. A vessel travelling at 17 knots turns with a radius of 450m when the rudder is hard over. The centre of gravity is 7m above the keel , the transverse meta centre 7.45 above the keel and the centre of buoyancy 4m above the keel. If the centripetal force is assumed to act at the centre of buoyancy, calculate the angle of heel when turning. The rudder force may be ignored.
(10 Marks)

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