COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

B.TECH. DEGREE VI SEMESTER EXAMINATION IN MARINE ENGINEERING
JUNE 2020

MRE 1607 NAVAL ARCHITECTURE-II
(2013 Scheme)

Time: 2hrs 30 Minutes [30 for Answering and Scanning/Uploading the page of the Answer Sheet per module]
Max. Marks: 14 per module

INSTRUCTIONS
1. You have to be available in Google Meet on demand by the faculty.
2. You have to share your '**live location**' to the faculty before uploading the answer sheet.
3. You have to answer only one question per module.
4. Answer may not exceed one page of an A4 size paper in a standard handwriting, as far as possible.
5. If at all an answer goes beyond one page, (due to your handwriting) another page can also be used. In such a situation, the page number should be given as 1/2, 2/2.
6. You have to put dated signature along with Register Number, Subject Code, Module/Group Number (as given in the Question Paper) in each page.
7. You have to put the Question Number correctly.
8. After answering the question, you have to scan and upload the answer page.

MODULE - I
(Answer *ANY ONE* question)

I(1). Mid-ship section of a Rectangular Barge is given below: Breadth = 30 m, Depth = 12 m, Double bottom height = 3 m. Thicknesses are 20 mms for all plates. Calculate (i) M.I about Neutral axis (ii) Section modulus at Deck, Double bottom and Bottom shell. (14)
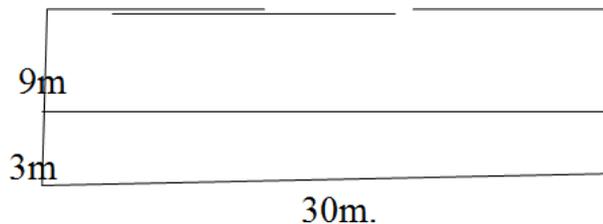
All plate thicknesses are 20 mms.

OR

I(2). (a) A box shaped vessel of length 80 m is divided into 4 equal tanks of 20 m each. Hull weight is 800 t evenly distributed. End tanks are filled with 1200 t in each tanks. Derive curves of loads, shear forces, and bending moments. (8)

(b) (i) Find location and values of maximum SF and BM. (6)
    (ii) Calculate the Values of SF&BM at 25m from aft.
    (iii) State whether the vessel in hogging/sagging condition.

MODULE - II
(Answer *ANY ONE* question)

II(1). (a) What is Q.P.C and P.C? Express it in terms of efficiencies. (3)

 (b) Following are the details obtained during acceptance trials of a Ship: (11)

Ship speed	= 16 knots
Delivered power to the propeller	= 3950 kw
Propeller Thrust	= 465 KN
Propeller speed	= 1.85 rev/sec
Effective power	= 2900 KW
Propeller efficiency	= 67%
Apparent slip	= 5%

Calculate:
  (i) The Pitch of the propeller
  (ii) Taylor's wake fraction
  (iii) Real slip ratio
  (iv) Q.P.C

OR

II(2). (a) A propeller of 6 m diameter having pitch ratio = 0.9, B.A.R = 0.48, rpm = 120, (10)
real slip ratio = 0.25, wake fraction = 0.3, propeller thrust = 700 KN and Hull
efficiency = 85%. Calculate: (i) Blade area (ii) Average pressure on the blade
surface (iii) Ship speed (iv) Thrust power (v) Thrust deduction factor.

 (b) If Root radius = 0.1 diameter. Find Pitch angle at Tip and Root. (4)

MODULE - III
(Answer *ANY ONE* question)

III(1). (a) State advantages of fitting a Balanced Rudder. (3)

(b) Force parallel to ship's centre line is given by F = 570 Av*2 newtons. A = rudder area in sq.m, v = ship speed in m/sec. Rudder Area = 18 sq.m. Rudder width is 3.6 m. Rudder axis is 0.4 m from leading edge. An angle of rudder at 35 degrees the center of effort is 32% of rudder width from leading edge. Maximum shear stress of rudder stock material is 70 MN/sq.m. Calculate following:

   (i) Minimum diameter of rudder stock for a Ship speed of 16 knots.
   (ii) Reduced speed to be restricted for the vessel if the rudder stock diameter is reduced by 20% due to corrosion (11)

OR

III(2). (a) Explain briefly the types of Rudders ie Balanced, Semi-Balanced and Un-Balanced. (4)

(b) A Ship of 8000 t displacement has a rudder area = 22 sq.meter. The Ship has a GM = 0.6 m, and the center of Lateral Resistance is 3.8 m above keel. The maximum Rudder angle is 35 degrees and the centroid of Rudder is 2.2 m above keel. Force acting parallel to Ship's center line is given by F = 580 Av**2 Sin(Alpha) Newtons, where A = rudder area in sq.meter, v = speed of Ship in m/sec. Calculate the angle of heel due to the force on the Rudder if it put hard over Port When travelling at a speed of 20 knots. (10)

MODULE - IV
(Answer *ANY ONE* question)

IV(1). (a) What are the six degrees of freedom for the Ship's motion ? Explain the same with suitable sketch. (6)

(b) Calculate Rolling period of a Vessel at loaded condition, details are as under: Displacement = 9400 t, KB = 2.6 m, KMt = 9.6 m, KG = 8.8 m. Density of Water = 1000 kg/sq.m (8)

OR

IV(2). (a) Write down the equation for Sinusoidal wave and explain the terms. (4)

(b) Write short notes on: (i) Strength, Duration (ii) Fetch (iii) Sea and Swell (iv) Wave spectrum (v) Anti-rolling tanks. (10)

MODULE - V
(Answer *ANY ONE* question)

V(1). (a) What is 'Coupling' in Vibration? Give an example in Ships. (2)

(b) Explain 2-node vertical mode and 3-node horizontal mode hull vibration on Ships, with suitable sketches. (5)

(c) What are the causes/consequences of vibration on Ships? Describe. (7)

OR

V(2). (a) Write down three sources of vibration and three adverse effects of vibration in Ships. (4)

(b) Define term 'Resonance' and explain its significance with respect to Ship's Vibrations. (3)

(c) Describe how the hull vibration can be minimized in a Vessel (i) in the design stage (ii) on the Vessel already built. (7)

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