

COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

B.TECH. DEGREE V SEMESTER REGULAR/SUPPLEMENTARY EXAMINATION IN MARINE ENGINEERING DECEMBER 2020

MRE 1507 NAVAL ARCHITECTURE I (2013 Scheme)

Time: 30 Minutes [for Answering and Scanning/Uploading the page of the Answer Sheet]

Max. Marks: 10

INSTRUCTIONS

1. You have to be available in Google Meet Video Camera throughout the examination hours.
2. Those students who are not present through Google Meet Video Camera will not be permitted to write the online examination.
3. You have to share your '**live location**' to the faculty before uploading the answer sheet.
4. You have to answer only one question.
5. You have to write register number, subject code and module/group number (as given in the question paper) in each page.
6. Answer may not exceed one page of an A4 size paper in a standard handwriting, as far as possible.
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MODULE - I

(Answer **ANY ONE** question)

- I(1). (a) Compare the structural arrangements in way of midship sections of a container ship and a bulk carrier, which is used to carry grains. Sketches are not necessary. (7)
- (b) Compare the functions of a tug and a dredger. Sketches are not necessary. (3)
- OR**
- I(2). (a) Briefly describe the constructional features of a crude oil tanker. Sketches are not necessary (5)
- (b) Briefly describe the constructional features of chemical carriers. Sketches are not necessary. (5)

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MODULE - II

(Answer **ANY ONE** question)

- II(1). (a) List down the various information required to draw the lines plan of a ship. Draw lines plan of a box shaped vessel which has a uniform rectangular cross section along its length (Grid is not necessary. Assume suitable dimensions for the vessel). (5)
- (b) Write down the expressions for various form coefficients related to geometry of a ship. (5)

OR

- II(2). (a) How will you estimate the total wetted surface area of a ship? (3)
- (b) The particulars of a ship are as follows: LBP = 90 m, mass of the ship = 4000 tonnes, LCG = 43.50 m forward of AP, VCG = 4 m above baseline. If a mass of 200 tonnes is added at FP at a height of 12 m above the baseline, find the new location (both longitudinal and vertical) of the centre of gravity of the ship. (7)

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MODULE - III

(Answer *ANY ONE* question)

- III(1). (a) Draw a typical curve of statical stability of a ship that is stable in the upright condition. Indicate how you will find the initial metacentric height and the range of stability of the ship from this curve. (6)
- (b) During an inclining experiment of a ship, a mass of 15 tonnes was moved in the transverse direction by a distance of 8 metres. If the corresponding deflection on a 5m long pendulum was 0.125m, calculate the displacement of the ship. Assume $GM_T = 1.2$ m. (4)
- OR**
- III(2). (a) How do you find dynamical stability of a ship from its curve of statical stability? (2)
- (b) Consider a homogenous log having uniform square cross section and floating in fresh water of density 1t/m^3 . The log is having length = 12 m, breadth = 4 m and depth = 4 m. Assume the density of the log as 0.4 t/m^3 . Find the type of equilibrium condition of the log. (8)

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MODULE - IV

(Answer *ANY ONE* question)

- IV(1). (a) Write down the expression for MCT_{1cm} and name various terms in the expression. (2)
- (b) A vessel of uniform rectangular cross section, having length = 60 m, breadth = 10 m and depth = 7 m, is floating in sea water on an even keel at a draft of 4.2 m. A mass of 30 tonnes is to be loaded on the ship such that the final forward draft of the vessel will be the same as its present value of 4.2 m. Find the longitudinal location for loading the mass. Assume that $GM_L = BM_L$ and the density of the seawater is 1.025 t/m^3 . (8)
- OR**
- IV(2). (a) Differentiate between floodable length and permissible length. What are factors of subdivision? (4)
- (b) A barge of uniform rectangular cross section has length = 50 m, breadth = 10 m, and depth = 6 m and it floats at an even-keel draft of 4.1 m. The barge has a 9 m long compartment located amidships. This compartment extends over the full breadth and full depth of the barge; however, the compartment is subdivided by a horizontal watertight flat located at 3 m above the keel. Find the new draft of the barge if the above midship-compartment is bilged below the watertight flat. Assume the permeability of the compartment as 90%. (6)

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MODULE - V

(Answer **ANY ONE** question)

- V(1). (a) What is Froude Number? State Froude's law of comparison. (3)
- (b) A ship of 80000 tonnes displacement has a fuel coefficient of 130000. Estimate the amount of fuel required by the ship to complete a voyage of 2000 nautical miles at 16 knots. Also estimate the amount of fuel that would be saved if the ship speed is reduced to 14 knots. (7)

OR

- V(2). (a) A 120 m long ship, which has a displacement of 5100 tonnes and speed of 20 knots, is to be tank tested using a geometrically similar model of length 3 m. Determine: (6)
- (i) the speed at which the model should be tested
- (ii) the ratio of the effective power of the ship to the effective power of the model at the above model speed
- (b) Define (i) Residuary resistance (ii) Quasi Propulsive Coefficient (iii) Admiralty coefficient. (4)