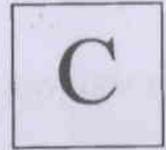


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## ***B.Tech. Degree VI Semester Regular/Supplementary Examination in Marine Engineering June 2023***

**19-208-0607 NAVAL ARCHITECTURE-II  
(2019 Scheme)**

Time: 3 Hours

Maximum Marks: 60

**Course Outcome**

On successful completion of the course, the students will be able to:

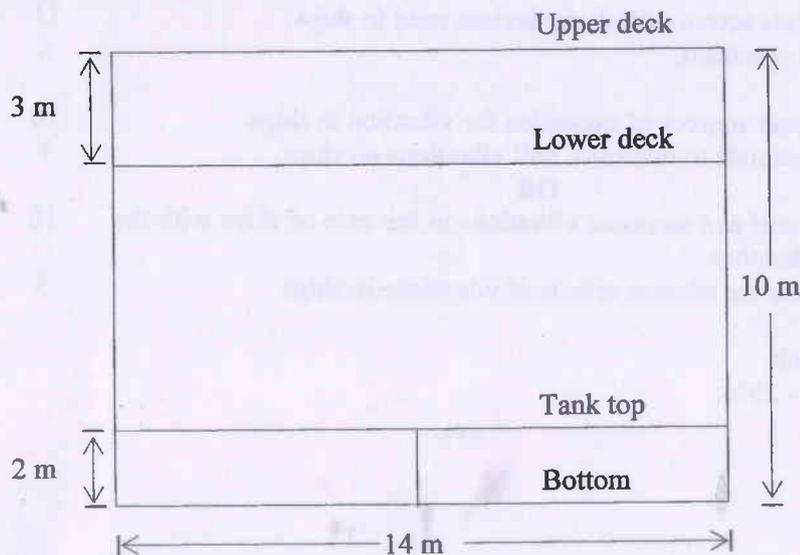
- CO1: Understand the basic concepts of strength of ship and calculate bending moment and deflection  
 CO2: Gain knowledge regarding propellers and design propeller  
 CO3: Calculate the forces acting on rudder and angle of heel while turning  
 CO4: Explain how the ocean waves affect the rolling pitching and yawing  
 CO5: Understand the different sources of ship vibration and the prevention of vibration

Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 – Analyze,  
 L5 – Evaluate, L6 – Create  
 PI – Programme Indicators

(Answer *ALL* questions)

(5 × 15 = 75)

		Marks	BL	CO	PI
I. (a)	A 240 m long barge of uniform rectangular cross section is divided into 6 compartments of equal length. Weight of the barge is uniformly distributed along its length. If 400 tonnes each of cargo are added to its end compartments, draw the shear force and bending moment curves.	10	L3	1	2.3.1
(b)	Explain the causes of sagging and hogging conditions of a ship. Explain the nature of stresses on keel and main deck in each of these conditions.	5	L2	1	1.4.1
<b>OR</b>					
II. (a)	The midship section of a steel barge having a breadth of 14 m and depth of 10 m is shown in the figure below. Assume that all plates and sections are of 14 mm thickness. Calculate bending stresses at the bottom and the upper deck if the barge is subjected to a hogging bending moment of 800 MNm.	10	L3	1	2.3.1



- (b) What do you mean by 'balancing ship on a wave'? Explain the procedure to do it. 5 L2 1 1.4.1

(P.T.O)

		Marks	BL	CO	PI
III.	(a) A propeller having 4.6 m pitch turns at 120 rpm and drives the ship at 16 kn. If the Taylor wake fraction is 0.3, calculate the apparent slip ratio and real slip ratio.	7	L3	2	1.4.1
	(b) Explain the following features of a right handed screw propeller with the help of neat sketches: leading edge, trailing edge, rake, skew, hub, and direction of rotation.	8	L1	2	1.4.1
<b>OR</b>					
IV.	(a) A propeller has a diameter of 4.2 m with pitch ratio 1.1. At 120 rpm of the propeller the ship speed is 16 kn, propeller efficiency is 68%, Froude wake fraction is 0.22 and thrust deduction factor is 0.15. For a delivered power of 1800 kW determine the thrust power, effective power, actual thrust and the true slip ratio.	7	L3	2	1.4.1
	(b) Explain cavitation of propellers. Describe various methods to reduce cavitation.	8	L1	2	1.4.1
V.	(a) Describe the following for a balanced type rudder with the help of neat sketches: span, chord, thickness, root, tip, leading edge, trailing edge, thickness chord ratio, taper ratio and aspect ratio.	10	L2	3	1.4.1
	(b) A single screw ship of 6000 tonne displacement has a centreline rudder of area 16 m <sup>2</sup> behind the propeller. The centre of lateral resistance of the hull is 4 m above the keel while the centre of pressure of the rudder is 2.4 m above the keel. The maximum rudder angle is 35°. Calculate the angle of heel due to force on the rudder if the rudder is put hardover to starboard. Assume that ship is having a speed of 20 knots with a metacentric height of 0.5 m.	5	L3	3	1.4.1
<b>OR</b>					
VI.	(a) With the help of a neat sketch, describe the turning circle manoeuvre carried out during trials of ships.	10	L2	3	1.4.1
	(b) A ship turns in a radius of 280 m at a speed of 18 knots under the action of a rudder force of 1.6 MN. If the draught of the ship is 5 m, KG is 6 m and KM <sub>T</sub> is 8 m, find the approximate angle of heel during the steady turn.	5	L3	3	1.4.1
VII.	(a) Briefly describe the sinusoidal wave theory.	11	L2	4	1.4.1
	(b) What are the assumptions made in the trochoidal wave theory?	4	L2	4	1.4.1
<b>OR</b>					
VIII.	(a) Describe various active antirolling devices used in ships.	11	L2	4	1.4.1
	(b) Explain wave spectrum.	4	L2	4	1.4.1
IX.	(a) Explain the main sources of excitation for vibration in ships.	10	L2	5	1.4.1
	(b) Explain the methods to minimise hull vibrations on ships.	5	L2	5	1.4.1
<b>OR</b>					
X.	(a) Describe flexural and torsional vibrations in the case of ships with the help of neat sketches.	10	L2	5	1.4.1
	(b) Briefly describe the adverse effects of vibrations in ships.	5	L2	5	1.4.1

Blooms's Taxonomy Levels

L1 – 11%, L2 – 60%, L3 – 29%.