BT MRE-V(R/S)-11-24-3456 Reg. No. | | | | | | | | |

A

B.Tech. Degree V Semester Regular/Supplementary Examination in Marine Engineering November 2024

19-208-0507 NAVAL ARCHITECTURE- I

(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 functions of ship and types of ships.
CO2: Explain the geometry of ship and its hydrostatic calculations.
CO3: Understand transverse stability of ships and calculate Metacentric height.
CO4: Explain longitudinal stability of ship and do trim corrections.
CO5: Gain knowledge on resistance and power calculations of ship.

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)	What are all the basic differences between a chemical tanker and a conventional oil tanker?	10	L2	1	1
	(b)	Briefly discuss five types of Tugs used in the marine industry.	5	L2	1	1
		OR				
II.	(a)	Describe any lash ship and how it differs from other crafts. Draw a rough figure showing its operation.	10	L2	1	1
	(b)	Discuss the working of a cutter suction dredger, with the help of a rough figure.	5	L3	1	1
III.	(a)	Draw the main views in a lines plan of a commercial ship.	10	L2	2	1
	(b)	A vessel is floating in salt water. Its LBP is 300 m, breadth 60 m and draft is 20 m. Block coefficient is 0.8. Find its displacement. What will be its draft if the ship enters freshwater with the same loading? (Assume appropriate mass densities).	5	L3	2	1
		OR				
IV.	(a)	Draw suitable views of a ship and mark the following. VCG, KB, KM_T, GM_T, LCF, LCB, LCG, KM_L and GM_L	10	L2	2	1
	(b)	Explain Simpson's second rule.	5	L3	2	1

(P.T.O.)

			Marks	BL	CO	PI
V.	(a)	The half breadths (in meters) at equidistant stations of a ship's water plane of length 125 meters are as follows.	10	L2	3	1

Station	0 (AP)	1	2	3	4	5	6	7	8	9	10(FP)
Half Breadths	2.1	7.4	9.9	10.5	10.7	10.9	10.7	10.0	7.9	4.3	0.3

Find out the total area and the distance of the centroid of the water plane from the AP.

	(b)	What is the TPC of a vessel in saltwater and freshwater?	5	L2	3	1

OR

VI.	(a)	Explain the procedure of conducting inclining test. What is the immediate requirement and what is the ultimate aim for doing the inclining test?	10	L3	3	1
	(b)	State the typical loading conditions of a cargo ship.	5	L3	3	1
VII.	(a)	A ship of 4200 displacement has the centre of gravity 7.4 m above the keel. Loads are added and removed as shown below. Find the metacentric height in the final condition and the moment of statical stability at 7 degree inclination. The metacentric diagram gives the KM for the final condition as 7.3 m.	10	L3	4	1

Loads added	KG
800 Tonnes	3.8 m
600 Tonnes	4.2 m
400 Tonnes	6.7 m
Loads removed	KG
300 Tonnes	0.6 m

	(b)	The moment of inertia of the water plane about the centre of floatation is 1100000 m^4. If the displacement is 9300 Tonnes, find the BM_L.	5	L3	4	1

OR

VIII.	(a)	Derive Moment to Change Trim by One cm (MCT1cm) for a slender cargo ship.	10	L2	4	1
	(b)	How will you find out the initial GM from the GZ plot of a ship?	5	L3	4	1
IX.	(a)	What are all the components of ship resistance? Discuss.	10	L2	5	1
	(b)	How will you find out the frictional component of resistance using ITTC formula?	5	L2	5	1

OR

X.	(a)	State the expressions for Admiralty Coefficient and Coefficient of fuel consumption. Mention their significance in marine industry.	5	L3	5	1
	(b)	A ship of length 140 m has a wetted surface area of 3750 m^2. Find out the frictional resistance of this ship at 15 knots. The residual resistance of a geometrically similar model of 4.5 m length is 3.5 N in seawater. Find out the residuary resistane of the ship and the effective power at 15 knots. Assume f (Froude's skin friction constant) for ship as 1.416.	10	L3	5	1

Bloom's Taxonomy Level
L2 – 50%, L3 – 50%.

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