BT MRE-V(R/S)-11-22-2037 Reg. No. | | | | | | | | |

A

B.Tech. Degree V Semester Regular/Supplementary Examination in Marine Engineering November 2022

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 of 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

PO – Programme Outcome

			(5 × 15 = 75) Marks	BL	CO	PO
I.		Draw the general arrangement of a bulk carrier and oil tanker and compare the major arrangements for the same.	15	L2	1	1
		OR				
II.	(a)	Explain how free surface effect of liquid cargo is minimized is in tankers.	8	L2	1	1
	(b)	Describe the constructional details of a general cargo vessel.	7	L2	1	1
III.	(a)	Draw the lines plan of a 50000-dwt bulk carrier having a bulbous bow.	6	L2	2	1
	(b)	A ship of 190 m between perpendiculars has beam of 21 m and draught of 7 m. If prismatic coefficient is 0.75, the area of waterplane 3500 m^2 and mass displacement in salt water is 22500 tonnes, estimate all form coefficients.	9	L3	2	1
		OR				
IV.	(a)	Derive the expression for Simpson's first rule.	5	L2	2	1
	(b)	A ship has a main body defines by waterplane areas given below. The water lines are 0.5 m apart. In addition, there is an appendage having a volume of displacement of 10 m^3 with center of volume 0.1 m below no 4 WL. What is the volume of displacement and the position of VCB?	10	L3	2	1

Waterline	1	2	3	4
Area (m^2)	123	110	87	48

V.	(a)	Explain in detail using suitable examples how intact stability of ships are assessed.	10	L2	3	1
	(b)	A ship leaves port upright with a full cargo of timber, and with timber on deck. During the voyage, bunkers, stores, and fresh water are consumed evenly from each side. If the ship arrives at her destination with a list, explain the probable cause of the list and how this should be remedied?	5	L2	3	1

OR

(P.T.O.)

			Marks	BL	CO	PO
VI.	(a)	Righting levers of a ship of 15,200 tonne displacement at angles of heel 15, 30, 45 and 60 degrees are 0.31, 0.69, 0.91 and 0.91 m respectively. Calculate the dynamical stability of ship at 30, 35, 40 and 60 degrees.	8	L2	3	1
	(b)	A ship 120 m 17 m 10 m has a block coefficient 0.800 and is floating at the load summer draft of 7.2 metres in fresh water. Find, how much more cargo can be loaded to remain at the same draft in salt water?	7	L3	3	1
VII.		During a voyage a cargo ship uses up 320 tonnes of consumable stores and fuel from fore peak, 85 m forward of midships. Before the voyage the forward fraught marks 7 m aft of forward perpendicular recorded 5.46 m and after marks, 2 m aft of perpendicular, recorded 5.85 m. At this mean draught, the hydrostatic data shown:	15	L3	4	1

TPC	44
MCTC	33,200 tonne/m
LCF	3 m (Aft of midship)
LBP	195 m

Calculate the draught mark readings at the end of voyage, assuming that there is no change in water density.

OR

VIII.		A guided missile destroyer is 155 m long BP and displaces 6228 tonnes in salt water when draught mark readings are 4.53 m forward and 4.66 m aft. The distances of draught marks from amidships are 70.1m forward and 83.8 m aft. The second moment of area of waterplane is 0.71×10^6 m^4 about center of floatation which is 1.52 m abaft amidships. Waterplane area is 1626 m^2. Calculate the new draughts when 142 tonne of missile are embarked at a mean distance of 57.9 m abaft amidships. Illustrate on a bold diagram, the forces and movements involve and state any assumptions made.	15	L3	4	1
IX.	(a)	Draw the engine room layout of an 85000-dwt oil tanker and mark various powering coefficients and explain how they are calculated.	6	L3	5	1
	(b)	A Very Large Crude Carrier (VLCC) has an input power of 26500 kW within the Engine Room. Mechanical efficiency is 88.75%, propeller shaft losses are 2.65% and QPC is 0.621. Estimate the effective power (PE) generated at the propeller tips, after accounting for all power losses enroute.	9	L3	5	1

OR

(Continued)

		Marks	BL	CO	PO
X.	For a new design, it was found that after towing a ship model that the power extrapolated to the full-size ship was 3475 kW. Using basic ship information, it was decided to use the following information: hull efficiency 99.24%, propeller efficiency 68.75%, shaft losses 2.85%, diesel engine efficiency 88.73%, weather and appendage allowances 18.5%.	15	L3	5	1
	(i) Calculate all the powers from the propeller tips to the Engine Room.				
	(ii) What is the power loss in kW between the thrust block to the propeller tail shaft?				

Bloom's Taxonomy Levels
L2-38.7%, L3-61.3%,

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