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Sixth Semester B.E. Degree Examination
Naval Architecture

TIME: 03 Hours **Max. Marks: 100**

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

		Module – 1	**Marks**	**CO's**	**RBT L**
Q.1	**(a)**	Derive an equation for liquid load on an immersed plane.	6	CO4	L3
	(b)	Define: i) Aft Perpendicular, ii) Forward Perpendicular, iii) Length between perpendicular	4	CO1	L1
	(c)	A rectangular double bottom tank is 20 m long, 12 m wide and 1.5 m deep, and is full of sea water having a density of 1.025tonne/m^3. Calculate the pressure in kN/m^3 and the load in MN on the top and bottom of the tank if the water is: (a) at the top of the tank (b) 10 m up the sounding pipe above the tank top.	10	CO4	L4
		OR			
Q.2	**(a)**	Define i) Density, ii) Specific Gravity, iii) Centre of Pressure	4	CO2	L1
	(b)	Derive an equation for centre of pressure.	6	CO3	L3
	(c)	The half ordinates of a waterplane 180m long are as follows: section: AP, ½, 1, 2, 3, 4, 5, 6, 7, 8, 9, 9½, FP ½ ord: 0, 5.0, 8.0, 10.5, 12.5, 13.5, 13.5, 12.5, 11.0, 7.5, 3.0, 1.0, 0 m Calculate: a) Waterplane Area. b) Distance of centroid from midships.	10	CO4	L4
		Module – 2			
Q.3	**(a)**	Explain with the help of a neat sketch i) Waterplane area coefficient, ii) Block Coefficient, iii) Midship Section Area Coefficient, iv) Prismatic Coefficient	12	CO2	L2
	(b)	A ship displaces 9450 tonne and has a block coefficient of 0.7. Area of immersed midship section is 106m^2. If beam = 0.13L = 2.1d, calculate the length of the ship and prismatic coefficient.	08	CO4	L3
		OR			
Q.4	**(a)**	Explain the following: i) archimidies principle ii) displacement of the ship	07	CO3	L2
	(b)	Explain the effect of suspended mass on centre of gravity.	05	CO2	L2
	(c)	A ship of 10000 tonne displacement has a mass of 60 tonne lying on the deck. A derrick, whose head is 7.5 m above the center of gravity of the mass, is used to place the mass on the tank top 10.5 m below the deck. Calculate the shift in the vessel's center of gravity when the mass is: a) Just clear of the deck b) At the derrick head	08	CO4	L3

		c) In its final position			
		Module – 3			
Q.5	**(a)**	Explain the following terms with neat diagrams: i) Equillibrium ii) Stable Equillibrium iii) Unstable Equilibrium iv) Neutral Equilibrium	12	CO3	L2
	(b)	A vessel of 10000 tonne displacement has a second moment of area of waterplane about the centreline of 60000m. The center of buoyancy is 2.75m above the keel. The following are the disposition of the masses on board the ship: 4000 tonne, 6.30m above the keel. 2000 tonne, 7.5m above the keel. 4000 tonne, 9.15 above the keel. Calculate the metacentric height.	08	CO4	L3
		OR			
Q.6	**(a)**	Explain the conduction of inclining experiment and hence derive for the height of centre of gravity above the keel.	12	CO3	L3
	(b)	A ship of 6000 tonne displacement has its centre of gravity 5.9 m above the keel and transverse metacentre 6.8 m above the keel. A rectangular double bottom tank 10.5 m long, 12 m wide and 1.2 m deep is now half-filled with sea water. Calculate the metacentric height.	08	CO4	L4
		Module – 4			
Q.7	**(a)**	Explain: i. Centre of Flotation, ii. Buoyancy, iii. Reserve Buyoyancy, iv. Permeability	08	CO3	L3
	(b)	A ship 130m long displaces 14000 tonne when floating at draughts of 7.5m forward and 8.10 m aft. GM_L 125 m, TPC 18, LCF 3 m aft of midships. Calculate the final draughts when a mass of 180 tonne lying 40m aft of midships is removed from the ship.	12	CO4	L4
		OR			
Q.8	**(a)**	Explain frictional and residuary resisitances.	08	CO2	L2
	(b)	A 6 m model of a ship has a wetted surface area of 8 m^2. When towed at a speed of 3 knots in fresh water the total resistance is found to be 38 N. If the ship is 130 m long, calculate the effective power at the corresponding speed.	12	CO4	L4
		Module – 5			
Q.9	**(a)**	Explain the following terms related to propeller: i) Pitch, ii) Theoretical Speed, iii) Apparent slip, iv) Wake, v) Real slip	10	CO4	L2
	(b)	Derive an expression for propeller thrust.	05	CO4	L3
	(c)	A ship travels at 14 knots when the propeller, 5 m pitch, turns at 105 rev/min. If the wake fraction is 0.35, calculate the apparent slip and speed of advance.	05	CO4	L3
		OR			
Q.10	**(a)**	Explain the relation between the various powers affecting the propeller and ship efficiency.	10	CO2	L2
	(b)	Derive an expression for angle of heel considering the effect of rudder force when the ship takes turn.	05	CO3	L3
	(c)	A ship with a metacentric height of 0.4 m has a speed of 21 knots. The centre of gravity is 6.2 m above the keel while the centre of lateral resistance is 4 m above the keel. The rudder is put hard over to port and the vessel turns in a circle 1100 m radius. Calculate the angle to which the ship will heel.	05	CO4	L3