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B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2023

Eighth Semester

MR18801 – MARINE VEHICLES PERFORMANCE

(Marine Engineering)

(Regulation 2018)

TIME: 3 HOURS

MAX. MARKS: 100

- CO 1** To impart knowledge to students about types of resistance.
- CO 2** To impart knowledge about types of propellers and theory of propulsion.
- CO 3** To enable students, understand the rudder theory and types of rudders
- CO 4** To impart basic knowledge about wave theory and anti-rolling devices
- CO 5** To impart knowledge about sources of ship vibration, noise and its effects.

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

	CO	RBT LEVEL
1. What are the components of tow-rope resistance?	1	2
2. What is (a) SCF (b) SFC ?	1	2
3. What do you understand by the term ‘Thrust deduction factor’?	2	2
4. What is rotative efficiency?	2	2
5. What is a Spade rudder?	3	2
6. Why the rudder angle is limited?	3	2
7. What is “Smith effect”?	4	2
8. What is ‘FETCH’ with regard to a wave?	4	2
9. Mention any two commonly used methods to control vibration.	5	2
10. What is meant by ‘Whipping’?	5	2

PART- B (5 x 14 = 70 Marks)

	Marks	CO	RBT LEVEL
11. (a) A model of 5.2 m in length and wetted surface of 4.25 m ² has a total resistance of 67 N when towed at 3.5 knots in fresh water. Determine the total resistance of a ship of similar form and length 131 m at the corresponding speed. Coefficient of friction in seawater for lengths 5.2 m and 131 m are 1.728 and 1.418 respectively.	14	1	3

(OR)

(b)	A ship of 9500 tonnes displacement consumes 19.2 tonnes of fuel oil per day at a speed of 12 knots. The main engine develops 4050 kW. Determine (a) Specific fuel consumption, (b) Fuel coefficient, (c) Fuel consumption for a voyage of 1800 nautical miles if the speed is reduced to 10.8 knots.	14	1	3
12. (a)	A ship's engine develops brake power of 8100 kW. Transmission losses are 100 kW, propeller efficiency is 69 % and hull efficiency in 0.96. Determine the delivered power, thrust power and effective power. Also find the QPC and overall propulsive coefficient.	14	2	3
(OR)				
(b)	A ship's model has propeller of 0.41 m diameter and pitch ratio 1.25. While advancing at a speed of 6.5 knots at 800 rpm, it produces thrust of 266 N and torque of 16.4 Nm. If the ship's propeller has diameter of 4.3 m, determine the pitch, rpm, thrust and torque.	14	2	3
13. (a)	Sketch and describe a Balanced rudder. Mark its components clearly. When such a rudder will be preferred?	14	3	3
(OR)				
(b)	A single screw ship with a speed of 15 knots has a rectangular rudder 4.6 m deep and 3.05 m wide. The axis of the rudder is 0.6 m aft of the forward edge. Determine the diameter of the rudder stock assuming a maximum stress of $77 \times 10^6 \text{ N / m}^2$ and the rudder angle of 35° for the ahead condition.	14	3	3
14. (a)	Explain the need for wave theory and the knowledge of the following to a marine engineer. (a) Sinusoidal wave (b) Trochoidal and Sub Trochoidal wave	14	4	3
(OR)				
(b)	How does the concept of the following help us in ship designing? (a) Irregular wave system (b) Energy Spectra	14	4	3
15. (a)	Explain the significance of the following on ship operation. (a) Flexural Vibration (b) Torsional Vibration (c) Hull Vibration	14	5	3
(OR)				
(b)	What is the effect of Noise on human performance and discuss briefly the elements of Noise code?	14	5	3
<u>PART- C (1 x 10 = 10 Marks)</u> (Q.No.16 is compulsory)				
16.	Analyze the importance of ship stabilization system. What are the different methods available for the same? Indicate their principle of each and their merits and demerits.	Marks 10	CO 4	RBT LEVEL 4
