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***B.Tech. Degree VIII Semester Special Supplementary Examination  
in Marine Engineering September 2024***

**19-208-0804 MARINE MACHINERY SYSTEM DESIGN (ELECTIVE 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 design considerations of marine systems.  
 CO2: Gain knowledge regarding marine machinery component design.  
 CO3: Explain the design of power transmission systems and the cooling systems.  
 CO4: Understand the designing of Lub Oil system, Steering gear system and Air starting system.  
 CO5: Gain knowledge on design of fuel systems, steam and gas turbine plants, davits and firefighting systems.

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 the factors to be considered by a designer while designing machinery systems?	10	L2	1	1.3.1
	(b) What are the different types of rolling process?	5	L3	1	1.3.1
	<b>OR</b>				
II.	(a) Differentiate lay, waviness and surface roughness with sketches.	5	L4	1	1.3.1
	(b) What are limits, fits and tolerances? How is it expressed in engineering drawings, describe with sketches.	10	L3	1	1.3.1
III.	(a) Describe the forces acting on a 2-stroke diesel engine crankshaft, what types of stresses are produced on the different parts of the crankshaft. What materials are preferred for the manufacture of the crankshafts and briefly describe its manufacturing process?	10	L3	2	3.2.1
	(b) Why is the design and maintenance of 4 stroke diesel engine bottom end bolts considered critical? What stresses are these bolts subjected to?	5	L4	2	1.4.1
	<b>OR</b>				
IV.	(a) The piston of a 2-stroke diesel engine is subjected to high thermal stresses. How is it taken care of in view of material selection and design geometry?	5	L3	2	3.2.1
	(b) What factors are considered while designing an engine room crane on board the ship? What safeties are incorporated in its design?	5	L2	2	3.1.6
	(c) What is co-efficient of fluctuation of speed and co-efficient of fluctuation of energy? How are they important in the design of an engine's flywheel?	5	L4	2	1.4.1

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		Marks	BL	CO	PI
V.	(a) Sketch and describe the propeller shafting system of a ship having fixed propeller. What care is to be taken in its design for the easy removal of the tail end shaft?	10	L3	3	3.1.6
	(b) Describe with the aid of sketches, the central cooling water system of a modern ship with special reference to the heat exchanger and its maintenance.	5	L2	3	1.3.1
<b>OR</b>					
VI.	(a) Sketch and describe thrust bearing used in a modern ship. How does the lubrication of this bearing differ from that of a journal bearing?	5	L3	3	3.2.3
	(b) With respect to piston cooling in large 2-stroke marine engines, briefly discuss the relative advantages and disadvantages of oil and water for piston cooling.	5	L4	3	1.3.1
	(c) What factors are considered while selecting the cooling water pumps of a 4-stroke marine diesel engine?	5	L3	3	3.2.3
VII.	(a) Sketch and describe the lubricating oil system of a large 4 stroke diesel engine. How is the liner of this engine lubricated?	10	L2	4	1.4.1
	(b) What is the difference in function between the relief valve and a fusible plug fitted on an air bottle? What factors affect the design of the relief valve?	5	L4	4	3.1.6
<b>OR</b>					
VIII.	What are the important factors you would consider while designing the electrohydraulic steering gear system for an oil tanker of over 100000 GT? Sketch and describe this system.	15	L3	4	1.4.1
IX.	(a) What changes have taken place in the fuel injection equipment of 2 stroke marine diesel engines in recent years? Explain the fuel injection system of a modern 2 stroke engine and enumerate its advantages.	10	L4	5	3.2.1
	(b) What are statutory requirements to be met while designing the life boat launching equipment of a cargo ship?	5	L3	5	1.3.1
<b>OR</b>					
X.	Write short notes on:				
	(i) Modern method of designing connecting rods in diesel engines.	5	L2	5	5.1.1
	(ii) Design of ships CO2 system.	5	L3	5	1.3.1
	(iii) Engine exhaust gas system.	5	L2	5	1.3.1

Blooms's Taxonomy Level  
L2 – 26.7%, L3 – 50%, L4 – 23.3%.

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