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***B.Tech. Degree VIII Semester Regular Examination in
Marine Engineering June 2023***

**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) Explain the application of basic design principles in respect to function, available materials, production methods, economics and aesthetic appeal. | 10 | L2 | 1 | 1.3.1 |
| | (b) Differentiate between direct extrusion and indirect extrusion with neat sketches. | 5 | L3 | 1 | 1.3.1 |
| OR | | | | | |
| II. | (a) Explain lay, waviness and surface roughness with sketches. | 5 | L4 | 1 | 1.3.1 |
| | (b) How tolerances are expressed in engineering drawings, describe with sketches. | 10 | L3 | 1 | 1.3.1 |
| III. | (a) Describe the stresses that a 2-stroke diesel engine connecting rod is subjected to and how these are taken care of during its design. | 10 | L3 | 2 | 3.3.1 |
| | (b) What is the difference in function of a flywheel and a governor with respect to the prime mover of a generator set. What is the "coefficient of fluctuation of energy"? | 5 | L4 | 2 | 2.1.3 |
| OR | | | | | |
| IV. | (a) What are the forces acting on different parts of a four-stroke marine engine piston? What are the criteria for calculating the piston head dimensions? Explain briefly. | 10 | L4 | 2 | 3.2.1 |
| | (b) What are the performance requirements of an engine room crane on board the ship? Explain how this is achieved. | 5 | L2 | 2 | 3.1.6 |
| V. | (a) Sketch and describe the propeller shafting system of a ship having fixed propeller. What are the inputs required for the design of the propeller shaft? | 10 | L3 | 3 | 3.1.6 |
| | (b) Where filters are normally found on the cooling water system of a ship. What factors are to be considered while designing a filter for the cooling water system? | 5 | L3 | 3 | 1.3.1 |

OR

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| | | Marks | BL | CO | PI |
|-----------|---|-------|----|----|-------|
| VI. | (a) List and sketch the different types of heat exchangers used on a modern diesel engine propelled ship and describe their design consideration. | 10 | L3 | 3 | 3.2.3 |
| | (b) Describe the function of a Thrust block in a ship. How is hydrodynamic lubrication achieved in the lubrication of the thrust block? | 5 | L3 | 3 | 1.3.1 |
| VII. | (a) Sketch and describe the lubricating oil system of a diesel propulsion engine. What consideration goes into selection of the lubricating oil pump? | 10 | L3 | 4 | 1.4.1 |
| | (b) What factors are to be considered while designing the reducing valve of a compressed air system? | 5 | L3 | 4 | 3.1.6 |
| OR | | | | | |
| VIII. | List and describe the two major types of steering gears found on large motor ships, what are the statutory requirements for steering gears. | 15 | L2 | 4 | 1.4.1 |
| IX. | (a) What factors to be considered in the design of exhaust valve for a two-stroke main propulsion engine. | 10 | L4 | 5 | 3.2.1 |
| | (b) What are the statutory requirements to be met while designing the fire-fighting system of a cargo ship? | 5 | L3 | 5 | 1.3.1 |
| OR | | | | | |
| X. | Write short notes on: | | | | |
| | (i) Life boat launching system. | 5 | L2 | 5 | 1.3.1 |
| | (ii) Main engine air starting system. | 5 | L2 | 5 | 1.3.1 |
| | (iii) Finite element analysis. | 5 | L2 | 5 | 5.1.1 |

Bloom's Taxonomy Levels

L2 = 30.0 %, L3 = 50.0%, L4 = 20.0%.
