

**Indian Maritime University**  
**(A Central University, Govt of India)**  
**End Semester Examinations – June 2025**

**Programme Name: B Tech (ME)**

**Semester: IV**

**Subject Code: UG11T4406**

**Subject Name: Marine Boilers and Steam Systems**

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Date: 11.06.2025

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

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General Instructions

- (i) All Sections (A, B & C) are to be attempted.
- (ii) Options, if any, are specified in respective section.

Section A

Choose the correct answer as applicable.

1. Sunrod fins in a Water tube boiler is fitted to the
  - a) Downcomers
  - b) Screen tubes
  - c) Generating tubes
  - d) Water drum
2. Mud holes or Hand holes are fitted on the
  - a) Steam drum
  - b) Feed Water line
  - c) Water drum
  - d) Downcomers
3. The function of the dump valve is to
  - a) dump surplus steam at high pressure to the condenser
  - b) dump surplus steam at high pressure to the economiser
  - c) dump surplus steam at high pressure to the blowdown line
  - d) dump feed water at high pressure into the economiser
4. A constant pressure of around 5 bar is maintained in the Boiler Heavy fuel oil line by the
  - a) Feed Water regulator
  - b) Back pressure valve
  - c) Air vent valve
  - d) Safety valve

5. The limiting value of Chlorides in Boiler Feed water is
  - a) 100
  - b) 200
  - c) 300
  - d) 400
  
6. Hydrazine is a chemical added to Boiler Feed water to remove
  - a) Carbon-di-oxide
  - b) Nitrogen
  - c) Hydrogen
  - d) Oxygen
  
7. In a 3-element water level control method, the 3<sup>rd</sup> element to be monitored is
  - a) Water level
  - b) Steam Flow
  - c) Feed water flow
  - d) Hot well level
  
8. The Burner with the Highest Turn Down Ratio is
  - a) Pressure jet Burner
  - b) Rotary Cup Burner
  - c) Steam Jet Burner
  - d) All burners have same Turn Down Ratio
  
9. When the Flame sensor on a Boiler senses no flame, it will
  - a) Stop the Feed water pump
  - b) Shut the Main steam stop valve
  - c) Clos the fuel shut off valves to stop combustion
  - d) Stop the Force draught Fan
  
10. The maximum lifting pressure of a boiler safety valve, considering the maximum allowable working pressure (MAWP) of a boiler is
  - a) Not more than 3 % above MAWP
  - b) Not more than 5 % above MAWP
  - c) Not more than 7 % above MAWP
  - d) Not more than 10 % above MAWP

### Section B

Five Questions of 02 Marks each

11. State the function of screen tubes in a water tube Boiler.
12. Briefly describe the use of a soot blower in a water tube boiler.
13. State the purpose of an observation tank in a Hotwell.
14. What is meant by Blowback and state the reasons for the same.
15. Explain the effect of scale formation on the water tube in a boiler

### Section C

Seven Questions of 10 Marks each of which any 05 questions to be answered.

16. a) State the classification of Boiler based on various parameters. (7 Marks)  
b) State the 3 methods of Heat transfer and explain, where they occur in a Water tube Boiler. (3 Marks)
17. a) Justify with reasons for the preference of Water tube Boiler over Smoke tube Boilers on ships (7 Marks)  
b) With sketch explain the boiler blow down procedure. (3 Marks)
18. With a neat sketch, explain all the components that constitute the Auxiliary Boiler Feed water line. (10 Marks)
19. a) What is meant by Flashing up a boiler up a Boiler from Cold condition. Explain the steps involved. (6 Marks)  
b) Explain the different types of Refractories used in Boiler (4 Marks)
20. a) Explain in details the problems associated with Boiler Feed water with reference to Corrosion, Scale formation and Carry-over (5 Marks)  
b) Explain any 3 tests that are carried out on Boiler Feed water to ensure it is fit for use. (5 Marks)
21. Emission control areas require that Boilers should be capable of burning both HFO and MGO. Sketch and explain a Boiler fuel oil line to take care of this requirement. (10 Marks)
22. a) Boiler needs to be fitted with multiple safety devices. State the Alarms and trips fitted to a Boiler to ensure it is safe for the seafarer operating it. (5 Marks)  
b) Explain what is the meaning of stoichiometric air-fuel ratio and what is its ratio value? What is lean and rich mixture? (5Marks)

