Indian Maritime University
(A Central Univ6ersity, Govt of India)

Sep/Oct'25 SE
Programme Name: B Tech (Marine Engineering)

Semester: IV

Subject Code: UG11T4406

Subject Name: MARINE BOILERS AND STEAM SYSTEMS

Date: 03.10.2025	Max Marks: 70
Duration: 03 Hrs	Pass Marks: 35

General Instructions

I. All Sections (A, B & C) are to be attempted.
II. Options, if any, are specified in respective section.
III. Write all sub parts of one question at one place.
IV. Use blue or black pen only.

Section A

Section A – (10 x 01 Marks)
Answer all questions in this section

1. A Boiler having its own furnace together with arrangement for passing Main Engine exhaust gases, is known as
   A. Composite boiler
   B. Babcock boiler
   C. Attemperator
   D. Incinerator

2. Type of boiler burner with highest turn down ratio is
   A. Pressure jet
   B. Rotary cup
   C. Steam assisted atomising type
   D. Ultrasonic

3. Identify a condition which does not cause a boiler shut down
   A. Low low water level
   B. Flame failure
   C. FD fan trip
   D. High water level

4. Process of removal of carbon, ash deposits from superheater / economizer coils is termed as
   A. Blowing through
   B. Soot blowing
   C. Bypassing
   D. Blowing down

5. Purpose of air vent cock on boiler is:
   A. To release air while filling up initial feed water.
   B. To release air during initial firing.
   C. To admit air & prevent vacuum after shutting down.
   D. All of the above.

6. Before burner is ignited, the correct thing to do is:
   A. Ensure no air is fed to the furnace
   B. Flush the furnace thoroughly with air
   C. Heat the pilot burner line
   D. Allow oil to enter the furnace.

7. Oil Contamination of boiler water can be first detected at
   A. Observation tank
   B. Boiler drain tank
   C. Make up feed water tank
   D. Economizer

8. Purpose of preheating of Feed Water in Feed Tank is to:
   A. Reduce oil contamination in feed water.
   B. Reduce dissolved Nitrogen in Feed Water.
   C. Reduce dissolved Oxygen in Feed Water.
   D. Reduce Chloride concentration in Feed Water.

9. Purpose of Stay Tubes in Smoke Tube Boiler is:
   A. To allow hot gases to pass through to exchange heat only.
   B. To allow water to pass through to exchange heat only.
   C. To allow hot gases to pass through and also as a support of Tube Plates.
   D. Only acts as a support of Tube Plates.

10. In High Pressure Water Tube Boiler, to keep the working stress under reasonable limit:
   A. More number of small diameter tubes are used for Heat Exchange.
   B. Less number of large diameter tubes are used for Heat Exchange.
   C. More number of large diameter tubes are used for Heat Exchange.
   D. Diameter of Tubes are irrelevant with respect to stress.

Section B – (05 x 02 Marks)
Answer all questions in this section

11. With respect to the Boiler Fuel Oil System, explain the term "Cracking".

12. Why Boiler Manholes are Elliptical in Shape.

13. What is "Blow Back"? How Blow Back can be avoided during Boiler operation.

14. What do you understand by the terms "Swelling" and "Shrinkage"?

15. What is Turn Down Ratio of Boiler Burner?

Section C
Answer any 5 question (10 x 5)

16. a. During a routine Watch Keeping in Engine Room, it was noticed that Boiler Gauge Glass is not showing any level of water. Describe the procedure to ensure the actual level of water inside Boiler Steam Drum. **(6 Marks)**

b. What might be the possible cause of increase of Salt concentration in Boiler Feed Water? How it can be reduced? **(2 + 2 Marks)**

17. a. Explain the functions of the below components and their location in the steam system:

i) Steam Trap
ii) Attemperator **(2.5 x 2 Marks)**

b. With respect to oil contamination in Boiler water:
i) Describe various ways in which oil can enter into a Boiler water side.
ii) What action will you take to minimise such contamination and to control the damage to the Boilers? **(2 +3 Marks)**

18. Explain following Boiler water test and state what effect it will cause on Boilers if their recommended value are not maintained.

i) Alkalinity test
ii) Chloride test
iii) Phosphate test
iv) Hydrazine test **(4x2.5 marks)**

19. a. State the principal differences between a Fire-Tube boiler and a Water-Tube boiler. **(5 marks)**

b. Explain with a simple diagram the Three Element Control for Boiler Feed Water System. **(5 Marks)**

20. a. What is the use of Easing Gear associated with the Safety Valve in Boiler? Describe accumulation of pressure test. **(4 Marks)**

b. Sketch the Boiler Feed Water System showing closed loop of boiler circulating water through Exhaust Gas Economiser. **(6 Marks)**

21. a. State the procedure to build up the steam pressure and to put boiler into service from cold. **(7 Marks)**

b. List the various Alarms and Trips associated in Boiler Operation. **(3 Marks)**

22. a. What do you mean by Poor Combustion and Perfect Combustion? **(2 Marks)**

b. Describe with sketch how the viscosity of a liquid fuel can be controlled by varying its temperature. **(4 Marks)**

c. Explain the process of changing over from High sulphur heavy Fuel Oil to Low sulphur Gas Oil during operation of Boiler. **(4 Marks)**