Indian Maritime University

(A Centr5al University, Govt of India)

Supplementary Examinations – March/April 2025

Programme Name: B Tech (ME)

Semester: Four

Subject Code: UG11T4406

Subject Name: Marine Boilers & Steam Systems

Date: 07.04.2025 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 – (10 x 01 Marks)
Answer all questions in this section

1. _____ % of accumulation is acceptable in a Boiler accumulation pressure test.

(a) 2
(b) 5
(c) 10
(d) 15

2. Which of these tubes have the largest diameter?

(a) Generating tubes
(b) Water wall tubes
(c) Down-comers
(d) Screen tubes.

3. 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.

4. Spalling, slagging and cracking are the common defects of which part of a boiler

(a) Boiler Tubes

(b) Boiler steam pipe lines
(c) Boiler Refractory
(d) Boiler Steam drum.

5. Steam pressure in a main engine exhaust gas economiser is prevented from exceeding working pressure by
(a) Regulating circulating water.
(b) By-passing exhaust gas.
(c) Using a dumping steam condenser.
(d) Lifting safety valve manually to release excess pressure.

6. To blow down the boiler, Ship side valve with respect to boiler blow down valve is operated as follows:
(a) Open earlier & Close earlier.
(b) Open earlier & Close later.
(c) Open later & Close earlier.
(d) Open later & Close later.

7. Boiler water Total Dissolved Solids can be tested with _____
(a) Micrometer
(b) Conductivity meter
(c) Vernier Caliper
(d) Screw Gauge

8. Which of the following can be used as Oxygen Scavenger in Boiler water?
(a) Sodium Hydroxide
(b) Hydrazine
(c) Sulphuric Acid
(d) Silver Nitrate

9. Which of the following Burner has the maximum Turn Down Ratio?
(a) Pressure jet Burner
(b) Rotary Cup Burner
(c) Steam Jet Burner
(d) All burners have same Turn Down Ratio

10. Blowing Down of gauge glass in Boiler is carried out
(a) Every Watch
(b) Daily
(c) Twice Daily
(d) Weekly

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

11. Explain what do you mean by cold corrosion in boilers. Suggest some ways to avoid it.
12. What do you understand by soot blow? What can be the effect on boiler if soot blow is not carried out regularly?
13. What are the advantages of roof top burner in a boiler.
14. What do you understand by blow back in boilers? Suggest some ways to avoid it.
15. What is water hammer? Suggest some ways to avoid it.

Section C – (05 x 10 Marks)
Answer any 5 questions in this section

16 (a). Draw a schematic diagram of water tube boiler with super-heater (may not be specific to any make). Show the passage of flue gas. Make a list of mountings on the steam drum. **(5 Marks)**

(b) What is super-heat steam & why it is required? Explain different methods adopted to control super-heat steam temperature. **(5 Marks)**

17. (a) With the help of a simple line diagram, Explain how a three element boiler water control system works. Explain what are the advantages of three element boiler water control over one and two element control. **(7 Marks)**
(b) What are the types of blowdown carried out on board. Give reasons why these blow downs are important to carry out at regular interval. **(3 marks)**

18. (a) With the help of simple sketch, explain the working principle of ROTARY CUP TYPE of Burner. **(7 marks)**
(b) Write down the various precautions that you will take in boiler operations to avoid soot deposit in smoke side and consequent Fire. **(3 marks)**

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

i) Alkalinity test
ii) chloride test
iii) phosphate test
iv) Hydrazine test
v) Total dissolved Solid test **(5x2 marks)**

20.(a) Draw a line diagram showing steam/water circulation from hot well to hot well. Make a list of places where steam is used in ship for heating. **(5 Marks)**

(b) What are the harmful effects of oil in boiler? What are the possible sources of contamination? How will you identify? **(5 Marks)**

21. (a) Draw a FO pipeline diagram for an Auxiliary Boiler showing temperature at different point with following component

1) HSHFO and LSHFO (MDO) tanks
2) Return FO line **(6 marks)**

(b) Write down the steps for changeover of Fuel Oil from HFO to MGO in an Auxiliary Boiler. **(4 marks)**

22. (a) Describe the important features of a package boiler. **(3 marks)**

(b) In steam pipe line system of ship, how is thermal expansion taken care off? **(4 marks)**

(c) Boiler low level cut out has activated. As a duty engineer what will be your action? **(3 marks)**