

**Indian Maritime University**  
**(A Central University, Govt of India)**  
**End Semester Examinations – June 2023**

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

**Semester: Four**

**Subject Code: UG11T4406**

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

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Date: 07.06.2023

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.
- (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. 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) All of the above.
3. What are the major functions of refractory in Boiler?
  - A) Prevents the Boiler casing from overheating
  - B) To act as reservoir of heat
  - C) Both of the Above
  - D) None of the above
4. Boiler water Total Dissolved Solids can be tested with \_\_\_\_\_ ?
  - A) Hydrometer
  - B) Conductivity meter
  - C) Both of the above
  - D) None of the Above

5. 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
6. Which of these tubes have the largest diameter?
- (i) Generating tubes (ii) Water wall tubes  
 (iii) Down-comers (iv) Screen tubes.
7. Purpose of air vent cock on boiler is
- (i) To release air while filling up initial feed water.  
 (ii) To release air during initial firing.  
 (iii) To admit air & prevent vacuum after shutting down.  
 (v) All of the above.
8. Which of the following is not a mounting of boiler.
- (i) Feed check valve (ii) Steam trap  
 (iii) Dry pipe (iv) Soot blower
9. Steam pressure in a main engine exhaust gas economiser is prevented from exceeding working pressure by:
- (i) Regulating circulating water.  
 (ii) By-passing exhaust gas.  
 (iii) Using adumping steam condenser.  
 (iv) Liftingsafety valve manually to release excess pressure.
10. The most pressing reason for not reducing boiler exhaust temperature below certain point.
- (i) Proportionately more heat surface area needed to extract that heat.  
 (ii) Avoid dew point being reached which will lead to corrosion.  
 (iii) Lower temperature will increase deposition.  
 (iv) Fire hazard in uptake.

**Section B – (05 x 02 Marks)**

**Answer all questions in this section**

11. Mention various reasons for manhole to be elliptical in shape.
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 is water hammer? How it can be avoided.
14. What do you understand by blow back in boilers? Suggest some ways to avoid it.
15. Define capacity and heat surface area of boiler.

### Section C

**Answer any 5 question (10x5)**

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) What is the use of safety valve in boiler. Define accumulation of pressure and blow down pressure. Describe the procedure of setting safety valve.

**(5 marks)**

(b) Discuss importance of soot blowing in boiler. Write the procedure to carry out soot blowing operation. **(5 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

**(4x2.5 marks)**

20. (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. **(10 Marks)**

21. (a) Why it is required to blow down boiler gauge glass regularly. With the help of diagram write the sequence of blowing down. What is cross blowing?

**(5 marks)**

(b) State the conditions for proper combustion. Define theoretical air and excess air. Explain primary and secondary flame.

**(5 marks)**

22.(a) Explain functions of boiler mountings and their locations, that are given below.

- i) Steam Trap
- ii) Attemperator

**(5 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 damage it can cause in such Boilers ?
- iii) What action will you take to minimise such contamination and to control the damage to the Boilers?

**(5 marks)**

100

