

**Indian Maritime University**  
**(A Central University, Govt of India)**  
**End Semester Examinations – June 2024**  
**Programme Name: B Tech (ME)**  
**Semester: Four**  
**Subject Code: UG11T4406**

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

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Date: 11.06.2024

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. Which of the tank steam is NOT used for heating purpose –
  - A. Bilge Tank
  - B. Diesel Oil Tank
  - C. Heavy Fuel Oil Tank
  - D. Main Engine Lube Oil Sump Tank
  
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. Function of a dump valve is
  - A. dumps surplus steam at high pressure to the condenser
  - B. dumps surplus steam at high pressure to the exhaust boiler
  - C. dumps surplus steam at high pressure to the boiler
  - D. dumps feed water at high pressure into the exhaust boiler

4. 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
5. What is the effect of excess of excess air in boiler FO combustion process on plant efficiency -
- A. Boiler plant efficiency increases.
  - B. Boiler Plant efficiency decreases.
  - C. Fuel oil combustion becomes easier.
  - D. No effect
6. What provision is made for cleaning tubes in the exhaust gas heat exchanger while the engine is running?
- A. No provision
  - B. Water washing
  - C. Soot blowing arrangements
  - D. Bypass arrangement
7. What is the maximum lifting pressure of a boiler safety valve, considering the maximum working pressure of a boiler?
- A. 5% above max working pressure
  - B. 7% above maximum working pressure
  - C. 10% above the maximum working pressure
  - D. Not more than 3% above the maximum working pressure
8. 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.
9. 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. lower the temperature in order to get a better mix of water
10. Alarm in the boiler control panel with photocell alarm light flashing indicates
- A. the burner has burned up the fuel
  - B. no flame is being registered
  - C. there is no steam
  - D. there is no water

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

11. List uses of steam on board merchant vessels having Diesel Engine as main Propulsion System
12. Explain what are filming amines in Boilers? Why they are used?
13. What do you understand by blow back in boilers? Suggest some ways to avoid it?
14. Explain in brief boiler gauge glass blowing down procedure.
15. Write short notes on Down comers & Steam Drum of a water tube boiler

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

16. (a) What is the purpose of fitting a boiler on diesel engine ships? (5 marks)  
b) Draw a Vertical Smoke Tube Boiler showing all mountings on it. (5 marks)
17. (a) With reference to pressure vessels explain why shells of cylindrical form give a higher strength / weight ratio than other shapes. (6 marks)  
(b) What do you understand by soot blowing? What can be the effect on boiler if soot blow is not carried out regularly? (4 marks)
18. (a) Why it is required to blow down boiler gauge glass regularly. With the help of diagram write the sequence of blowing down of gauge glass. (6 marks)  
(b) What is the use of safety valve in boiler. Define accumulation of pressure and blow down pressure. (4 marks)
19. (a) With the help of simple sketch, explain the Boiler Feed Water System showing closed loop of boiler circulating water through Exhaust Gas Economiser. (7 marks)  
(b) List the various Alarms and Trips associated in Boiler Operation. (3 marks)
20. (a) With the help of simple sketch, explain the working principle of Pressure Jet 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)

21 (a) Sketch a typical Fuel oil pipeline system for an Auxiliary System burning Fuel Oil and Diesel Oil. (5 Marks)

(b) State the procedure for igniting the burner manually. (5 marks)

22. (a) Name 4 different tests carried out on Boiler Water. (4 marks)

(b) Write short notes on the following (2+2+2 marks)

i) Why the temperature of exhaust gases should be maintained above a minimum value when utilising in Economiser?

ii) Explain the function of Vent Cock on the Boiler Drum?

iii) Explain the term 'blow-back'.