Indian Maritime University

(A Central University, Govt of India)

Mar/Apr'26 SE

Programme Name: B Tech (Marine Engineering)

Semester: V

Subject Code: UG11T4504

Subject Name: MARINE STEAM PLANT

Date: 07.03.2026	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.

Section A

Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable.

1. Efficiency of a thermal cycle increases by
a) Regeneration
b) Reheating of steam
c) Both (a) and (b)
d) Cooling of steam

2. Waste heat recovery boiler helps to _____ overall efficiency of the engine Plant.
a) No effect
b) Decrease
c) First increases and then decreases
d) Increase

3. The Blow down control is not carried out to
a) Adjust the corrosion tendencies of boiler water
b) Adjust the chloride and acidic content of boiler water
c) Adjust the scaling tendencies of boiler water
d) Adjust the heat content of boiler water

4. Which of the items are excluded under boiler survey
a) Steam receivers and reservoirs
b) Thermal oil heating systems
c) Exhaust gas economiser
d) Exhaust gas receivers

5. Which branch of the following type of condensate line in a steam propulsion Plant system sometimes carry flash steam

a) Common return line from steam trap
b) Drain line to trap
c) a pumped return line
d) None of these

6. In a steam heater, if the amount of heat extraction from the steam to the Secondary fluid is increased substantially, then (LMTD) (logarithmic mean Temperature difference) will become
a) Smaller
b) Larger
c) remains constant
d) No effect on heating

7. The velocity of the saturated steam in the pipelines is normally kept within safe limits to prevent issues like erosion etc. Its value is in the range of
a) 20 m/sec is the maximum
b) 25 m/sec to 40 m/sec range
c) Equal to velocity of sound maximum
d) Any range of speed from zero to infinity.

8. In boiler water treatment, the chemicals are dosed to remove the scaling Tendencies of boiler water. Which of the following sequence is normally followed To prevent adverse effects
a) Sodium hydroxide dosed first (required alkalinity attained) then followed by Phosphate
b) Phosphate dosed first (descaling done) then alkalinity raised by Sodium Hydroxide
c) Dosing of phosphate is enough for both descaling and alkalinity.
d) Dosing of Sodium hydroxide is enough for both descaling and alkalinity.

9. Barium chloride is added to boiler water sample to find .....
a) Total chlorides
b) Total dissolved solids
c) Alkalinity due to hydroxides
d) Hydrazine reserve

10. A smoking burner with a pulsating flame in an auxiliary boiler, is an indication that the _____.
a) Fuel oil supply temperature is normal
b) Burner electrode is incorrectly positioned
c) fuel/air ratio is incorrect
d) Ignition current is too low

Section B

Five Questions of 02 Marks each

11. Explain stalling in heat exchanger and its effects?
12. Explain water hammer and its effects?
13. State various steam system on board ships?
14. Why the condensers preferred to run at vacuum in a steam plant?

15. In waste heat recovery systems (WHRS), heat cannot be recovered up to a Very low temperature, why?

Section C

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

16. (a) Sketch and Explain a feed and condensate system suitable for a steam propulsion plant. Consider three closed feed heaters and one open feed heater. Turbo driven feed pump and atmospheric drain tanks is to be included. (7 Marks)
(b)Explain insulation of steam line and give some example of insulation materials. (3 Marks)

17. (a) what is the function of steam trap? State various type of steam trap? With neat sketch explain thermodynamic steam trap? [7 Marks]
(b) What is tracing steam lines? How they are located with the system piping [3 Marks]

18. (a) What are the two basic types of desuperheaters found in modern steam Propulsion plants on board ships. [3 Marks]
(b) Write a short note on "heat balance diagram" and bring out its Importance in design phase as well as operations? [4 Marks]
(c) Why the water is carried over into the steam flow? [3 Marks]

19. Using the principle of waste heat recovery system, describe with a simple line sketch, a Dual pressure steam system from the Main diesel engine waste heat, popularly used on board ships. [10 Marks]

20. In reference to the control of boilers
(a) What is 'turn down ratio' of a burner? What are the values for different type of burners? [3 Marks]
(b) How the "shrink and swell" phenomena pose a challenge for feed water control in a boiler? [4 Marks]
(c) Explain the 'loss of flame' interlock provided in a boiler? [3 Marks]

21. a) Sketch a single line diagram of a thermal oil system, explain various components of the system? (7 Mark)
b) State the safety consideration for a thermal Oil system? Make a Comparison between Thermal oil systems over steam system? (3 Mark)

22. Explain the following about boiler survey
a) Continuous machinery survey of boiler? (3 Mark)
b) What are the item of boiler need to be surveyed? (3 Mark)
c) What are the checks and inspection need to be carried out during boiler survey? (4 Mark)