Indian Maritime University

(A Central Uni2versity, Govt of India)

End Semester Examinations – June 2025

Programme Name: B Tech (ME)

Semester: VII

Subject Code: UG11T4701

Subject Name: PIPING AND PUMPING SYSTEMS: DESIGN AND OPERATION

Date: 02.06.2025	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.

Section A

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

1. The fluid coming in the centrifugal pump is accelerating with the help of...
A) Throttle
B) Impeller
C) Nozzle
D) Governor

2. Which of the following is true about a reciprocating pump?
A) A reciprocating pump delivers a constant volume of liquid in a single discharge stroke.
B) A reciprocating pump delivers a less volume of liquid in a single discharge stroke than suction stroke.
C) A reciprocating pump delivers more volume of liquid in a single discharge stroke than suction stroke.
D) None of these

3. The What is the primary purpose of the Oil Record Book (ORB) on a vessel?
A) To document the crew's working hours
B) To record all oil transfers and discharges
C) To track fuel consumption
D) To maintain a log of maintenance activities

4. In centrifugal pump friction is more than reciprocating pump.
A) TRUE
B) FALSE

5. What is Slippage in the pump operation?
A) Slippage is leakage of fluid from the discharge of the pump back to its suction
B) Slippage is leakage of fluid from the discharge of the pump back to its discharge
C) Slippage is leakage of fluid from the inlet of the pump back to its suction
D) None of these

6. The Lobe type pump is a variation of
A) Gear pump
B) Power pump
C) Single acting pump
D) Double acting pump

7. Materials used for construction of the pipe carrying steam
A) Aluminum
B) Galvanized Steel
C) Lead
D) Stainless Steel

8. Identify the wrong color coding combination of the pipe line
A) Red: Fire-fighting systems
B) Blue: Potable water
C) White: Fuel Oil
D) Green: Sea water

9. What are required to be used as remotely operated shut off valves to safeguard against serious hazards due to oil leakage, spills or fire.
A) Quick closing valves
B) Swing check valves
C) Gate valves
D) Ball valves

10. Which of the following is NOT a common reason for air ingress in onboard cooling seawater systems?
A) Faulty seals and gaskets
B) Clogged strainers
C) Properly sealed connections
D) Vacuum conditions

Section B

Five Questions of 02 Marks each

11. What is the purpose of lantern ring? (2 Marks)

12. How higher fluid viscosity affects pump performance in the context of marine applications? (2 Marks)

13. Describe how a positive displacement pump is protected against various factors. (2 Marks)

14. Briefly explain the purpose of a reducer in shipboard piping systems and the function of bulkhead penetrations. Why are both essential for maintaining the efficiency and safety of fluid transport on a ship? (2 Marks)

15. List down the various types of sealants and packing used on board. (2 Marks)

Section C

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

16. Explain the function of a pump with various on-board system. (10 Marks)

17. (a)With a neat sketch describe the working of a simple gear pump (7 Marks)

(b) Specify three applications of screw pumps. (3 Marks)

18. (a) Draw the constructional drawing of a centrifugal pump, identify the following major components: (5 Marks)

a. Volute
b. Volute casing
c. Impeller vane
d. Impeller eye
e. Shroud
f. Impeller wearing ring
g. Casing wear ring

(b) Explain the water ring priming method for a centrifugal pump. (5 Marks)

19. Explain the losses of head in a pumping system with the remedies.(10Marks)

20. Discuss the various types of fittings used in shipboard piping systems, focusing on bends, reducers, tees, elbows,flanges and gaskets. For each type of fitting, provide a brief description, its common applications, and explain how the proper selection of these components contributes to the safety and efficiency of marine operations. (10 Marks)

21. State the purposes of the following centrifugal pump components:

a. Impeller
b. Volute
c. Diffuser
d. Packing
e. Lantern and Wearing ring (10Marks)

22. Discuss the need to understand the pipe lines constructing pumping systems to be daily used in order to maintain the normal operation of the plant. Explain with relatable examples and regulatory compliance. (10 Marks)