Indian Maritime University

(A Central University, Govt of India)

End Semester Examinations – December 2024

Programme Name: B Tech (ME)

Semester: VII

Subject Code: UG11T4701

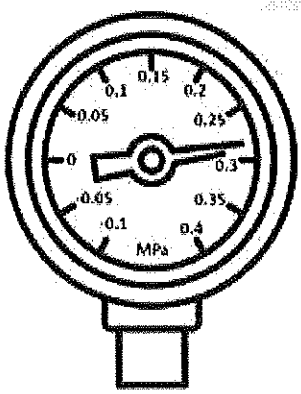
Subject Name: Piping and Pumping Systems: Design and Operation

Date: 10.12.2024	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.

1. What type of pressure gauge is shown in the figure and where it is used in the pumping system? (1)



a) Barometric Pressure Gauge used in pump suction.

b) Absolute Pressure Gauge used in pump discharge.

c) Compound Pressure Guage used in pump suction.

d) Vacuum Pressure Gauge used in pump discharge.

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

4. Direct acting reciprocating pumps could be driven by _____ (1)

a) gas turbine

b) electric motor

c) steam

d) all of the above

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

6. Electric motor driven centrifugal pump amperage is maximum when __ (1)

a) both suction and discharge valves are fully closed.

b) suction valve is fully open and discharge valve is fully closed.

c) suction valve is fully closed and discharge valve is fully opened.

d) both suction and discharge valves are fully opened.

7. 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

8. Which of the following symbol represents butterfly valve? (1)

a)  b)  c)  d) 

9. 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

10.Materials used for construction of the pipe carrying steam

A) Aluminum
B) Galvanized Steel

C) Lead
D) Stainless Steel

Section B

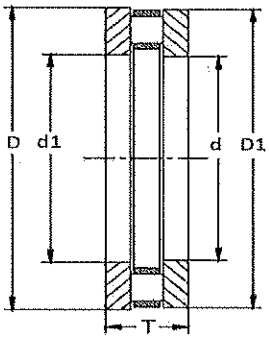
Five Questions of 02 Marks each

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

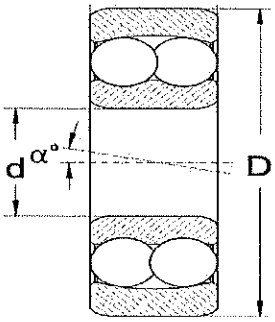
12. State type of pump commonly used as bilge pump to transfer engine room bilges to bilge holding tank and enumerate possible reasons for bilge pump not being able to empty bilge well. (2)

13. State type & load bearing characteristics of bearings shown in figure. (2)

i)



ii)



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.

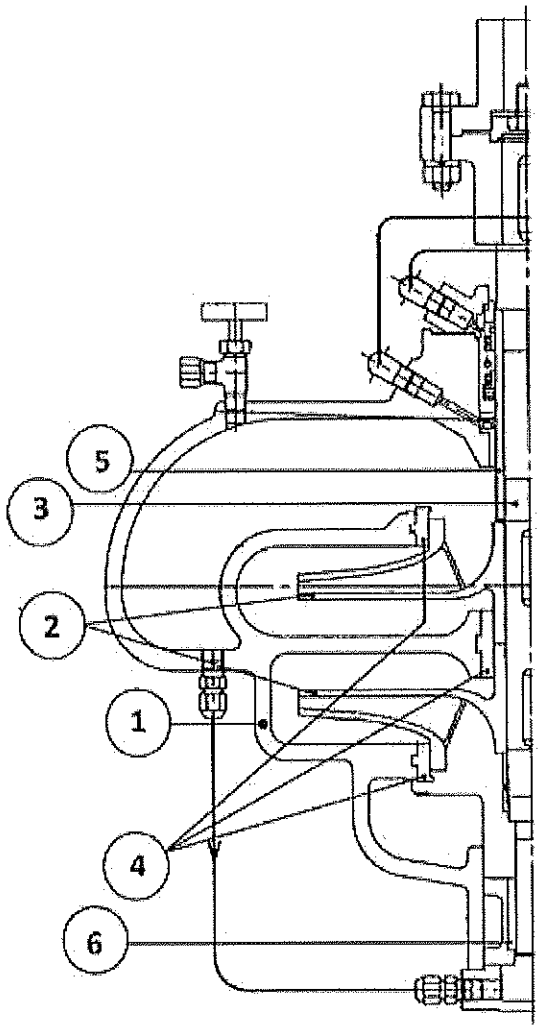
16. a) Classify marine pumps with operating principle and application onboard vessel. (6)

b) List out functional differences between centrifugal and reciprocating pumps. (4)

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) Below is a diagram of sea water centrifugal pump. What are the materials used for marked components? (4)



b) Explain the losses of head in a pumping system (6)

19. (a) Explain the characteristics of piping system layout onboard ship and what are the means to reduce vibrations? (4)

(b) Explain the water ring priming method for a centrifugal pump. (6 Marks)

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.

21. With the help of a simple sketch describe the construction of a globe valve. State it's working principle, various configuration, advantages and disadvantages, the various materials used and the factors considered for material selection. (10)

22. a) Briefly explain concept, effect and remedy for centrifugal pump cavitation. (7)

b) State concept and marine use of supercavitating pump. (3)