Indian Maritime University
(A Central University, Govt of India)
End Semester Examinations – June 2026
Programme Name: B Tech (ME)
Semester: 7th
Subject Code: UG11T4701
Subject Name: PIPING AND PUMPING SYSTEMS : DESIGN AND OPERATION

Date: 08.06.2026 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. For flood control and irrigation applications, the pump generally used is
   (a) centrifugal type
   (b) screw type
   (c) axial flow type
   (d) reciprocating type
2. The ratio of the actual measured head to the head imparted to the fluid by the impeller is known as
   (a) mechanical efficiency
   (b) volumetric efficiency
   (c) manometric efficiency
   (d) overall efficiency
3. As per affinity law, in case of variable speed centrifugal pump for water, capacity and head varies as _____ and _____ of the speed, respectively.
4. Direct acting reciprocating pumps could be driven by _____.
5. Centrifugal pump discharge valves are _____ valves.
6. Which of the following reason can cause excessive packing wear for piston type reciprocating pump during operation?
   a) Too high discharge pressure
   b) Relief valve leaking
   c) Broken valve spring

d) Clogged suction strainer

7. What will happen if the discharge valve of a centrifugal pump is fully closed during operation?
   A. Flow will increase
   B. Pump will run smoothly
   C. Temperature will rise and cause damage
   D. Pump efficiency will improve
8. Which parameter is usually measured to monitor pump performance?
   A. Discharge head and flow rate
   B. Fuel consumption
   C. Shaft speed only
   D. Motor color temperature
9. Cavitation in a pump is caused by:
   A. Excessive lubrication
   B. Low suction pressure
   C. High discharge pressure
   D. Air trapped in delivery line
10. A pump is vibrating excessively during operation. The likely cause is:
   A. Proper alignment
   B. Balanced impeller
   C. Misalignment or bearing wear
   D. Clean suction line

Section B

Five Questions of 02 Marks each

11. What is NPSH?
12. Briefly explain the energy consumption of a pump.
13. With respect to ship's pipe colour coding, match items of left column with correct option from right column.

a) Fresh water line	i) Green
b) Heavy oil line	ii) Red
c) Sludge line	iii) Dark Brown
d) Fire line	iv) Blue
	v) Black
	vi) Grey

14. Explain the possible reasons for the loss of pump performance.
15. Briefly explain the fault-diagnosis techniques for positive displacement pumps.

Section C

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

16. Derive the expression for loss of head due to sudden enlargement in a piping system, and explain it with the help of Bernoulli's equation.

17. What are the various types of bearings used in pumps? Draw and explain the pressure distribution in a hydrodynamic bearing.

18. Describe the correct procedure for starting and stopping an axial-flow pump and explain it using the discharge characteristic curve.

19.

a) Describe the materials used for the construction of pipes carrying fluids such as steam, seawater, fire main, bilge, ballast, starting air, and control air.

b) Describe miscellaneous fittings such as the changeover sea chest and mud box.

20. Draw and explain the gate valve, and describe the material construction of each component.

21. What are the procedures to be followed in the cooling seawater system in case of air ingress or clogged strainers? Explain with a line diagram.

22.

a) Describe the pumping arrangement in gas carriers with a line diagram.

b) Describe the pumping arrangement in oil tankers with a line diagram.