

Indian Maritime University

(A Central University, Govt of India)

End Semester Examinations – December 2025

Programme Name: B Tech (ME)

Semester: VII

Subject Code: UG11T4701

Subject Name: PIPING AND PUMPING SYSTEMS: DESIGN AND OPERATION

Date: 05.12.2025

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) Governor
C) Nozzle
D) Impeller
2. Which of the following is true about a reciprocating pump?
- A) A reciprocating pump delivers a less volume of liquid in a single discharge stroke than suction stroke.
B) A reciprocating pump delivers a constant volume of liquid in a single discharge stroke.
C) A reciprocating pump delivers more volume of liquid in a single discharge stroke than suction stroke.
D) None of these
3. Closing of discharge valve to stop discharge of running axial flow pump will result in _____
- A) High discharge pressure and high amperage

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- B) Reduced discharge pressure and reduced amperage
 - C) High discharge pressure and low amperage
 - D) There will be no significant change in discharge pressure and amperage as liquid will come back to suction through lifted relief valve

4. What happens to pump performance when the viscosity of the fluid being pumped increases beyond the specified range?

- A) Performance improve
- B) Performance deteriorates
- C) Performance remains constant
- D) Viscosity has no effect on pump performance

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. What is the purpose of the priming system in a centrifugal pump?

- A) To increase fluid viscosity
- B) To remove air or gas from suction pipe
- C) To reduce pump speed
- D) To filter the fluid

7. What does the term "schedule number" refer to in pipe specifications?

- A) Pipe Color Coding
- B) Pipe Diameter
- C) Pipe Length
- D) Pipe Wall Thickness

8. Identify the wrong color coding combination of the pipe line

- A) Red: Fire-fighting systems
- B) Blue: Potable water
- C) Yellow: Fuel Oil
- D) Black: Waste media

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 reason will not result in excessive vibration in centrifugal pump when started after scheduled overhauling?

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- A) Misaligned shaft
 - B) Clogged or eroded impeller
 - C) Overtightened gland packing
 - D) Foundation bolts not tightened

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. Draw the characteristic curve of the positive displacement pump. (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 system on board ship. (10 Marks)
 - 17. (a) With a neat sketch describe the working of a simple gear pump (5 Marks)
 - (b) With a neat sketch describe the working of a diaphragm pump. (5 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. Casing wear ring
 - (b) Explain the water ring priming method for a centrifugal pump. (5 Marks)
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19. Explain the losses of head in a pumping system with the remedies. (10 Marks)

20. Discuss the various types of fittings used in shipboard piping systems. For each type, describe its function and typical applications, and explain how the correct selection, installation, and maintenance of these fittings contribute to the overall safety, reliability, 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. Wearing ring

Also mention the materials used for the above components. (10 Marks)

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

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