

Indian Maritime University
(A Central University, Govt of India)

Mar/Apr'26 SE

Programme Name: B Tech (ME)

Semester: IV

Subject Code: UG11T4407

Subject Name: Automation, Control Engineering and Safety Devices

Date: 01.04.2026

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. The final controlled device has not settled at desired position and remain steady above or below the desired value is
(A) Span (B) offset (C) Hysteresis (D) None of the above
2. In a pneumatic automation system, a unit producing a signal to govern the position of the controller of the measured variable, relative to the value of the measured variable, is said to have _____
(A) Rate action (B) two position action (C) Reset action (D) Proportional action
3. The below one is example of electro-pneumatic converter
(A) PI converter (B) Relay (C) IP converter (D) Amplifier
4. The below one condition initiate the shutdown function in the purtifier
(A) High vibration (B) water detected in water monitoring system
(C) Elapsed separating time (D) Oil discharge pressure low
5. In automatic control system, If gain is increased too high, system response be
(A) over-damped (B) under-damped (C) No change (D) critically damped
6. Main engine room control console alarms are to be of the self monitoring type, meaning that an open circuit to a particular alarm circuit will _____
(A) cause an alarm condition (B) secure power to the indicator
(C) secure power to the monitored device (D) automatically reclose within 10 seconds
7. Main propulsion engine control is shifted to bridge
(A) only during UMS period (B) only during manoeuvring (C) Always (D) only when pilot on-board

8. In Aux Engine using PT100 as its temperature sensor, how alarm setpoint is adjusted?

- (A) in the sensor itself (B) by replacing another sensor of required setpoint
(C) In the alarm monitor (D) None of the above

9. The below one is a primary safety device in boiler which will shutdown the boiler.

- (A) Low water level detector (B) High water level detector
(C) Low-Low water level detector (D) All of the above

10. The consistent results of repeated measurement regardless of closeness to standard value is

- (A) Accuracy (B) Error (C) Precision (D) overshoot

Section B

Five Questions of 02 Marks each

11. Explain ON/OFF control with any on-board application
12. What is servomotor?
13. Define (a) transducer (b) Hunting.
14. Why the controller must be tuned?
15. How pressure transmitters are calibrated on-board?

Section C

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

16. Draw and explain the function of pneumatic PID controller. (10 marks)

17.

(A) Explain the function of temperature switch working in the principle of bi-metallic expansion. (3 marks)

(B) What is Log Printer? How this is helpful for on-board operations? (3 marks)

(C) Explain the function of Extended alarm system? How any alarm sounded in this extended unit get reset? (4 marks)

18. Draw the diaphragm -type pneumatic operated control valve, Explain how this valve regulate the flow? (10 marks)

19. Draw and explain jacket cooling water temperature control circuit in detail. (10 marks)

20.

(A) Explain why single element water level controller is not efficient in boiler. How it is improved? (6 marks)

(B) what are all the factors are considered for selection of control valve actuators? Explain in details. (4 marks)

21.

(A) what are the requirements of UMS? (5 marks)

(B) Explain all safety alarms and trips in circuit breaker. (5 marks)

22.

(A) Describe different reasons for the flame failure in boiler. (7 marks)

(B) How to confirm the functioning of viscotherm is correct? (3 marks)