

**Indian Maritime University**  
**(A Central University, Govt of India)**  
**End Semester Examinations– June 2024**  
**Programme Name: B Tech (ME)**  
**Semester: IV**  
**Subject Code: UG11T4407**

**Subject Name: Automation, Control Engineering and Safety Devices**

Date: 14.06.2024

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.

**Section A**

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

1. The interval between a change in signal to the element and the initiation of response to the change is

- (A) Injection time (B) Purging time (C) Dead time (D) None of the above

2. Which one of the following can be the result of introducing integral action in unity feedback system?

- (A) Reduced Noise (B) Eliminate the steady state error (C) Increased stability  
(D) Faster system response

3. What is the full form of PLC ?

- (A) Programmable logic computer (B) Programmable logic Controller  
(C) Programme level controller (D) Programmable letter controller

4. The below one is an essential condition for the requirement of UMS certification of the ships.

- (A) Auto starting of bilge pump  
(B) Remote control of main propulsion engine from bridge  
(C) Automatic fire extinguishing system  
(D) All of the above

5. The following condition will shut down the boiler operation

- (A) Low water level alarm (B) feed water tank low level  
(C) Atomising steam pressure low (D) Ignition diesel oil tank low level

6. The following will act as a trip for generator engine  
(A) Exhaust gas turbocharger inlet high (B) Fuel oil leakage tank high  
(C) Generator sump lube oil level low (D) Over speed

7. Which control loop system is having " Feedback " ?

- A) Open Loop control system
- B) Open and Close loop control system
- C) Close loop control system
- D) This is not related with any control system

8. Fill up the blanks

\_\_\_\_\_ is a device that detects and measures a physical quantity, then provides that information to the control system.

- (A) Transformer (B) Rectifier (C) Controller (D) Sensor

9. Ratio control on boiler ignition system regulates the below two elements

- (A) Feed water and Steam Produced (B) Air and Fuel
- (C) Heat generated and Heat utilised (D) All of the above

10. What is calibration?

- (A) Calibration is the process for controlling intermolecular force.
- (B) Calibration is the process of comparing a device with an unknown value to a reference standard with a known value
- (C) Calibration is the process of changing set point
- (D) Calibration is the process of transferring a device with an unknown value

### **Section B**

Five Questions of 02 Marks each

- 11. What is pneumatic relay in control system?
- 12. Write short notes on differential pressure cell
- 13. Explain the term "Hysteresis" on control valve operation.
- 14. What are the significance of different sensors related to scavenge air in two stroke diesel main propulsion engine?
- 15. Explain boiler feed water high salinity alarm?

### **Section C**

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

- 16. (A) What is the necessity of the valve positioner in pneumatic control valve? (3 marks)
- (B) Draw and explain the functioning of valve positioner on the pneumatic control valve. (7 marks)
- 17. (A) What is meant by mechatronics? (3 marks)
- (B) List different types of hydraulic actuators (3 marks)
- (C) Explain any one type of hydraulic actuator with neat sketch (4 marks)

18. (A) Explain "Tuning" in the PID control system. (3 marks)  
(B) How Ziegler-Nichols method used for tuning the control valve? (7 marks)
19. Explain monitoring and control system of advanced boiler combustion control with detailed flowchart and diagrams (10 marks)
20.  
(A) Describe Remote control and Local control of diesel propulsion engine. (5 marks)  
(B) What are all the safety system incorporated on remote control to protect the diesel propulsion engine? (5 marks)
21. (A) List and describe their features of various instruments and control elements located on main switch board for control of generator and power distribution. (4 marks)  
(B). Draw and explain the jacket cooling water system of main propulsion engine. (6 marks)
22. (A) Explain How viscosity of fuel oil is measured on-board? Explain with the diagram. (5 marks)  
(B) How Temperature sensor is calibrated on-board? (5 marks)

