

**Indian Maritime University**  
**(A Central Udniversity, Govt of India)**  
**End Semester Examinations – June 2025**  
**Programme Name: B Tech (ME)**

**Semester: IV**

**Subject Code: UG11T4407**

**Subject Name: AUTOMATION, CONTROL ENGINEERING AND SAFETY DEVICES**

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Date: 13.06.2025

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

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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. Integral action in a Control system

- |                              |                                  |                        |                         |
|------------------------------|----------------------------------|------------------------|-------------------------|
| a) Reduces speed of response | b) Eliminates Steady State Error | c) Increases stability | d) Reduces oscillations |
|------------------------------|----------------------------------|------------------------|-------------------------|

2. Which one of the following is an electro pneumatic converter?

- |          |                 |                 |                    |
|----------|-----------------|-----------------|--------------------|
| a) Relay | b) IP converter | c) PI converter | d) Pneumatic valve |
|----------|-----------------|-----------------|--------------------|

3. Boiler will shut down in which one of the following cases?

- |                    |                     |                       |                        |
|--------------------|---------------------|-----------------------|------------------------|
| a) Low water level | b) High Water Level | c) Steam Pressure Low | d) Steam Pressure High |
|--------------------|---------------------|-----------------------|------------------------|

4. Full form of PLC is

- |                                  |                                |                                |                                  |
|----------------------------------|--------------------------------|--------------------------------|----------------------------------|
| a) Programmable Level Controller | b) Proportional Level Computer | c) Programmable Logic Computer | d) Programmable Logic Controller |
|----------------------------------|--------------------------------|--------------------------------|----------------------------------|

5. \_\_\_\_\_ is the process of comparing a device's unknown value with a known reference standard value.

6. In a boiler, to switch fuel oil from recirculation line to high/low combustion line, a \_\_\_\_\_ valve is used.

7. What is the full form of VCB used in Electrical systems?

- a) Vacuum Circuit Breaker      b) Variable Circuit Breaker      c) Vacuum Closed Breaker      d) None of the above

8. Standard level of Electrical Signal in a Transmitter is

- a) 4-20 mV      b) 0-20 mV      c) 4-20 mA      d) 0-20 mA

9. VFD are used to

- a) motor starters      b) motor protection systems      c) speed control      d) feedback of motor

10. Identify the correct statement

- a) First Order systems cannot have oscillatory response      b) First Order systems step response reaches 90% in one Time Constant      c) Second Order systems cannot exhibit over damped response      d) Second Order systems cannot become unstable

### **Section B**

Five Questions of 02 Marks each

11. With examples, explain ON-OFF control
12. Why should a boiler run a purge cycle prior to starting?
13. What are the Main Engine starting interlocks?
14. What are the advantages of PLCs?
15. What are Log Printers and Alarm Printers

### **Section C**

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

- 16.(a)With a neat diagram, explain the working of diaphragm type pneumatically operated control. (6)  
(b)Using simple diagrams, show how the direct and reverse action of valve and actuators affect the valve on air failure. (4)
17. (a) With a neat Block diagram explain the components of a PLC (5)  
(b) Explain Zeigler-Nichols First method of tuning a PID controller (5)
18. Explain the Jacket water cooling system of marine propulsion engines using neat diagram. (10)
19. (a) Explain PID Control including control actions of each term. (5)  
(b) Explain how a RTD temperature Transmitter is calibrated (5)
20. Explain the various alarms and safety systems/devices in Boiler (10)
21. Using a neat diagram, explain the High-Low combustion control of a boiler (10)
22. Describe a simple electronic governor for a diesel generator using a simple diagram. (10)

