

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

**End Semester Examinations– December 2025**

**Programme Name: B Tech (ME)**

**Semester: VII**

**Subject Code: UG11T4702**

**Subject Name: PLC and Automation Control**

Date: 08.12.2025

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 - Answer all questions**

**(10 x 1 = 10 Marks)**

1. Over-speed limit of the main engine is set to \_\_\_\_  
A. NCR                      B. 110%                      C. 150%                      D. Critical speed
2. Very high Jacket cooling water temperature >95 deg C leads to \_\_\_\_  
A. Shut down of the Engine  
B. Slow down of the Engine  
C. Alarm to be activated  
D. None of the above
3. As per SOLAS, Emergency generator should start and connect to the ESB automatically within \_\_\_\_ seconds  
A. 45                      B. 46                      C. 47                      D. 48
4. Synchronization of the Alternators is done to  
A. Match Engine speeds only                      B. Match Voltage, frequency and phase  
D. Match Voltage only                      D. Equalise currents
5. Which sensor is used for overcoming Swell effect and Shrinkage effect in the Boiler?  
A. Level sensor                      B. Steam flow sensor  
C. Feed water flow sensor                      D. Steam pressure sensor
6. Reset Control is same as

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- A. Integral Control                      B. Derivative Control  
C. Proportional Control                D. On-Off Control

7. As per SOLAS - A rudder angle indicator must be fitted
- a) On the navigating Bridge
  - b) Inside Steering gear compartment
  - c) Nav Bridge and steering gear compartment
  - d) Nav Bridge, steering gear compartment and ECR
8. Square Root Extractor is used in the measurement of
- A. Temperature    B. Pressure            C. Level                D. Flow
9. Number of Rungs in the PLC Ladder diagram of logic with 2 inputs , 4 outputs is
- A. 2                      B. 8                      C. 6                      D. 4
10. Full form of SPI in Microcontroller systems is
- A. Slow Peripheral Interface            B. Serial Parallel Interface  
C. Synchronous Peripheral Interface    D. Serial Peripheral Interface

**Section B - Answer all questions**

**(5 x 2 = 10 Marks)**

11. What is meant by cut-in and cut-out pressure in Hydrophore system?
12. What are the benefits of Computer control of Main Engine?
13. Explain the working principle of an Analog to Digital Converter (ADC)
14. What is Feed Forward Control?
15. Mention the applications of Operational Amplifiers

**Section C - Answer any 5 questions**

**(5 x 10 = 50 Marks)**

16. (a) Explain the M/E Slow down conditions (5)  
(b) Explain various types of Governors for Engines used in Ships
17. Explain the protective/safety functions incorporated in the automation of Boiler Control. (10)
18. (a) Explain the automation, monitoring and alarm functions incorporated in Oil Purifiers (5)
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(b) Explain the working of Capacity Control mechanism in Refrigeration and Air Conditioning systems (5)

19.(a) Discuss in detail about the Preferential Trip (5)

(b) Explain PID Control including control actions of each term (5)

20. a) List solas requirements for a ships steering gear system (5)

b) Draw a line diagram of ships Steering gear system showing all safeties and controls. (5)

21. (a) Draw and describe the inert gas system used on board tankers. (5)

(b) Explain Cascade Control with example (5)

22. (a) Explain the advantages of using PLCs in Automation (5)

(b) Compare Microprocessors and Microcontrollers (5)

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