

Indian Maritime University
(A Central University, Govt of India)
Supplementary Examinations – March/April 2024
Programme Name: B Tech (ME)
Semester: IV
Subject Code: UG11T4407

Subject Name: AUTOMATION, CONTROL ENGINEERING AND SAFETY DEVICES

Date: 22.03.2024

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. Derivative Control is also called as ____ Controller
2. Offset is difference between ____ and ____
3. In a Marine power distribution and Power management system, Air compressor start/stop is an example of ____ control system.
4. In a final correcting element, the component responsible for accurate positioning of actuator is _____.
5. State true/false – A device is accurate but it may not be precise - _____
6. State True or false – A servomotor is used to transfer lube oil to engine sump____
7. A virtual raise in boiler water level due to sudden decrease in steam drum pressure is known as _____
8. Main Engine Over speed trip is generally set at _____of rated speed
9. In Sequential Starting control system, Steering Gear should be set to start at _____ Sec after power is restored.
10. State True/false - Calibration of thermometers can be done on board ship - _____

Section B

Five Questions of 02 Marks each

11. What are the elements of basic closed loop Control system arrangement.
12. Write a short note on Alarm printer system?
13. Describe characteristics of Stable system
14. Write a short note on Pre-purging in Boiler combustion control system.
15. Classify types of process actuators or correcting devices.

Section C

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

16. a. What are SOLAS requirements for Unattended Machine Spaces (UMS) (8 Marks)
b. what an 'Extension alarm' on UMS ship (2 Marks)
17. a. Explain system configuration of a marine engine room "Data logging and Alarm monitoring system" (8 Marks)
b. What do you understand by Hysteresis (2 Marks)
18. a. What do you understand by Proportional- Integral-Derivative (PID) control system (8 Marks)?
b. What are international standard signal ranges for electrical and pneumatic devices used in automation. (2 Marks)
19. Explain following functions related to Main Engine for Propulsion
- Remote control
- Local Control
- Normal values of various parameters being monitored
- Alarm and Shut down values
- explain what is "Slow down" function. (10 Marks)
20. a List and describe important features of Marine power distribution system and safety arrangement. (8 Marks)
b. What is difference between Transducer and Transmitter (2 Marks)
21. a. Explain Simple 3 element Boiler water level control system with suitable diagram (6 Marks)
b. List various safety devices and alarms incorporated in marine boiler, explain settings/functioning of each device. (4 Marks)
22. a. How do we ensure that the sensors/transducers are working correctly? (4 Marks)
b. Explain the working principle of Pneumatic Diaphragm actuator with sketch. (6 Marks)