Indian Maritime University

(A Central University, Govt of India)

End Semester Examinations – June 2024

Programme Name: B Tech (ME)

Semester: IV

Subject Code: UG11T4405

Subject Name: Electro Technology

Date: 13.06.2024	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 typical dry full body contact resistance is about _____.
   a. 5000 Ω at 25 V
   b. 5000 Ω at 50 V
   c. 2500 Ω at 50 V
   d. 2500 Ω at 250 V

2. In marine industries the high voltage is termed as
   a. Less than 1000 voltage
   b. 1000 voltage and above
   c. 400 voltage and above
   d. None of the above

3. Which of the following electrical diagrams are commonly used in industrial control systems to represent the logical relationships between inputs and outputs?
   a. Block diagram
   b. System diagram
   c. Ladder diagram
   d. Wiring diagram

4. The gases that require low ignition energy are classified under the gas group _____.
   a. I
   b. II A
   c. II B
   d. II C

5. The ships with 3-phase, 3-wire, 440 V have their neutral points
   a. isolated from ship's hull
   b. connected to ship's hull through neutral earthing resistor
   c. connected to ship's hull using a solid wire
   d. connected to ship's hull through a coil

6. In the brushless excitation of the alternators, the pilot exciter is _____ and the main exciter is _____.

a. permanent magnet generator, ac generator
b. ac generator, permanent magnet generator
c. dc shunt generator, ac generator
d. ac generator, dc shunt generator

7. In CRO, which component generates the time scale?

a. Delay line
b. Vertical amplifier
c. time-base generator
d. CRT

8. For alternator synchronization, the phase angle between the generated voltage and grid voltage must be _____.

a. 30°
b. zero
c. 90°
d. 60°

9. A circuit breaker and a fuse have a basic similarity in that they both_____.

a. can be reset to energize the circuit
b. should open the circuit when overloaded
c. will burn out when an over current flow develops
d. all of the above

10. When four 12 V, 100 Ah batteries are connected in series, you will get _____ battery system.

a. 48 V, 400 Ah
b. 48 V, 100 Ah
c. 12 V, 400 Ah
d. 12 V, 100 Ah

Section B

Five Questions of 02 Marks each

11. Explain the Ingress Protection Rating. What does "IP56" mean?
12. Explain the terms, "Arc", "Arc Flash" & "Arc Blast", with respect to high voltage systems.
13. What do you mean by "Hazardous" and "normally safe" space on tankers?
14. What is preferential tripping in electrical distribution system?
15. What is earth fault? State the effects of earth fault.

Section C

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

16. (a) State the safety procedures to be adopted on-board when working on electrical Installations. Also discuss the effect of electric shock on human body. (4 + 3 Marks)

(b) Why is it vital to determine whether the phase sequence of the incoming shore supply is "correct"? What is the procedure for correcting an improper phase sequence? (3 Marks)

17. (a) State emergency power requirements on-board a ship. (5 Marks)

(b) List out the probable reasons for blackout. Explain sequential restarting after blackout. (5 Marks)

18. Draw a block diagram of an automatic voltage regulator, listing the key components and explaining the use of a manual trimmer. Also, describe how it works. (10 Marks)

19. (a) Discuss the working principle of preferential trip using a neat sketch. (6 Marks)

(b)Describe significance of reverse power protection. (4 Marks)

20. (a) Describe briefly the working principle of any two types of closing mechanism of circuit breakers. (5 Marks)

(b) Explain the difference between insulated system and earth neutral system of a ship (5 Marks)

21. (a) List out any four components of fault-protection systems and explain. (5 Marks)

(b) Describe the reaction of electric cables to a fire. Also, highlight the causes of cable fire. (5 Marks)

22. (a) State the purpose of employing capacitor in discharge tube circuits? Comment on Stroboscopic effect. (4 Marks)

(b) State safety precautions that should be strictly followed to prevent accidents when working on high-voltage electrical equipment. (6 Marks)