

**Indian Maritime University**  
**(A Central University, Govt of India)**  
**End Semester Examinations – June 2025**  
**Programme Name: B Tech (Marine Engineering)**  
**Semester: IV**  
**Subject Code: UG11T4405**  
**Subject Name: Electro Technology**

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Date: 09.06.2025

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 of 01 Mark each – Choose the correct answer as applicable.**  
**(10x1=10 Marks)**

1. Any electric motor can be constructed to be
  - a) Short Proof
  - b) Ground Proof
  - c) Overload Proof
  - d) Explosion Proof
  
2. Enclosure protection for electrical equipment is defined in terms of its opposition to the ingress of
  - a) Solid Particles
  - b) Gaseous Particles
  - c) Liquids
  - d) Solid Particles and Liquids
  
3. 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
  
4. A diesel driven emergency generator is prevented from being paralleled with ship service generator by \_\_\_\_\_.
  - a) An Electric interlock system
  - b) Auto paralleling switch
  - c) Synchronizing Oscilloscope
  - d) Reverse current relay

5. Assume 2 alternators are running in parallel and load can be shifted on one of the alternator. When load is shifted to one alternator, and the other alternator must cut off but still it is carrying small amount of load its breaker trips and prime mover cuts off. The CB trips because
- CB has operated at normal condition, it is faulty
  - Earth fault has occurred
  - Reverse power relay operated
  - Under-voltage protection operated
6. A ground fault circuit interrupter is designed to \_\_\_\_\_.
- protect against electrical shocks
  - increase energy efficiency
  - regulate voltage levels
  - subside electrical fires
7. According to SOLAS regulations, how many degrees of trim should an emergency generator operate for?
- 22.5°
  - 20°
  - 10.5°
  - 10°
8. An earth fault in a ship's isolated neutral system causes:
- Immediate trip of protective devices
  - Increased voltage to other phases
  - Reduced voltage to other phases
  - No immediate trip of protective devices, system can continue operating
9. How does a multimeter measure current?
- By measuring the resistance of a circuit
  - By measuring the magnetic field around a conductor
  - By measuring the temperature of a circuit
  - By measuring the voltage drop across a known resistance
10. A device used to secure and seal the end of an electrical cable to an electrical equipment or enclosure is \_\_\_\_\_.
- Armour
  - Filler
  - Sheath
  - Cable gland

### **Section B**

#### **Five Questions of 02 Marks each (5x2=10)**

11. If synchroscope fails, then which method will be used for paralleling of alternators?
12. Why NER (Neutral Earthing Resistor) is used in High voltage system?

13. Specify the voltage limits for DC and AC that are considered safe to avoid the risk of electric shock.
14. Define an intrinsically safe circuit and explain its applications on a tanker.
15. Explain the concept of sequential starting in marine power systems and its importance.

### Section C

**Seven Questions of 10 Marks each of which any 05 questions to be answered. (5x10=50)**

16. a) State why high-voltage installations are used on board ships.  
b) Describe safety precautions must be taken while handling high-voltage electrical equipment.  
c) Write the effects of electric current on the human body. [3+4+3]
17. a) Sketch & explain a block diagram of an automatic voltage regulator, naming the main components.  
b) Explain the primary safety devices installed on the main switchboard. [5+5]
18. a) Sketch a typical ship's electrical distribution system operating at 440V and 60 Hz.  
b) Describe the difference between insulated system and earth neutral system of a ship. [6+4]
19. a) Draw & explain working principle of air circuit breaker.  
b) Explain the difference between fire-resistant and flame-retardant cables. [6+4]
20. a) Describe the function of each symbol presented.



- b) Calculate the neutral earthing resistor (NER) value needed to limit the earth fault current of a 2 MW, 3.3 kV, 0.8 power factor, three-phase alternator to 500 A.  
c) Discuss the working of a high-voltage SF<sub>6</sub> Circuit Breaker. [3+3+4]
21. a) Describe with suitable diagram preferential tripping when overload occurs on a generator.  
b) Describe the dangers which may exist in a battery compartment and explain how they are overcome. [5+5]
22. a) Describe the synchronizing sequence to bring the generator into service in parallel with running generator using synchroscope.  
b) With neat and clean diagram describe how megger test done on 3 phase induction motor and precautions to be followed carrying out test. [5+5]

