

**Indian Maritime University**  
(A Central University, Govt. Of India)  
**B. Tech (Marine Engineering)**  
Semester: 6<sup>th</sup>  
End Semester Examination  
**Subject Name: Marine Electrical Technology**  
**Subject Code: 3603**

**Time: 3 Hours**  
**Date: 06.06.2022**

**Max Marks: 70**  
**Pass Marks: 35**

**Part – A (compulsory)**  
**Answer the following (10x1=10 Marks)**

**Select the most appropriate option**

- 1) (I) When you start a motor on board, what type of power it draws from the generator?
- A. Apparent power
  - B. Active power
  - C. Active power and Reactive power
  - D. Reactive power
- II) What is the location of an Emergency generator room on board ship?
- A. Forward of forward collision bulkhead
  - B. Inside the machinery space
  - C. Above the upper continuous deck
  - D. All of the above
- III) In a 3-phase generator an insulated neutral system means
- A. Generator neutral is connected to the earth
  - B. Generator neutral is isolated from the earth
  - C. There is no neutral in the system
  - D. None of the above
- IV) A motor enclosure classed as IP<sub>56</sub> is suitable for
- A. Immersion in water under stated conditions of pressure & time
  - B. Immersion in water for very long time, under specified pressure
  - C. The Deck water type equipment
  - D. All of the above

V) In a freshwater generator what arrangement is provided in a Salinometer to give correct reading of salinity, when the cooling sea water temperature in the condenser varies?

- A. A fuse in the Salenometer circuit
- B. Solenoid operated spring loaded contact, creating short circuit across the meter
- C. Electrode cell
- D. Temperature correction unit

VI) Protection against sustained overload occurring in molded-case circuit breaker is provided by a/an

- A. Overvoltage release
- B. Thermal acting trip
- C. Thermal overload relay
- D. Current overload relay

VII) What is class "A" type tanker?

- A. Carries non-boiling oil cargoes in bulk having close test flashpoint $>60^{\circ}\text{C}$
- B. Intended for the carriage of LNG & LPG
- C. Carries non-boiling oil in bulk having close test flashpoint $\leq 60^{\circ}\text{C}$
- D. For the carriage in bulk of other flammable liquid cargoes

VIII) Ward-Leonard mechanism is

- A. A method of generator excitation
- B. A method of precise speed control of an ac motor
- C. A method of precise speed control of an dc motor
- D. A mechanism for starting a Synchronous motor

IX) In a high voltage system, the effect of arcing is:

- A. Arc flash
- B. Arc blast
- C. Both of the above (i.e. option A & B)

- D. None of the above
- X) As regard Electrical shock effect on human, which is more dangerous?
- A. Shock from a.c. system
  - B. Shock from d.c. system
  - C. Effect of shock on human is same in both the cases
  - D. Shock from none of the system is dangerous

**PART B, Q.No.2;**  
**Short Answer Type Questions (5 x 2 = 10 Marks)**

- I) What are the various safety devices provided on main switch board to protect the generator on board ships?
- II) Can we use petrol on board for Em. Generator? Justify your comment
- III) Enumerate the advantages of an Azipod drive over conventional electric propulsion system
- IV) In a high voltage system why we are allowed to earth the neutral of the generator through a neutral earthing resistance only?
- V) What is 'normally safe' and 'Hazardous' area on tankers?

**PART C**  
**Answer any Five (5 x 10 = 50 Marks)**

- 3) Generators are provided on board ships to generate power at constant (rated) voltage. It is observed that when few large rating motors were started, r.p.m. of the prime mover (diesel engine) dropped from the rated 900 to 880 r.p.m and the voltage of the generator dropped from 440 volts to 420 volts. How this decreased voltage and r.p.m.is automatically brought back to its rated voltage & r.p.m.? Explain with a neat diagram. (10)
- 4) (A) You are on board a bulk carrier, and you have 12volt, lead acid batteries, the capacity of each battery is 100 ampere-hour. How will you connect the bank of batteries to supply to the emergency loads of 400 amperes at 120 volts, for 1/2 hour? When main power has failed and the emergency generator failed to start within 15 seconds. Draw the arrangement.

- (B) As regards shore supply on board ship what will be the consequences, if the phase sequence of the shore supply is incorrect? If incorrect, what will be your action? (5 + 5)
- 5) (A) A synchronous motor is a drive for the propeller of an electric propulsion ship (No diagram, no explanation). Simply write how the system fulfills the requirement of maneuvering  
 (B) What is the purpose of Sheath on a cable?  
 (C) A cage rotor induction motor has been flooded with sea water and its insulation resistance is down to 100  $\Omega$ . What is the procedure for putting the motor back into service? (3+3+4)
- 6) What is the importance of a Rudder Angle indicator on board? With a neat sketch explain its working. (3+7)
- 7) "You should measure the insulation resistance of a machine while the machine is hot". Justify the statement? How will you check the insulation resistance of an induction motor? Draw Sketches to show various measuring points. (3+7)
- 8) (A) What is intrinsic safety (Exia circuit)? Where are these circuits used on a tanker? Draw a labeled circuit diagram, and briefly explain how these circuits provide intrinsic safety?  
 (B) In a Tabular form, enlist the "Ex" protected equipment that can be used safely in the hazardous area, zone wise. (6 + 4)
- 9) As regard merchant ships what is high voltage? Which ships uses high voltage? Enumerate the advantages and disadvantages of HV. What are the hazards associated with arc flash and arc ballast? What is Electrical permit to work (EPTW)? What are the types of circuit breakers used in a high voltage system? (10)

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