

Indian Maritime University
(A Central University, Govt of India)
Supplementary Examinations – September/October 2024
Programme Name: B Tech (Marine Engineering)

Semester: II
Subject Code: UG11T4206

Subject Name: Marine Electrical Power Generation and Distribution

Date: 20.09.2024 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 of 01 Mark each – Choose the correct answer as applicable. (10x1=10 Marks)

1. In general, Supply Voltage and frequency of merchant ship is:

- (a). 440 V, AC - 3 Phase and 60 Hz
- (b). 110 V, AC - 3 Phase and 60 Hz
- (c). 220 V, AC - 3 phase and 50 Hz
- (d). 220 V, AC 1 - phase and 50 Hz

2. If blackout happens, Emergency Switchboard will be fed from:

- (a). Main Switchboard
- (b). Emergency Generator
- (c). Storage battery
- (d). Shaft Generator

3. The main purpose of interlock between MSB and ESB is _____

- (a). Disconnect main generator
- (b). Disconnect emergency generator
- (c). To connect only one generator at a time
- (d). To connect both main and emergency generator

4. The ship board general alarm system must receive its main source of power from

- (a). A storage battery
- (b). Emergency generator
- (c). An auxiliary generator
- (d). Ships main service generator

5. Minimum protections provided in breakers are:

- (a). Overload and short circuit
- (b). Overload and open circuit
- (c). Short circuit and open circuit
- (d). Open circuit and earth fault

6. Which material is used to construct armature core of alternator?

- (a) Spring steel (b) Mild steel (c) Silicon Steel (d) Forged steel

7. Advantage of AC supply over DC supply is:

- (a) Can be stopped up
- (b) Can be easily converted to mechanical power
- (c) Can be stepped down
- (d) All of the above

8. For the three phase transformer, which of the following statement is true?

- a) True ratio = line voltage ratio
- b) True ratio = phase voltage ratio
- c) True ratio = $\sqrt{3}$ phase voltage ratio
- d) True ratio = $\sqrt{3}$ lines voltage ratio

9. What is the location of Emergency generator room on board ship?

- (a) Forward of forward collision bulkhead
- (b) Above the upper continuous deck
- (c) Inside the machinery space
- (d) All of the above

10. When charging lead-acid batteries, you should reduce the charging rate as the battery nears its full charge capacity to.

- (a) Prevent excessive gassing and overheating
- (b) Allow equalization of cell voltages
- (c) Reduce lead sulphate deposits
- (d) Increase lead peroxide formation

Section B

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

- 11. What is the importance of DC excitation system in alternator?
- 12. Name the 4 types of breakers as per arc extinction method.
- 13. What are the advantages of using High Voltage onboard ships?

14. Differentiate the wiring and schematic diagrams of electrical circuits.
15. Define phase sequence of a three-phase supply. When do we check it mostly?

Section C

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

16. a) Draw the Power Distribution arrangement on board showing Gens, breakers, main & emergency switchboard, transformers, Shore supply and storage battery. (7)
b) What is the importance of breaker interlock between Main and emergency switchboard? (3)
17. a) Derive the expression for RMS value of ac sinusoidal voltage in terms of peak value. (5)
b) With Suitable diagram describe the operation of shaft generator. (5)
18. a) Explain the working of star-delta and delta-delta transformer with suitable diagram. (7)
b) How is the efficiency of a transformer measured? (3)
19. a) Compare Salient pole type and smooth cylindrical type rotor of Synchronous Generator. (5)
b) Describe the rotary and static exciters. (5)
20. a) Explain the need for shore supply. With neat sketch explain shore supply connection box and procedures to be followed. (7)
b) Explain why heaters are fitted to a generator. (3)
21. Explain briefly the following: -
a) Single line or one-line diagram. (5)
b) Explain brushless excitation system of an alternator. (5)
22. (a) Discuss the maintenance checks on shipboard Lead - acid Battery set and battery room. (5)
(b) Sketch a schematic arrangement of a three-phase alternator with star connection and highlight the importance of an AVR in the circuit. (5)