Indian Maritime University

(A Central University, Govt of India)

March/April 2024 Supplementary Examinations

Programme Name: B Tech (ME)

Semester: II

Subject Code: UG11T4206

Subject Name: Marine Electrical Power Generation and Distribution

Date: 14.03.2024	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.

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Section A

Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable.

(10X1=10 Marks)

Answer All Questions

1. Fleming's right hand rule is primarily utilized for finding
   (a) Direction of motion of conductor
   (b) Direction of magnetic field
   (c) Direction of induced emf
   (d) All of the above

2. The ship board general alarm system must receive its main source of power from _____.
   (a) Storage battery
   (b) Emergency generator
   (c) An auxiliary generator
   (d) Ships main service generator

3. The purpose of commutator in DC generator is to
   (a) Convert alternating current to direct current
   (b) Collect current generated in armature conductors
   (c) Increase magnetic flux

(d) Increase ampere turns in the field winding

4. Transformer is rated in kVA instead of kW because
   (a) Load Power factor is often not known
   (b) kVA is fixed while kW depends on load power factor
   (c) Losses depend on KVA
   (d) All of the above

5. Paralleling of main and emergency generators is prevented by
   (a) Circuit breaker
   (b) Fuse
   (c) Interlock
   (d) Relay

6. 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

7. Alternators used to generate power on ships will have _____.
   (a) Rotating Armature and fixed field
   (b) Rotating field and fixed armature
   (c) Rotating field and rotating armature
   (d) Fixed field and fixed armature

8. On a ship, AC power is recommended for the following reason(s):
   (a) Can be stepped up
   (b) Can be easily converted to mechanical power
   (c) Can be stepped down
   (d) All of the above

9. In a distribution system, safety devices serve the following:
   (a) Automatically connect source with services during fault
   (b) Automatically disconnect source from services during fault
   (c) Display the readings of supply
   (d) Regulate the voltage and current during fault

10. A type of electrical configuration on the ship called a preferential trip is intended to disconnect the _____.
   (a) non-essential loads from the main bus bar in case of partial failure or overload of the main supply
   (b) essential loads from the main bus bar in case of partial failure or overload of the main supply
   (c) essential loads from the emergency bus bar in case of overload of the emergency supply
   (d) essential and non-essential loads from the main bus bar in case of partial failure or overload of the main supply

Section B

(5 x 2 Marks=10 Marks)

11. Why are carbon brushes preferred in DC generators?

12. What do you understand by the term "Transformation ratio" of transformers?

13. What is the most regularly used type of battery on a ship? Give the voltage rating.

14. Classify circuit breakers according to the medium of arc extinction.

15. What is the significance of the DC excitation system in alternators?

Section C

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

(5 x 10 Marks=50 Marks)

16. (a) Make a Clear note on various types of DC generators. Use diagrams wherever necessary. (7 Marks)

(b) Write the EMF equation of the DC generator, defining all terms. (3 Marks)

17. (a) Explain the brushless excitation system for a ship's alternator. (7 Marks)

(b) Why is it necessary to cool generators? (3 Marks)

18. (a) Explain the operation of star-delta and delta-delta transformers using relevant sketches. (8 Marks)

(b) Write a brief note on the efficiency of a transformer. (2 Marks)

19. Using a single line diagram, explain the ship's electrical power distribution system. (10 Marks)

20. (a) With suitable sketch explain the Shore supply box. (8 Marks)

(b) What happens if the shore supply sequence is not matched? (2 Marks)

21. Give the constructional details and a neat sketch explaining how a 3-phase alternator works. (10 Marks)

22. (a) What are the essential services fed by the emergency switchboard?

(3 Marks)

(b) Name any two strategies for starting an emergency generator.

(1 Mark)

(c) Give reasons for the following: (6 Marks)

i. EG & Emergency switch board are installed away from Engine room
ii. kW rating of EG is smaller when compared with main Generator
iii. EG cannot be paralleled with main Generators.