

**Indian Maritime University**  
**(A Central University, Govt of India)**  
**End Semester Examinations – December 2023**  
**Programme Name: B.Tech (ME)**  
**Semester: II**  
**Subject Code: UG11T4206**

**Subject Name: Marine Electrical Power Generation and Distribution**

Date: 18.11.2023

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.**

- Q1. 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
- Q2. The ship board general alarm system must receive its main source of power
- a) A storage battery
  - b) Emergency generator
  - c) An auxiliary generator
  - d) Ships main service generator
- Q3. 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

- Q4. If blackout happens, Emergency Switchboard will be fed from:
- a) Main Switchboard
  - b) Emergency Generator
  - c) Storage battery
  - d) Shaft Generator
- Q5. The interlock between MSB and ESB ensures that:
- a) The MSB should not feed the ESB
  - b) The ESB should not feed the MSB
  - c) ESB should feed the MSB
  - d) Main generator should feed directly to ESB
- Q6. Safeties incorporated with MSB are:
- a) Reverse Power protection
  - b) Preferential trips
  - c) Under voltage protection
  - d) All of the above
- Q7. General faults in distribution system are:
- a) Earth fault
  - b) Overload fault
  - c) Short Circuit fault
  - d) All of the above
- Q8. The purpose of safety devices in distribution system is to:
- a) Automatically connect source with services during fault
  - b) Automatically disconnect source with services during fault
  - c) Display the readings of supply
  - d) To manually switch on and off during fault
- Q9. Advantage of AC supply over DC supply is:
- a) Can be stepped up
  - b) Can be easily converted to mechanical power
  - c) Can be stepped down
  - d) All of the above
- Q10. What principal does alternator follow, Select the correct option?
- a) Rotating field and fixed armature

- b) Rotating Armature and fixed field
- c) Rotating field and rotating armature
- d) Fixed field and fixed armature

### **Section B**

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

- Q11. Name the 4 types of breakers as per arc extinction method.
- Q12. Define the term transformation ratio (K) of transformers
- Q13. What are the Advantages of High Voltages system?
- Q14. What is the importance of DC excitation system in alternator?
- Q15. Differentiate the wiring and schematic diagrams of electrical circuits.

### **Section C**

#### **Solve any 05 questions**

##### **Q.16**

- a) Draw the Power Distribution arrangement on board showing Gens, breakers, main & emergency switchboard, transformers, Shore supply and storage battery. (7 marks)
- b) What is the importance of breaker interlock between Main and emergency switchboard. (3 marks)

##### **Q.17**

- a) Explain the working of star delta and delta delta transformer with suitable diagram. (8 marks)
- b) How is the efficiency of a transformer measured. (2 marks)

##### **Q.18**

- a) With a neat sketch, explain the working of an alternator. (6 marks)
- b) Write a short note on following: - (4 marks)
- 1) Stator 2) cylindrical & salient Rotor 3) Governor 4) Cooling arrangement

##### **Q.19**

- a) Describe the rotary and static exciters. (5 marks)

- b) Explain brushless excitation system for an alternator used in ship. (5 marks)

**Q.20**

- a) Make a drawing of DC generator showing rectangular coil, commutator and brushes explain the working of it. (7 marks)
- b) Derive an EMF equation of a DC generator. (3 marks)

**Q21**

- a) With suitable sketch explain the Shore supply box. (8 marks)
- b) What is the consequence if shore supply sequence is not matched? (2 marks)

**Q22.**

- a) What are the essential services fed from Emergency Switch board. (3 marks)
- b) Name any two methods by which emergency gen. is cranked. (1 mark)
- c) Give reasons for followings: - (6 marks)
- 1) EG & Emergency switch board are installed away from Engine room
  - 2) Kw rating of EG is smaller when compared with main Generators
  - 3) EG cannot be paralleled with main Generators.