

Indian Maritime University
(A Central University, Govt of India)
End Semester Examinations – December 2024
Programme Name: B Tech (Marine Engineering)
Semester: V
Subject Code: UG11T4508

Subject Name: Marine Electrical Motors: Starters & Drive Controls

Date: 23.12.2024

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/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable. (10x1=10 Marks)

1. Which of the following motors, on removal of load, will run at the highest speed?
 - a) Shunt motor
 - b) Series motor
 - c) Differential compound motor
 - d) Cumulative compound motor

2. Why starters are required in induction motor?
 - a) because of low starting torque
 - b) because they are not self-starting
 - c) because of the high starting torque
 - d) because of the high starting current

3. What is the difference between an overload and a short circuit?
 - a) An overload involves gradual current increase, while a short circuit is a sudden surge.
 - b) An overload occurs in faulty equipment, while a short circuit happens outside equipment.
 - c) An overload causes overheating, while a short circuit results in sparking.
 - d) All of the above.

4. Two stator winding of AC servomotors are oriented
 - a) 90° mechanical apart
 - b) 90° electrical apart

- c) 180° mechanical apart
- d) 180° electrical apart

5. The oscillations in a synchronous motor can be damped out by?

- a) maintaining constant excitation
- b) running the motor on leading power factors
- c) providing damper bars in the rotor pole faces
- d) oscillations cannot be damped

6. What is a servo motor?

- a) A motor that uses a feedback loop to control its position.
- b) A motor that uses a variable reluctance to control its speed.
- c) A motor that uses a permanent magnet to control its torque.
- d) A motor that uses a stepper motor to control its position.

7. If an induction motor is initially connected in delta and then reconnected in star then the current drawn will become

- a) Thrice of the current drawn when connected in delta
- b) Twice of the current drawn when connected in delta
- c) One third of the current drawn when connected in delta
- d) Half of the current drawn when connected in delta

8. Which of the following is not used for making variable frequency design drives?

- a) Phase controller
- b) Pulse-width modulation
- c) Controlled Current source
- d) Frequency controller

9. What is the purpose of laminations in the core of an electrical motor?

- a) To reduce the weight of the motor
- b) To increase the motor's efficiency
- c) To provide electrical insulation
- d) To improve the motor's torque

10. The motor enclosure used for industrial purpose is

- a) Totally enclosed type
- b) Protected type
- c) Open type and drip proof type
- d) Drip proof type

Section B

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

11. What are the main components of DC servomotor?

12. Give a brief on DC series motor and what are the features of DC series motor.

13. State factors determining the speed of DC motor.

14. What are the most common causes of failure insulations in electrical motors.

15. Enumerate the possible reasons if a 3-phase motor fails to start?

Section C

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

16. a) Explain the difference between the following motor enclosure, describing how cooling is achieved in each case: a) Drip-proof b) totally enclosed c) flameproof. (6)

b) Describe in brief information displayed on motor nameplate (4)

17. What are the major parts of 3 phase induction motor? Write briefly about them? (10)

18. Explain the working of following starter used in Squirrel cage induction motor with neat diagram

(a) Star-Delta Starter (4)

(b) Stator Resistance Starter (3)

(c) Autotransformer Starter (3)

19. Explain the Ward-Leonard method of speed control for DC motor? List out the advantages and disadvantages of this method. (10)

20. a) Explain the general procedure for Overhaul of Motors. (5)

b) What is a thermal overload relay? Write the Advantages and disadvantages of thermal overload relay (5)

21. a) With suitable diagram explain IGBT motor speed control by means of PWM method. (5)

b) The armature and shunt field resistance of a four-pole, lap wound DC shunt motor is 0.05 ohm and 25 ohms respectively. If its armature contains 500 conductors, find the speed of the motor when it takes 120 A from a DC mains of 100 V supply. Flux per pole is 2×10^{-2} Wb. (5)

22. a) Draw & explain the principle of a thermal relay, including the means of its adjustment. (5)

b) Explain single phasing in electrical motors. What are the causes and effects?

(5)

