Indian Maritime University

(A Central University, Govt of India)

Supplementary Examinations– September / October 2024

Programme Name: B Tech (Marine Engineering)

Semester: V

Subject Code: UG11T4508

Subject Name: Marine Electrical Motors: Starters & Drive Controls

Date: 22.10.2024	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. Which of the following starter can sufficiently start the DC series motor?
   A) 3-point starter
   B) 4-point starter
   C) 2-point starter
   D) Cannot be determined

2. In an induction motor, rotor slots are usually not quite parallel to the shaft but are given a slight skew
   A) To reduce the magnetic hum
   B) To reduce the locking tendency of the rotor
   C) To increase the speed of the motor
   D) Both A & B above

3. In a circuit breaker the current which exists at the instant of contact separation is known as
   A) recovery current
   B) breaking current
   C) surge current
   D) restriking current.

4. In servomechanism is a feedback control system used to control
   A) Position
   B) Velocity
   C) Acceleration
   D) All of the above

5. Which of the following thing must keep in mind during Plugging?
   A) Change phase sequence - When motor reached near zero speed
   B) Disconnect Supply - When the motor reached a synchronous speed
   C) Change phase sequence - When the motor reached a synchronous speed
   D) Disconnect Supply - When motor reached near zero speed

6. The percentage slip in case of a synchronous motor is
   A) 1%
   B) 100%
   C) 0.5%
   D) Zero

7. Which is 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

8. Which of the following is NOT an application of servo motor?
   A) Valve control
   B) CNC milling
   C) Robotic arm control
   D) Engine cooling system

9. A motor enclosure which protects against falling liquids is classified as
   A) Waterproof
   B) Spray tight
   C) Drip proof
   D) Spray proof

10. Ward-Leonard system of system of speed control is not recommended for
   A) constant speed operation
   B) Wide speed
   C) frequent-motor reversed
   D) very slow speed

Section B

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

11. In brief, explain why under voltage trips are necessary for induction motors.
12. What is single phasing? What are the effects on the operation of a motor when single phasing occurs during starting and running condition?
13. What is Motor Enclosure? State types of Motor Enclosures.
14. What is the appropriate maintenance equipment used to maintain an electric motor?
15. What are the main components of servomotor.

Section C

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

16. (a) Briefly explain the following enclosures and describe how cooling is achieved in them.
    i. drip-proof
    ii. deck watertight
    iii. explosion proof

    (b) Draw the Long Shunt Compound Machine and Short Shunt Compound Machine. Mention all the various voltages and currents in the circuit diagram. Write the equations of voltages, armature current and back e.m.f in the armature circuit.

17. a) Draw & Explain Star Delta method of starting in AC motors. [5]

    b) Explain the principle of a variable – frequency motor with suitable diagram [5]

18. What is a Servomotor. Describe a DC Servo motor and explain how it varies from the common motor. [10]

19. a) What is the necessity to control speed of Induction motors. Explain pole changing method and frequency control method of 3 phase induction motor. [7]

    b) Compare Squirrel cage rotor & Slip ring rotor induction motor. [3]

20. a) With suitable diagram describe Why Synchronous motor is not self-starting motor. [5]

    b) A 220V, DC series motor has an armature resistance of 0.05 Ω and field resistance of 0.1Ω. If the full load armature current is 30A, find:

    i. The drop in field coil
    ii. The drop in the armature
    iii. The induced emf in the armature (back emf)

    [5]

21. How important is the electrical motor overhauling on ships? Describe in brief procedure for motor overhauling. [10]

22. Why motor starter panel routine and maintenance are important on ship? How to carry out motor starter panel maintenance. [10]