Indian Maritime University

(A Central University, Govt of India)

End Semester Examinations – June 2023

Programme Name: B Tech (ME)

Semester: III

Subject Code: UG11T4307

Subject Name: Electrical Machines

Date: 23.05.2023	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.

1. Which of the following circuit breakers has high reliability and minimum maintenance?
   a) Air blast circuit breaker
   b) SF_6 Circuit breaker
   c) Vacuum circuit breaker
   d) Oil circuit breaker

2. Ward-Leonard mechanism is
   a) A method of generator excitation
   b) A method of precise speed control of dc motor
   c) A method of precise speed control of ac motor
   d) A mechanism for starting a synchronous motor

3. What happens is the field winding of the synchronous motor is short-circuited?
   a) First, starts as in induction motor then run as synchronous motor
   b) Run as induction motor
   c) Motor will burn out
   d) Not start

4. The starter is used in DC motor in order to
   a) Limit the starting current
   b) Increase the starting torque

c) Both (a) & (b)
d) None of the above

5. Which of the following is best suitable material for the construction of the armature of a dc machine?
   a) Silicon steel
   b) Cast steel
   c) Wrought iron
   d) Soft iron

6. A fuse that blows often should be replaced only with a fuse of
   a) The recommended current and voltage rating
   b) Higher current and voltage rating
   c) Higher current and lower voltage rating
   d) Lower current and higher voltage rating

7. Sequential starting of machineries after black out in engine room is necessary
   a) To prevent overload of Generators
   b) To quickly restore the failed power supply in order
   c) To prevent damage to machinery which has been switched off
   d) All of the above

8. Which of the thermal protection switch is provided in power line system to protect against?
   a) Over voltage
   b) Short circuit
   c) Temperature rise
   d) Overload

9. Slip ring motor is preferred over squirrel cage induction motor where_____
   a) high starting torque is required
   b) load torque is heavy
   c) heavy pull out torque is required
   d) all of the above

10. What is the function of bearing?
    a) Generate heat
    b) Ease of motion of shafts and gears
    c) Balancing shaft
    d) Rotate at high speed

Section B

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

11. Explain what happens when a dc motor is connected across an ac supply?
12. Write the name of High voltage circuit breakers.
13. The frequency of the emf in the stator of a 4-pole, 3-phase induction motor is 50 Hz and that of the rotor is 2 Hz. Find the slip and actual speed of the motor.
14. Explain Drip proof motor enclosure.
15. List out the differences between induction and synchronous motor.

Section C

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

16. Why a DC series motor should never be started without load? Draw and Explain schematic diagram of three point starter of d.c motor. (10)

17. (a) What is the Function of Thermal Overload Relay? (5)

(b) What is the significance of back emf in a d.c motor? (5)

18. (a) Explain Construction of 3 phase synchronous motor? (5)

(b) Write the advantages and disadvantages of Ward Leonard System. (5)

19. Draw and Explain with the aid of sketch, the working principle of IGBT in varying motor speed control. (10)

20. Explain the major differences between high voltage supply and low voltage supply on board ship. What are the advantages and disadvantages of HV. (10)

21. (a) Explain Blackout Situation on a Ship. What are the precautions and actions should be taken? (5)

(b) A 3-phase, 5 kW induction motor has a p.f. of 0·75 lagging. A bank of capacitors is connected in delta across the supply terminals and p.f. raised to 0·9 lagging. Determine the kVAR rating of the capacitors connected in each phase. (5)

22. (a) Explain Single Phasing in Electrical Motors. What are the Causes and Effects? (5)

(b) A 200 V DC shunt motor running at 1000 R.P.M. takes an armature current of 17·5 A. It is required to reduce the speed to 600 R.P.M. What resistance must be inserted in the armature circuit if the original armature resistance is 0·4 ohm? Assume armature current is constant. (5)