Indian Maribtime University

(A Central University, Govt. of India)

Supplementary Examinations – March/April 2025

Programme Name: B Tech (ME)

Semester: III

Subject Code: UG11T4307

Subject Name: Electrical Machines

Date: 28.03.2025	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. If the field of a synchronous motor is under excited, the power factor will be
   A) Lagging
   B) Leading
   C) Unity
   D) More than unity

2. An induction motor is identical to
   A) D.C. compound motor
   B) D.C. series motor
   C) Synchronous motor
   D) Asynchronous motor

3. The emergency generator should have independent fuel supply having flash point
   A) Not less than 43°C
   B) Not less than 33°C
   C) Not less than 23°C
   D) None of the above

4. What will happen if the back e.m.f. of a D.C. motor vanishes suddenly?
   A) The motor will stop
   B) The motor will continue to run
   C) The armature may burn
   D) The motor will run noisy

5. Which of the following is the most common protection device that can make or break the circuit either manually or through remote control under normal operating conditions?
   A) Fuse
   B) Circuit breaker
   C) Protective relay
   D) Lightning arrester

6. A three-point starter is suitable for
   A) Shunt Motor
   B) Series Motor
   C) Shunt & Compound Motor
   D) Shunt, Series, and compound motor

7. The direction of rotation of a D.C. series motor can be changed by
   A) Interchanging supply terminals
   B) Interchanging field terminals
   C) Both together (A) and (B) above
   D) None of the above

8. Star-delta starting of motors is not possible in case of
   A) Single phase motors
   B) Variable speed motors
   C) Low horsepower motors
   D) High speed motors

9. The crawling in the induction motor is caused by
   A) Low voltage supply
   B) High loads
   C) Harmonics developed in the motor
   D) Improper design of the machine

10. What will happen if the relative speed between the rotating flux of stator and rotor of the induction motor is zero?
    A) The slip of the motor will be 5%
    B) The rotor will not run
    C) The rotor will run at very high speed
    D) The torque produced will be very large

Section B

Answer Any Five Questions **(5X2=10 Marks)**

11. Write the few differences between slip ring and squirrel cage induction motor.

12. A 4 pole induction motor, supplied with 440 volts,50 Hz,3–Phase power supply. Calculate the speed of rotor and frequency of the rotor current when the slip is 0.04.

13. State the reasons for blackout on board ship & What are the reaction in event of blackout situations?

14. State the various types of motor enclosures and what is I.P. Protection?

15. What is the purpose of starters in the case of motor?

Section C

Answer any 05 questions **(5X10=50 Marks)**

16. With the suitable sketch of a DC motor. Discuss what is the back emf? and explain the significance of back emf. (3+7)

17. Discuss Single Phasing phenomena in Electrical motors; (a) with a suitable diagram (b) its Causes (c) Effects and Protection Methods. (3+3+4)

18.a) A 4- Pole dc motor has lap connected armature winding with flux of 0.6 weber. The number of conductors is 250. When connected to 230 volt dc supply, it draws an armature current of 40 Amps. Calculate the back e.m.f. and Speed with which motor is running. Assume armature resistance of 0.6 Ohms. (6)

b) Draw with neat sketches, the electrical equivalent circuit diagram of dc separately excited, series, shunt and compound motors. (4)

19.a) How does rotor rotates in 3 –phase induction motor. (5)

b) Draw the block diagram, to indicate power stages in an induction motor. (5)

20.a) Draw neatly diagram of single phase and split phase induction motor. (5)

b) Draw the diagram of starter by showing Primary resistors (or rheostat) or reactors for 3-phase induction motor. (5)

21.a) With the help of simple sketch, show the effect of excitation on armature current and power factor of synchronous motor by V and inverted V curves. (5)

b) Write the comparison between synchronous and induction motors. (5)

22. Explain the isolation procedure, while working on High voltage equipment. And justify the importance of I.R. test and P.I. test with regard to H.V. equipment (10)