



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology

Department of Electrical and Electronic engineering

Diploma in Electrical Power Engineering

Electrical Machines I

EEP 2204

END OF SEMESTER EXAMINATION

SERIES: NOVEMBER 2024

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **five** Questions;. Attempt any **THREE** Questions.

Do not write on the question paper.

Question ONE

- (a) State:
- (i) Faradays laws of electromagnetic induction.
 - (ii) Lenz law
- (6 marks)
- (b) Describe the construction of a DC machine. (6 marks)
- (c) An 8 pole d.c. generator has 1200 conductors and a flux per pole of 0.03wb. Determine the emf generated if it runs at 500rev/min and is:
- (i) Lap wound
 - (ii) Wave wound
- (8 marks)

Question TWO

- (a) Explain armature reaction in DC machines. (6 marks)
- (b) State:
- (i). The effects of armature reaction
 - (ii). Methods of minimizing armature reaction
- (8 marks)
- (c) (i) Define commutation,
- (ii) State the methods of improving commutation. (6 marks)

Question THREE

- (a) (i) With the aid of a diagram and waveforms show that a three-phase winding connected to a three-phase supply produces a rotating magnetic field.
- (ii) State TWO characteristics of this field. (10 marks)
- (b) Explain how torque is produced in an induction motor. (6 marks)
- (c) (i) Explain why an induction motor takes a high starting current.
- (ii) Explain why an induction motor cannot run at synchronous speed. (4 marks)

Question FOUR

- (a) Define slip in induction machines. (2 marks)
- (b) Draw the torque speed characteristics of an induction motor. (4 marks)
- (c) (i) A three phase 4 pole induction motor has a synchronous speed of 60 rev/s.
Determine the frequency of the supply to the stator winding.
- (ii) 8 pole three phase 415 volts, 50Hz induction motor has a full load slip of 2.5%.
Determine:
- (1) The synchronous speed
 - (II) Rotor speed
 - (III) Frequency of rotor emfs
- (14 marks)

Question FIVE

- (a) Explain why single phase motors are not self starting. (3 marks)
- (b) With the aid of a diagram explain three methods of starting single phase Induction motors.
(9 marks)
- (c) Draw the equivalent circuit diagram of a single-phase induction motor at stand still.
(4 marks)
- (d) Explain the operation of the shaded pole motor. (4 marks)