

TECHNICAL UNIVERSITY OF MOMBASA

School of Engineering and Technology

Department of Electrical and Electronic engineering

UNIVERSITY EXAMINATION:

Diploma in Electrical Power Engineering

ELECTRICAL DRIVES AND CONTROL

EEP 2304

END OF SEMESTER IV EXAMINATION

SERIES: JULY 2025

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) (i) Draw the block diagram of a general electric drive system and explain each block. (12 marks)
(ii) State FIVE advantages of an electric drive over other drive systems. (8 marks)
- (b) (i) With the aid of a diagram explain the operation of a four quadrant drive (8 marks)

Question TWO

- (a) Explain (7 marks)
(i) FOUR factors to be considered in the selection of drive
(ii) THREE types of motor rating (4 marks)
- (b) Draw the heating and cooling curves for a continuously rated motor (4 marks)
- (c) A motor operates continuously on the following load cycle.
20 kW for 10 sec, 10 kW for 15 sec, 30 kW for 5 sec, 50 kW for 20 sec,
40 kW for 10 sec, and idle for 5 sec. this cycle repeats indefinitely.
- (i) Draw the load diagram
(ii) Determine the size of the motor required. (9 marks)

Question THREE

- (a) Explain the causes of drive freewheeling (2 marks)
(b) Explain three methods of electric braking (6 marks)
- (c) (i) State two methods of speed control in dc motors
(ii) Explain three methods of speed control in AC motors (5 marks)
- (d) (i) Explain the roles of a motor enclosure
(ii) Describe the types of motors enclosures commonly used. (7 marks)

Question Four

- (a) Explain Three methods of Induction motor braking. (6 marks)
(b) Draw the circuit of a controlled rectifier fed single phase two quadrant d.c drive. (6 marks)
(c) Draw the diagram of a controlled rectifier three phase two quadrant d.c drive. (8 marks)

Question FIVE

- (a) State **FOUR** reasons why induction motors are widely used for drives. (4 marks)
(b) State the Losses in an induction motor drive. (6 marks)
(c) (i) Draw the Torque - speed characteristics of an induction motor drive.
(ii) State the basis of choosing a starting arrangement.
(iii) State Three starting methods of Induction machines (10 marks)