



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF MECHANICAL & AUTOMATIVE ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN TECHNOLOGY IN MECHANICAL ENGINEERING (PLANT OPTION)

EPL 2305: PLANT ELECTRICAL IV

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2024

TIME: 2 HOURS

DATE:

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) Explain any THREE factors affecting choice of motors for particular industrial applications. (6Marks)
- b) State any FOUR causes of bearing failure that may lead to motor breakdown. (4Marks)
- c) Briefly explain the following types of motor enclosures:
 - i) Totally enclosed non-ventilated enclosure
 - ii) Open drip-proof enclosure
 - iii) Explosion proof enclosure (6Marks)
- d) Name ONE type of motor enclosures suitable for application in the following industrial motor installations:
 - i) General industrial installations (non-explosive atmosphere)
 - ii) Metal working machinery (non-explosive atmosphere)
 - iii) Chemical plant (non-explosive atmosphere)
 - iv) Industrial mines. (4Marks)

QUESTION TWO

- a) Explain the following types of electric drives stating ONE industrial application area of each:
- i) Individual drives
 - ii) Group drives
 - iii) Multi-motor drives (6Marks)
- b)
- i) Draw a block diagram depicting the general configuration of an electric drive system
 - ii) With aid of a block diagram, describe motor speed control by tachometer method (10Marks)
- c) A motor has to perform the following duty cycle:
- 100 KW for 10 minutes
 - No-load for 5 minutes
 - 50 KW for 8 minutes
 - No-load for 4 minutes
- If this duty cycle is repeated indefinitely:
- i) Draw the curve for the load cycle
 - ii) Determine suitable size of a continuously-rated Motor to drive this load. (6Marks)

QUESTION THREE

- a) Define terms as applied to motor installation:
- i) Alignment
 - ii) Leveling
 - iii) Coupling (3Marks)
- b) State any FOUR:
- i) Factors to consider when installing motor couplings.
 - ii) Effects of mechanical misalignment when installing a motor. (8Marks)
- c) Explain the following types of coupling and state where each can required for industrial motor installation:
- i) Direct coupling
 - ii) Gear box coupling
 - iii) Pulley coupling
 - iv) Belt coupling (9Marks)

QUESTION FOUR

- a) Using a circuit diagram, describe how the blocked rotor test can be carried out on a single phase induction motor. (8Marks)
- b) State any TWO:
- i) Functions of starters in induction motors
 - ii) Factors to consider when selecting starting method for a 3- Φ induction motor. (4Marks)
- c) An electrical plant desires to install a 3- Φ cage induction motor restricting the maximum line current drawn from a 400 V, 3- Φ supply to 120 A. if the starting current is 6 times full load current, what is the maximum permissible full load kVA of the motor when:
- i) It is directly connected to the mains
 - ii) It is connected through an auto-transformer with a tapping of 60%
 - iii) It is designed for use with star-delta starter. (8Marks)

QUESTION FIVE

- a) Define:
- i) Mechanical drive
 - ii) Prime mover (2Marks)
- b) State any THREE:
- i) Advantages of mechanical drive system
 - ii) Disadvantages of mechanical drive system (6Marks)
- c) Name FOUR types of chains deployed in mechanical drive coupling (4Marks)
- d) Figure Q 5 (c) shows compound train consisting of a series of pulleys system

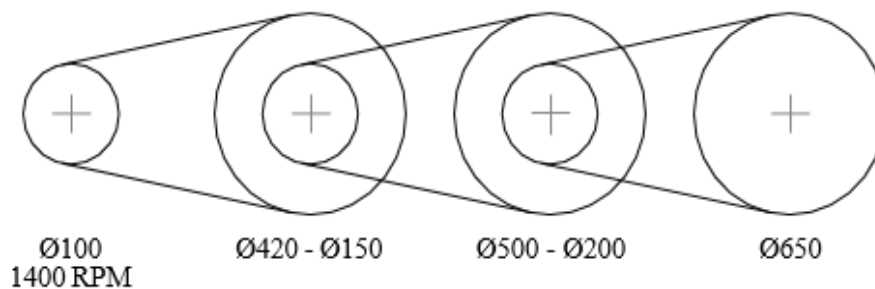


Figure Q 5 (c)

Calculate:

- i) Immediate and final drive speed
- ii) Final reduction ratio. (8Marks)