

DEPARTMENT OF EDUCATION  
REPUBLIC OF SOUTH AFRICA  
NATIONAL CERTIFICATE  
ELECTROTECHNICS N5  
TIME: 3 HOURS  
MARKS: 100

**QUESTION 1**

1.1 By reversing either the field  $\checkmark$  or armature connections.  $\checkmark$  (2)

1.2 They are placed in slots in the pole shoes.  $\checkmark$  They are connected in series with the armature windings.  $\checkmark$  (2)

1.3  $V = 550 \text{ V}$      $P = 44 \text{ kW}$      $N = 1500 \text{ rpm}$      $\eta = 85\% = 0.85$   
 $R_a = 0.32$      $I_f = 1.8 \text{ A}$      $I_a R_b = 3.5 \text{ V}$

1.3.1  $\text{Input} = \frac{\text{Output}}{\eta} = 44 / 0.85 = 51.765 \text{ kW} \checkmark$

$I_L = P / V = 51765 / 550 \checkmark = 94.12 \text{ A} \checkmark$  (3)

1.3.2  $\text{Output} = \frac{2 \pi N T}{60}$

$44000 = \frac{2 \pi 1500 T}{60} \checkmark$

$T = \frac{44000 \times 60}{2 \pi 1500} \checkmark$

$= 280.25 \text{ Nm} \checkmark$  (3)

1.3.3  $\text{Starting current} = 1.75 \text{ (full load)} = 1.75 \times 94.12 = 164.7 \text{ A} \checkmark$

$I_a = I - I_f = 164.7 - 1.8 = 162.9 \text{ A} \checkmark$

$V = E + V_b + V_a \text{ (at start)} \quad E = 0 \quad V_a = I_a (R_a + x)$

$550 = 0 + 3.5 + 162.9 (0.32 + x) \checkmark$

$x = \frac{550 - 55.63}{16.9}$

$= 2.035 \text{ ohms} \checkmark$

(4)

# Electrotechnics Nquestion Papers

**Lauren Gardner**



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## **Table of Contents Electrotechnics Nquestion Papers**

1. Understanding the eBook Electrotechnics Nquestion Papers
  - The Rise of Digital Reading Electrotechnics Nquestion Papers
  - Advantages of eBooks Over Traditional Books
2. Identifying Electrotechnics Nquestion Papers
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Electrotechnics Nquestion Papers
  - User-Friendly Interface
4. Exploring eBook Recommendations from Electrotechnics Nquestion Papers
  - Personalized Recommendations
  - Electrotechnics Nquestion Papers User Reviews and Ratings
  - Electrotechnics Nquestion Papers and Bestseller Lists
5. Accessing Electrotechnics Nquestion Papers Free and Paid eBooks

- Electrotechnics Nquestion Papers Public Domain eBooks
  - Electrotechnics Nquestion Papers eBook Subscription Services
  - Electrotechnics Nquestion Papers Budget-Friendly Options
6. Navigating Electrotechnics Nquestion Papers eBook Formats
    - ePub, PDF, MOBI, and More
    - Electrotechnics Nquestion Papers Compatibility with Devices
    - Electrotechnics Nquestion Papers Enhanced eBook Features
  7. Enhancing Your Reading Experience
    - Adjustable Fonts and Text Sizes of Electrotechnics Nquestion Papers
    - Highlighting and Note-Taking Electrotechnics Nquestion Papers
    - Interactive Elements Electrotechnics Nquestion Papers
  8. Staying Engaged with Electrotechnics Nquestion Papers
    - Joining Online Reading Communities
    - Participating in Virtual Book Clubs
    - Following Authors and Publishers Electrotechnics Nquestion Papers
  9. Balancing eBooks and Physical Books Electrotechnics Nquestion Papers
    - Benefits of a Digital Library
    - Creating a Diverse Reading Collection Electrotechnics Nquestion Papers
  10. Overcoming Reading Challenges
    - Dealing with Digital Eye Strain
    - Minimizing Distractions
    - Managing Screen Time
  11. Cultivating a Reading Routine Electrotechnics Nquestion Papers
    - Setting Reading Goals Electrotechnics Nquestion Papers
    - Carving Out Dedicated Reading Time
  12. Sourcing Reliable Information of Electrotechnics Nquestion Papers
    - Fact-Checking eBook Content of Electrotechnics Nquestion Papers
    - Distinguishing Credible Sources
  13. Promoting Lifelong Learning
    - Utilizing eBooks for Skill Development

- Exploring Educational eBooks

#### 14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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