higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N5

(8080115)

22 November 2024 (X-paper)
09:00–12:00

Drawing instruments may be used.

This question paper consists of 5 pages and answer sheet.

080Q1E2422

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
FAULT FINDING AND PROTECTIVE DEVICES N5
TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Use only a black or blue pen.
5. Write neatly and legibly.

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QUESTION 1

1.1 State the function of the following components found in a single-phase induction motor:

1.1.1 Capacitor (2)

1.1.2 Centrifugal switch (2)

1.2 Explain the purpose of *a thermal overload protection device*. (2)

1.3 A three-phase induction motor fails to turn after it was started.

Name FIVE possible faults that can cause a motor not to start. (5)

1.4 Before working with "dead" equipment, mention any FIVE golden rules that should be taken into consideration. (5)

1.5 Briefly describe the following parts of a DC motor:

1.5.1 Brush holders (2)

1.5.2 Slip ring (2)

[20]

QUESTION 2

Refer to the attached ANSWER SHEET and complete the TABLE given for the possible brush faults that may occur in practice.

NOTE: The ANSWER SHEET must be handed in with the ANSWER BOOK. **[10]**

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QUESTION 3

3.1 Redraw the following table in the ANSWERBOOK and describe any FIVE differences between the SCR and the TRIAC.

	SCR (Silicon control rectifier)	TRIAC (Triode for alternating current)
3.1.1		
3.1.2		
3.1.3		
3.1.4		
3.1.5		

(10)

3.2 Draw and label the construction and symbol of a TRIAC. (5)

3.3 List any FIVE applications of an SCR. (5)

[20]

QUESTION 4

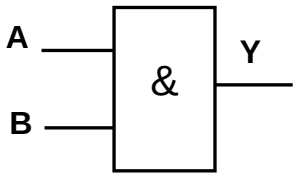
4.1 Name TWO types of circuits that consist of flip-flops. (2)

4.2 Draw a J-K four bit shift-left register. (4)

4.3 Draw the truth table for an SR flip-flop. (4)

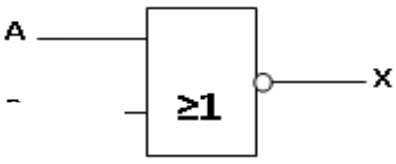
4.4 Give the names of the following logic gates:

4.4.1



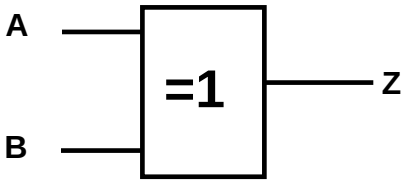
(1)

4.4.2



(1)

4.4.3



(1)

4.5 FIGURE 1 below shows a truth table of two inputs of an 'OR' gate.

Copy the table in your ANSWER BOOK and complete it.

A	B	A+B
0	0	
0	1	
1	0	
1	1	

FIGURE 1 (4)

4.6 The following numbers are in their binary equivalents. Perform the calculations in the binary number system:

4.6.1 $101111_2 + 100101_2 + 110011_2$ (4)

4.6.2 $110001_2 - 101011_2$ (4)

[25]

QUESTION 5

5.1 Name SIX applications of DC to AC inverters. (6)

5.2 Draw a neat, labelled diagram of a voltage mode controller for DC to DC buck-boost converter. (10)

5.3 What is meant by the *bunk-mode* of the converter? (3)

5.4 Draw and label the main circuit diagram of a buck-boost DC to DC converter. (6)

[25]

TOTAL: 100

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ANSWER SHEET **EXAMINATION NUMBER:** | | | | | | | | | | | | | |

Hand this page in together with the ANSWER BOOK.

PROBLEMS	POSSIBLE CAUSE	POSSIBLE SOLUTION
Gradual wear of brushes		
Brush wear rapidly		
Wear, hot shunt and arcing		
Sparking		
Vibration of the brushes		

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