higher education & training

Department:
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REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N5

(8080115)

3 April 2020 (X-paper)
09:00–12:00

This question paper consists of 7 pages

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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. Start each section on a new page.
5. Work neatly.

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QUESTION 1

Design and draw the control circuit of a sequence starter using the information below.

Motors A and B start together when the start button is pressed. Motor A stops after 10 seconds and 10 seconds later motor B also stops.

The two timers are set at 10 seconds. All coils are 220 V. **[10]**

QUESTION 2

2.1 Study FIGURE 1 and answer the following questions.

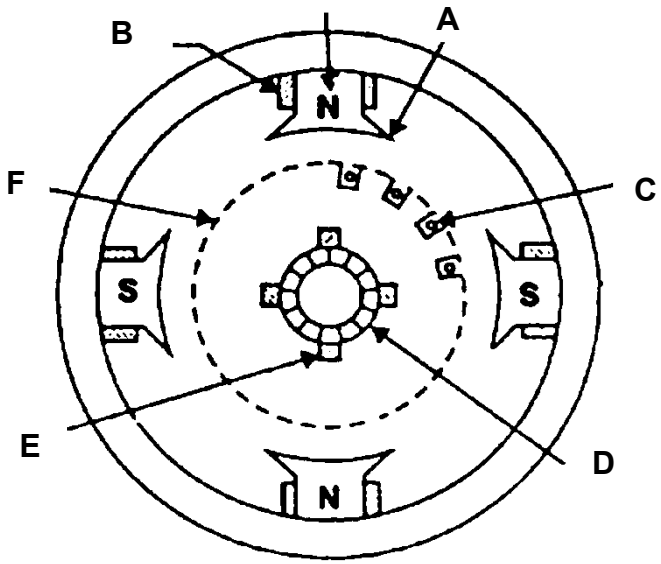


FIGURE 1

2.1.1 Name the electrical machine in FIGURE 1. (1)

2.1.2 Identify the labelled parts in FIGURE 1 by writing only the answer next to the letter (A–F) in the ANSWER BOOK. (6)

2.2 Define the following terms regarding a DC machine:

2.2.1 Commutation (2)

2.2.2 Pole pitch (1)
[10]

QUESTION 3

3.1 Name the THREE main parts of an induction motor. (3)

3.2 State FOUR characteristics of the wound rotor in an induction motor. (4)

3.3 Give THREE electrical tests performed on the windings of a three-phase induction motor. (3)
[10]

QUESTION 4

4.1 Give FOUR functions of lubrications after a machine has been overhauled. (4)

4.2 Describe how a drop test is done on a three-phase motor when the voltage drop across commutator segments is checked. (6)
[10]

QUESTION 5

5.1 Name THREE characteristics with which the output signal of an oscillator circuit must comply. (3)

5.2 Draw a neat block diagram of a beat-frequency oscillator. (7)
[10]

QUESTION 6

6.1 Define *measuring instrument*. (1)

6.2 Give FOUR uses of a cathode-ray oscilloscope. (4)

6.3 Describe the operation of each the following:

6.3.1 Cathode-ray tube (3)

6.3.2 Time-base generator. (2)
[10]

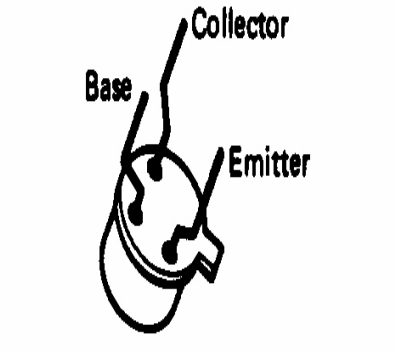
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QUESTION 7

7.1 Study the electronic components below and answer the questions.



A



B

FIGURE 2

7.1.1 Identify the TWO components in FIGURE 2. (2)

7.1.2 Give the IEC symbols for the components by drawing only the symbol next to the letter (A–B) in the ANSWER BOOK. (2)

7.2 Name the THREE basic transistor configurations. (3)

7.3 State THREE uses of a silicon-controlled rectifier in an electronic circuit. (3)
[10]

QUESTION 8

X and Y are two switches connected in parallel and this combination is then connected in parallel with the load LED and source battery. When both switches are open the current flows to LED, but when any of the switches is closed the current does not flow to LED.

8.1 Draw a switching circuit to represent the statement in QUESTION 8.1. (3)

8.2 What type of gate is defined by this description? (1)

8.3 Draw the truth table and the IEC symbol for the circuit. (6)
[10]

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QUESTION 9

9.1 Study the logic circuit in FIGURE 2 and answer the questions.

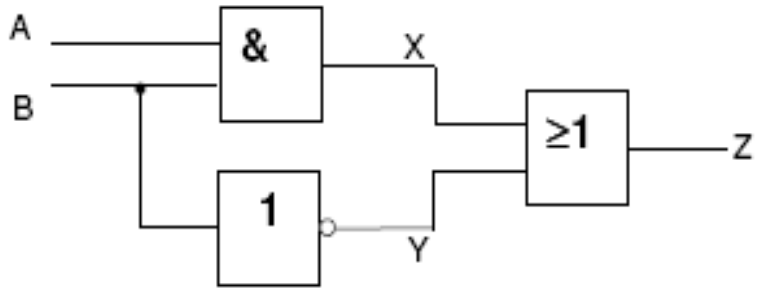


FIGURE 2

Give the names of the digital gates used in FIGURE 2. (3)

9.2 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–E) next to the question number (9.2.1–9.2.5) in the ANSWER BOOK.

9.2.1 A NOT gate is also known as …

A a converter.
B an inverter.
C a complementor.
D both B and C.

9.2.2 Flip-flops can be constructed with two …

A NAND gates.
B OR gates.
C AND gates.
D NOT gates.

9.2.3 The difference between flip-flops lies in …

A their outputs.
B their inputs.
C their gates.
D both A and B.

9.2.4 The state of a flip-flop can be switched by changing …

A its input signal.
B its output signal.
C its momentary signals.
D all signals.

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9.2.5 Logic gates take input signals and generate it …

A within gates.
B to input.
C to output.
D both A and B.

(5 × 1) (5)

9.3 Name TWO types of flip-flops. (2)
[10]

QUESTION 10

Convert the following numbers to the base in brackets:

10.1 $4A,6_{16}$ (2)

10.2 $3,7_{8}$ (2)

10.3 $100110,010_{2}$ (10)

10.4 $7,25_{10}$ (2)

10.5 $10001010,001000_{2}$ (16)

(5 × 2) **[10]**

TOTAL: 100

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