higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ELECTROTECHNOLOGY
NQF LEVEL 3

(12040423)

26 February 2018 (X-Paper)
09:00–12:00

This question paper consists of 6 pages.

NCV

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. Circuit diagrams must be neatly drawn and labelled.
5. Write neatly and legibly.

NCV

QUESTION 1

1.1 Refer to FIGURE 1 below and answer the questions:

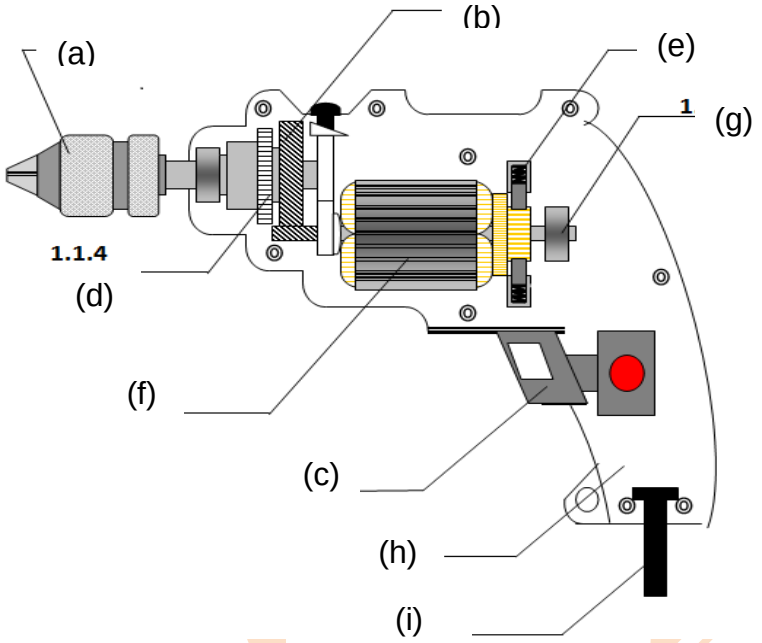


FIGURE 1

1.1.1 Name the hand-held power tool shown in FIGURE 1. (1)

1.1.2 Name the parts of the hand-held power tool indicated in FIGURE 1 by writing only the answer next to the letter (a–i) in the ANSWER BOOK. (9)

1.2 Draw a fully labelled diagram for a shunt DC motor. (9)

1.3 Name the material used for the manufacturing of brushes used in hand-held power tools. (1)

[20]

QUESTION 2

2.1 2.1.1 Draw a fully labelled circuit diagram of the earth-leakage protection relay. (9)

2.1.2 Explain the operation of the earth-leakage protection relay. (4)

2.2 Explain what is meant by the terms *basic insulation* and *double insulation*. (5)

2.3 Draw the symbol for a double isolator. (2)

[20]

QUESTION 3

Refer to the diagram in FIGURE 2 and answer the questions. The circuit shown is not functional.

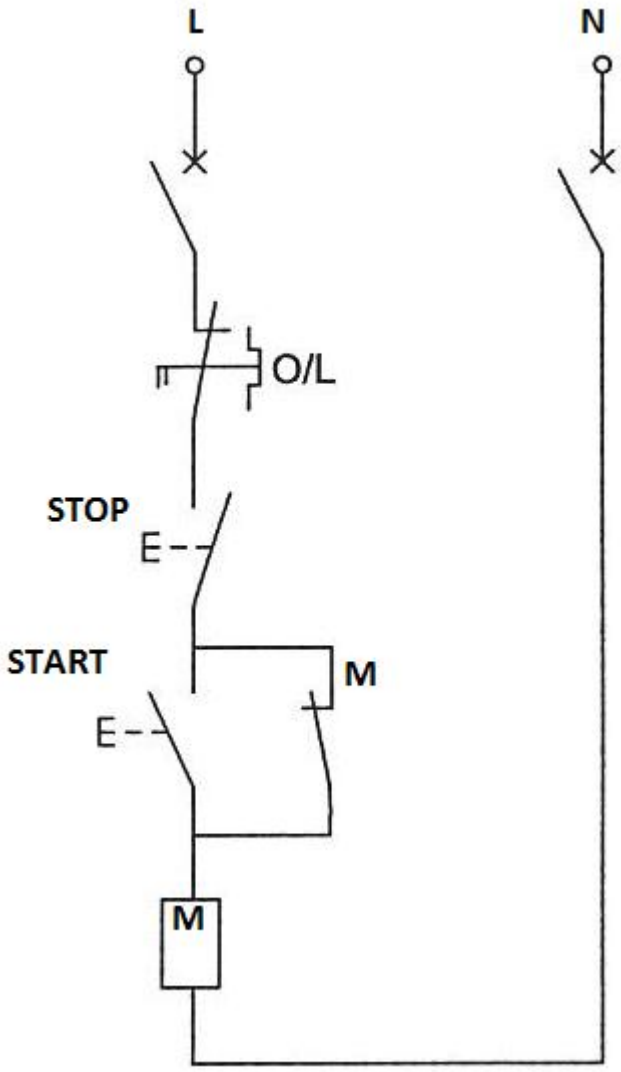


FIGURE 2

3.1 Name the starter shown in FIGURE 2. (1)

3.2 Give a short description of why the circuit diagram is not functional. (5)

3.3 Draw the correct circuit diagram in your ANSWER BOOK. (9)

3.4 Name FIVE tools needed for testing and installing a motor. (5)
[20]

QUESTION 4

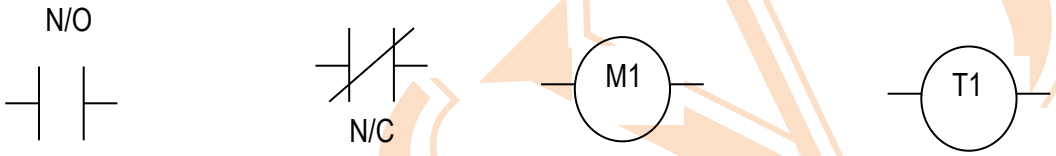
4.1 Explain what are the inputs and outputs of the PLC and give examples. (5)

4.2 Design brief:

You as a mechatronic person have to design a control circuit of a relay logic control circuit using the following briefing:

Press the start pushbutton for the motor to run for 30 minutes and stop. The stop pushbutton can be pressed anytime during the process. All the components must be correctly labelled.

Components used for the design:



(11)

4.3 Write down the full name of the following terms related to PLC's and regulations:

4.3.1 SANS

4.3.2 PLC

(2 × 2) (4)

[20]

QUESTION 5

FIGURE 3 shows a nonfunctional control circuit. Analyse the circuit and answer the questions:

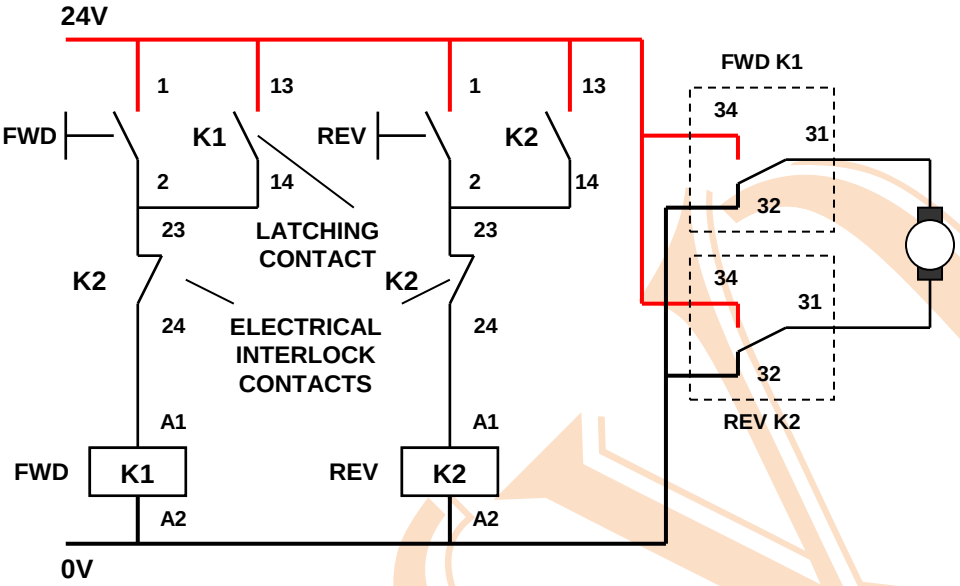


FIGURE 3

5.1 State the fault in the control circuit shown in FIGURE 3. (2)

5.2 Explain how you would correct the faulty circuit. (2)

5.3 Explain the difference between *contactors* and *relays*. (5)

5.4 Show, by means of a sketch, the difference between a *relay* and a *contactor*. (11)
[20]

TOTAL: 100

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