higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ELECTROTECHNOLOGY
NQF LEVEL 3

(12040423)

26 February 2020 (X-paper)
09:00–12:00

This question paper consists of 6 pages.

049Q1S2026

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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 question on a new page.
5. Write neatly and legibly.

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QUESTION 1

1.1

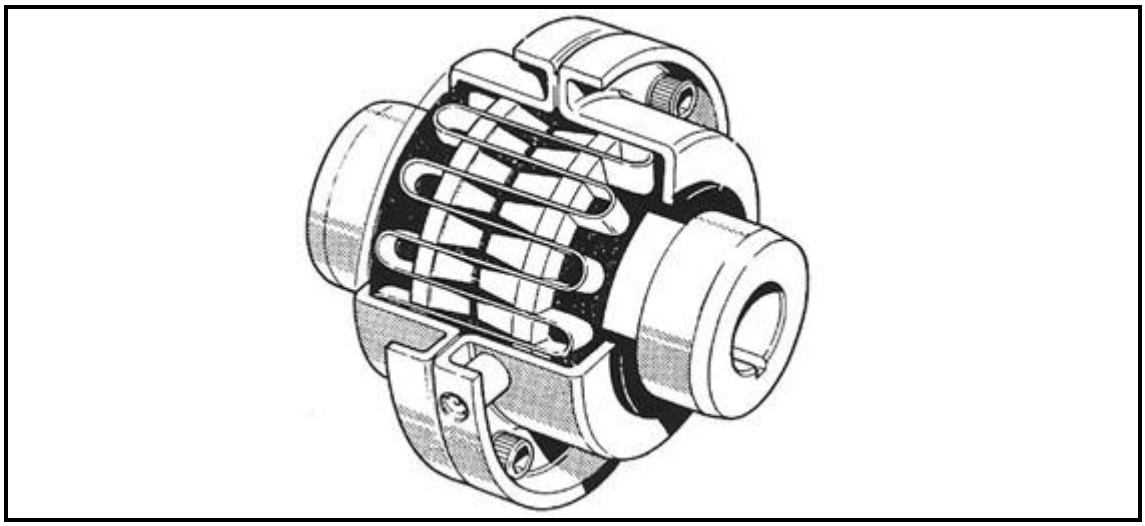


FIGURE 1

1.1.1 Identify the type of coupling shown in FIGURE 1. (1)

1.1.2 Give THREE advantages of using couplings in industry. (3)

1.2 Make a neat sketch of each of the following gear reducers:

1.2.1 In-line reducer

1.2.2 Parallel-shaft reducer

1.2.3 Vertical-shaft reducer

1.2.4 Right-angled reducer

(4 × 2) (8)

1.3 Which TWO of the following are positive drives?

- Gear drives
- Chain drives
- Belt drives

(2)

1.4 Briefly explain each of the following methods to transmit power:

1.4.1 Chain drives

1.4.2 V-belt drives

1.4.3 Gear drives

(3 × 2) (6)

[20]

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QUESTION 2

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

2.2 List FOUR sections or groups in SANS 10142. (4)

2.3 Give THREE safety procedures to consider when performing live testing. (3)

2.4 Indicate whether each of the following materials in an electrical installation is classified as an EXPOSED or EXTRANEOUS conductive part by writing only 'Exposed' or 'Extraneous' next to the question number (2.4.1–2.4.4) in the ANSWER BOOK.

2.4.1 Metal conduit

2.4.2 Copper water pipe

2.4.3 Metal gas pipe

2.4.4 Metal casings of appliances

(4 × 1) (4)

[20]

QUESTION 3

3.1

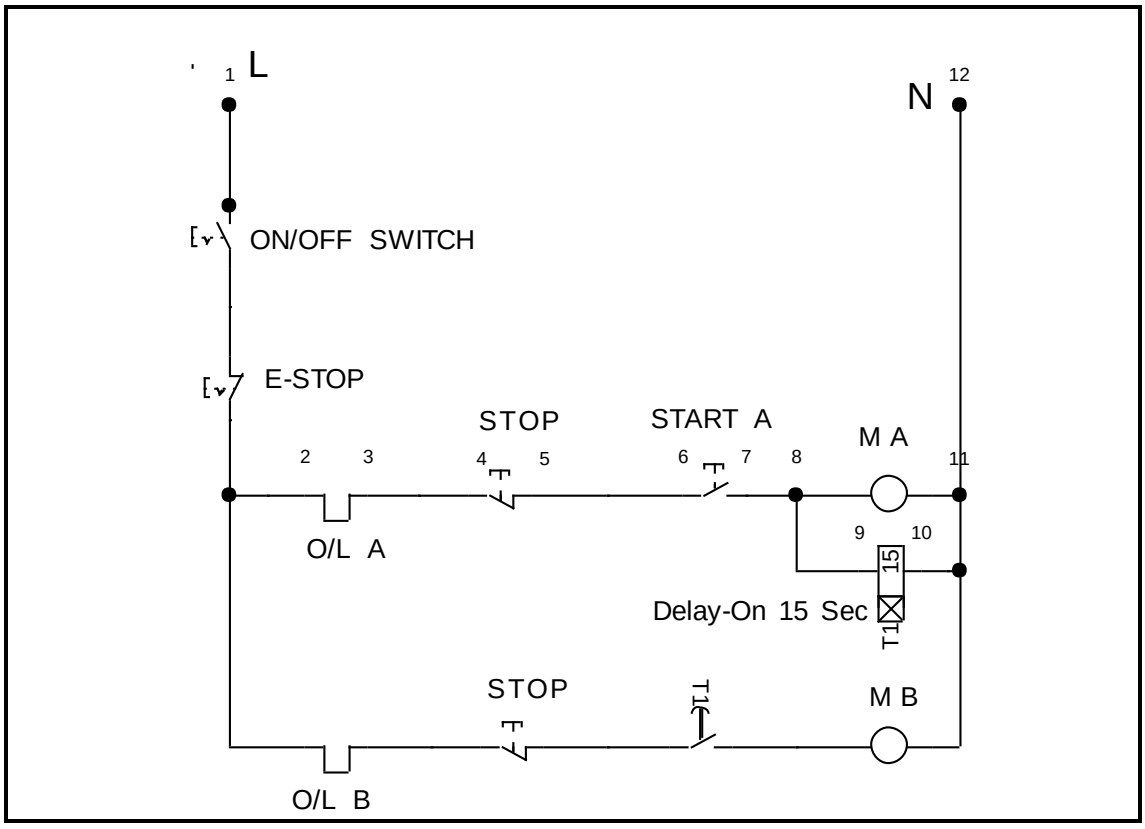


FIGURE 2

3.1.1 Explain the purpose of each component in the circuit. (7 × 2) (14)

3.1.2 Explain the operation of the circuit. (10)

3.1.3 Write a short paragraph on the protection devices found in wiring diagrams. (3)

3.2 List THREE measuring instruments that can be used to test an electrical circuit. (3)

[30]

QUESTION 4

4.1

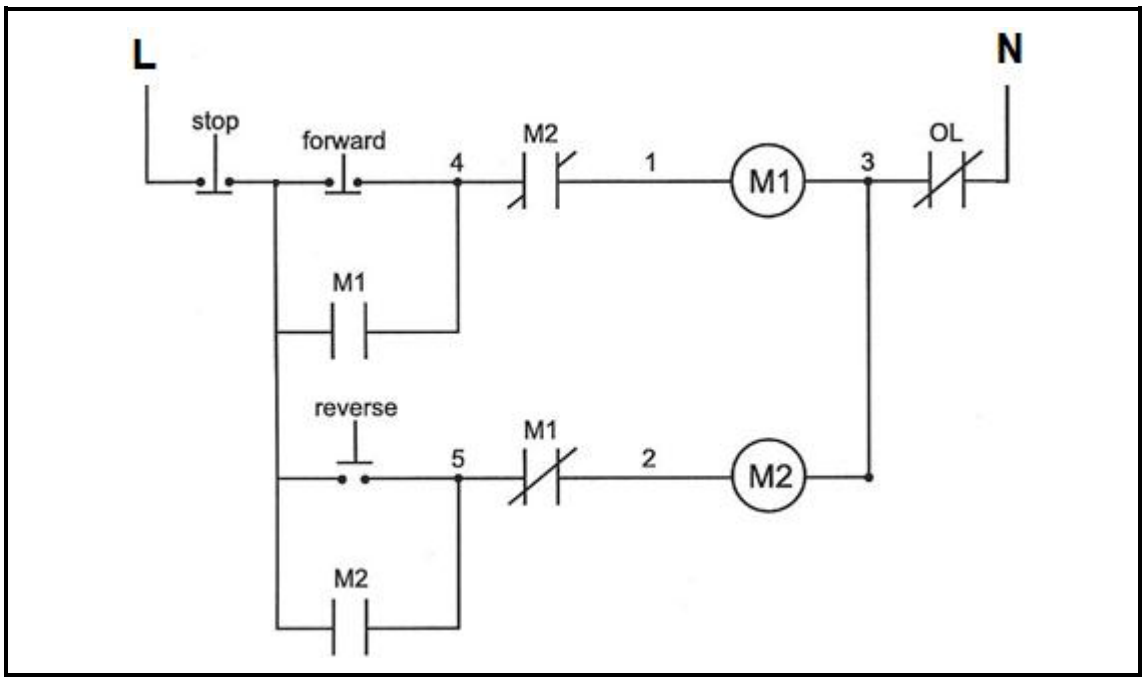
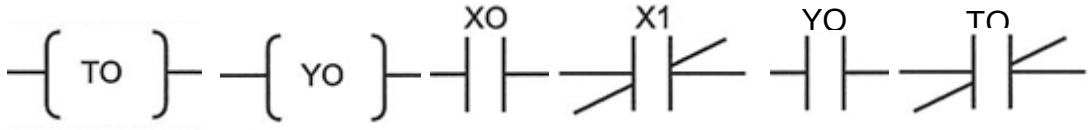


FIGURE 3

Explain each of the relay logic circuit components shown in FIGURE 3. (8)

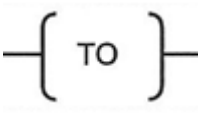
4.2 A lamp must be switched on, stay on for five seconds and switch off automatically.

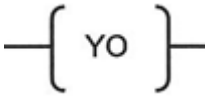
Design a relay logic diagram using the following symbols:

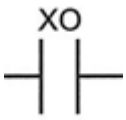


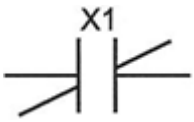
(8)

4.3 Identify each of the following relay logic element symbols:

4.3.1 

4.3.2 

4.3.3 

4.3.4 

(4 × 1) (4)
[20]

QUESTION 5

5.1 List FOUR ratings that should be on the rating plate of an electric motor. (4)

5.2 Complete the table showing a list of various motor problems, causes and remedies below by writing only the answer next to the question number (5.2.1–5.2.6) in the ANSWER BOOK.

MALFUNCTION	POSSIBLE CAUSE	CORRECT ACTION
Contactor welding or freezing	Rapid jogging	5.2.1
	Short-circuit	5.2.2
	Insufficient tip pressure	5.2.3
Failure to pick up and seal	Low voltage	5.2.4
	Coil open or shorted	5.2.5
	Wrong coil	5.2.6

(6 × 1) (6)
[10]

TOTAL: 100

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