higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ELECTRICAL WORKMANSHIP
NQF LEVEL 3

(12041013)

7 December 2020 (X-paper)
09:00–12:00

This question paper consists of 7 pages.

343Q1N2007

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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. Write neatly and legibly.

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QUESTION 1

1.1 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.1.1–1.1.5) in the ANSWER BOOK.

1.1.1 A work permit must clearly define all hazardous areas where new electrical equipment will be installed.

1.1.2 Careful planning will avoid costly mistakes.

1.1.3 The *prove-test-prove* method of testing is used once lockout and tagout has been completed.

1.1.4 Numbered parts consist of conduit, cables or conductors.

1.1.5 Bar charts give workers a sequential list of tasks to be completed.

(5 × 1) (5)

1.2 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.2.1–1.2.4) in the ANSWER BOOK.

1.2.1 An unsafe act in the workplace is called a/an …

A accident.
B incident.
C personal factor.
D unsafe condition.

1.2.2 When a hazardous condition is not easily seen causing workers to be careless and injure themselves, is called …

A an injury.
B an incident.
C an accident.
D repetitive work.

1.2.3 The term used when a hazard has to be eliminated, is …

A prioritise.
B act.
C identify.
D repair.

1.2.4 The personal protective equipment (PPE) used to prevent loss of hearing, is …

A rubber gloves.
B safety boots.
C earmuffs.
D safety goggles.

(4 × 1) (4)

1.3 Explain the difference between the *aims* and the *objectives* of the Occupational Health and Safety Act (OHSA). (3)

1.4 Name TWO illnesses caused by stress. (2)

1.5 There are various circumstances to consider when reporting an incident.

1.5.1 State THREE types of physical evidence required around the scene of an accident. (3)

1.5.2 State THREE questions that should be asked to a witness on the accident scene. (3)

1.6 State TWO reasons why planning and scheduling is very important when preparing for work to be done. (2)

1.7 State THREE general guidelines that must be followed when completing an incident report form. (3)

[25]

QUESTION 2

2.1 Testing and measuring equipment are classified according to the various effects of electric current or voltage on which their operations depend.

Name THREE of these effects. (3)

2.2 Name the test instruments used to measure or test the following electrical values:

2.2.1 The continuity between two electrical terminals

2.2.2 The cycles per second of a waveform

2.2.3 The condition of the insulation between the conductors of a cable

(3 × 1) (3)

2.3 Name TWO conditions that can cause damage to test- and measuring instruments. (2)

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2.4 Draw a basic, fully labelled circuit diagram consisting of a 230 V supply, closed switch and a load in series.

Show how you will connect the following test instruments to the circuit:

- A voltmeter to measure the voltage across the load
- An ammeter to measure the current of the circuit (7)

[15]

QUESTION 3

3.1 Explain the operation of an automatic kettle. (3)

3.2 Name the THREE types of electric kettles. (3)

3.3 Name the parts used in the basic structure of a microwave oven magnetron. (3 × 1) (3)

3.4 Briefly explain the basic function of each of the following components or appliances:

3.4.1 A washing machine inlet solenoid

3.4.2 The pilot light used in appliances

3.4.3 The hob of a stove

(3 × 1) (3)

3.5 Discuss the regulation concerning *water heaters* with reference to the term *bonding*. (3 × 1) (3)

[15]

QUESTION 4

4.1 Give TWO reasons why testing of electrical appliances and power tools is necessary. (2)

4.2 Name FOUR types of testing to be performed when doing fault-finding or maintenance on electrical equipment. (4)

4.3 Choose a possible fault and repair from COLUMN B that matches each faulty condition in COLUMN A. Write only the letter (A–H) next to the question number (4.3.1–4.3.4) in the ANSWER BOOK.

COLUMN A Faulty condition		COLUMN B Possible fault and repair	
4.3.1	A kettle does not switch off automatically	A	the power cord of the iron is faulty, replace the power cord
4.3.2	An electric iron gives insufficient heat	B	faulty thermostat
4.3.3	An oven pilot switches on but does not get hot	C	blown fuse, replace the fuse
4.3.4	Foam coming out of the detergent dispenser of a washing machine	D	too much detergent
		E	air vent blocked, clean the air vents
		F	the kettle element is faulty, replace the element
		G	bimetal contact/strip not opening/stuck
		H	bake element faulty

(4 × 1) (4)

4.4 Explain the procedure used when checking and replacing the brushes of a portable electric drilling machine after the drilling machine was switched off and unplugged. (5 × 1) (5) **[15]**

QUESTION 5

5.1 Name TWO types of mountings used when installing electric motors. (2)

5.2 Draw a fully labelled circuit diagram showing ONE method of reversing the rotational direction of a capacitor-start, induction-run motor. (6)

5.3 Name TWO coupling methods used to connect an electric motor to a load. (2)

5.4 State TWO purposes of overload protection. (2)

5.5 State THREE mechanical and visual inspection checks that should be done on an electric motor. (3)
[15]

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QUESTION 6

6.1 Explain the *SMAW* process. (2)

6.2 Give a basic explanation for the following terms:

6.2.1 Electrode holders

6.2.2 Welding cables

(2 × 1) (2)

6.3 Name FIVE factors that should be considered when selecting an electrode.
(5 × 1) (5)

6.4 SMAW is a very hazardous process.

State FOUR typical hazards when doing arc welding. (4)

6.5 Name TWO components that are used to connect the earth terminal from the arc welding machine to the workpiece. (2)
[15]

TOTAL: 100

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