higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1630**(E)**(M27)T

NATIONAL CERTIFICATE

SPECIALISED ELECTRICAL INSTALLATION CODES

(First Paper)

(8080654)

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This question paper consists of 7 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
SPECIALISED ELECTRICAL INSTALLATION CODES
(First Paper)
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: GENERAL

1.1 The furniture workshop spray booth (finishing-process areas) of a TVET college has been identified as Zone 1 area.

State THREE measures that you would recommend changing the zoning on the inside of these spray booths to safe areas, without changing the process itself. (Applying paint containing flammable vapours by means of compressed air). (3)

1.2 Gas stoves are used for domestic as well as for commercial purposes for heating. Potential hazards are normally associated with gas installations.

What criteria would you use before declaring gas installation as hazardous areas? (2)

1.3 Complete the question by writing down the answer next to the corresponding question number (1.3.1–1.3.10) in the ANSWER BOOK.

The first row serves as an example.

PROTECTION CONCEPTS	ABBREVIATION
Increased safety	Exe
Non-sparking	1.3.1
Flameproof	1.3.2
Encapsulation	1.3.3
Restricted breathing	1.3.4
Quartz/Sand Filled	1.3.5
Pressurised	1.3.6
Specially protected	13.7
Energy limitation	1.3.8
Enclosed break	1.3.9
Dust ignition-proof	1.3.10

(10)
[15]

QUESTION 2: OCCUPATIONAL HEALTH AND SAFETY ACT, ACT 85 OF 1993

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (2.1–2.10) in the ANSWER BOOK.

2.1 An installation electrician may issue a certificate of compliance for a restaurant located on the same premises as the petrol dispensing pumps.

2.2 Conveyor drive motors, light fittings and appliances do not form part of a plant.

2.3 Any person can register as an electrical contractor.

2.4 Vehicles, trains and aircraft form part of the description of premises.

2.5 If a registered person has issued a certificate of compliance to a user, the certificate remains valid for five years.

2.6 An approved inspection authority can enter any premises at any time to carry out an inspection.

2.7 After an inspection on an installation has revealed some faults a registered person can issue a temporary certificate of compliance for the installation in the interim.

2.8 The Approved Electrical Inspection Authority may suspend an accredited person's accreditation.

2.9 A notice served by an Inspector of the Department of Labour Is valid if it is left at the usual or last known place of residence or business of a person.

2.10 The municipality is responsible for the safe use and maintenance of an electrical installation?

(10 × 1) **[10]**

QUESTION 3: ARP 0108 2014 REGULATORY REQUIREMENTS FOR EXPLOSION-PROTECTED APPARATUS

3.1 The requirement for emergency maintenance replacements needs to be clarified. In a running plant, breakdown of certain equipment may occur and need replacement with identical equipment.

Is this equipment considered new and, in the case of IS equipment, should the typical loop be recertified if the original loop was not based on an IA certificate? (2)

3.2 Regarding IA certification, the effect on spares already held in stock needs to be clarified. Industry keeps a significant quantity of spare equipment in stock. Some is owned by the plant and some is consigned stocks owned by the vendor. It is not clear whether this stock can be considered as new. Some of it has been in stores for many years. It is also mostly used for identical replacements as a result of a breakdown.

What are the requirements for IA certification of these items? (2)

3.3 3.3.1 You have an existing IS loop that has been in operation for 15 years and the barrier needs to be replaced with a different (new) model for some or other reason.

Is it necessary to have the loop re-evaluated by an ATL? Motivate your answer. (2)

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3.3.2 Name THREE documents that are required for evaluation when the loop is re-evaluated? (3)

3.4 Define the term *Group III equipment* as defined in SANS ARP 0108 2014. (4)

3.5 Define the term *Typical loop* as defined in SANS ARP 0108 2014. (2)
[15]

QUESTION 4: SANS 60079 PART 10 – 1 2010 (CLASSIFICATION OF HAZARDOUS AREAS WITH EXPLOSIVE-GAS ATMOSPHERES) AND SANS 60079 PART 10 – 2 2009 (CLASSIFICATION OF AREAS WHERE COMBUSTIBLE DUSTS ARE OR MAY BE PRESENT)

4.1 Explain the term *relative density of a gas or a vapour*. (2)

4.2 Define the term *source of release*. (2)

4.3 Briefly explain the meaning of *type of protection 'pD'*. (2)

4.4 State the steps that you would follow to prevent the penetration of a significant quantity of flammable gas or vapour into an area where the source of release is situated outside the area or in an adjoining area. (4)
[10]

QUESTION 5: SANS 10108 – 2014: THE CLASSIFICATION OF HAZARDOUS LOCATIONS AND THE SELECTION OF APPARATUS FOR USE IN SUCH LOCATIONS

You are requested to calculate the air changes to be introduced in the battery-charging station to prevent an explosive atmosphere inside the battery-charging station.

The following information is known:

- Battery of 150 cells, that has an overcharge current equal to 20 A
- Dimensions of the charging station is 4,0 m × 4,0 m × 3,0 m
- Batteries and stand are occupying approximately 6 m³ of the station
- The rate of release of hydrogen for lead-acid cells is 0,000455 m³ per hour

Using the above information, determine the percentage concentration of hydrogen gas in the charging station after 1 hour of charging. **[5]**

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QUESTION 6: SANS 61241 PART 4: ELECTRICAL APPARATUS FOR USE IN THE PRESENCE OF COMBUSTIBLE DUST. PART 4: TYPE OF PROTECTION 'PD'

6.1 Define the following terms:

6.1.1 Self-revealing fault

6.1.2 Pressurisation

6.1.3 Static pressurisation

(3 × 2) (6)

6.2 Discuss what precautions you would take when the protected apparatus incorporates components which are possible sources of ignition. (3)

6.3 Describe TWO methods that you would use to switch off the electrical power supply to an enclosure in the event of loss of pressure. (6)

[15]

QUESTION 7: SANS 10123: 2014 THE CONTROL OF UNDESIRABLE STATIC ELECTRICITY

7.1 What measures should be taken by a master electrician when filling road tankers with flammable fluid using rubber hoses? (3)

7.2 In nonconductive fluids the dissipation of static cannot be achieved through earthing and bonding and alternative measures have to be employed.

State FOUR methods that you would use to achieve this. (4)

7.3 When measuring the resistance across metal piping sections/flanges what value of resistance should not be exceeded? (1)

7.4 What measures would you take when filling road tankers with flammable fluid using metallic swivel arms? (2)

7.5 Name THREE factors that affect the generation of static in liquids. (3)

7.6 What measures have to be taken to prevent static charge when filling large vessels or containers made of conductive material with flammable liquid? (2)

7.7 What measures are required when transferring small quantities (25 Litres) or less of flammable liquid? (2)

7.8 Transfer of a pure gas generates no static. Is this statement TRUE or FALSE? (1)

7.9 When transferring dust what requirements must be met regarding the outlet nozzles? (2)

[20]

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QUESTION 8: GENERAL (APPLICATION)

As a master installation electrician, you have been requested to make recommendations that would assist the TVET college with specialised electrical installations in the furniture workshop. Learners are trained here to manufacture furniture from timber and various other types of wood. During the processes involved excessive wood dust escapes into the atmosphere.



What approach would you take to the problem and what recommendations will you make to inform the TVET college on how to control or mitigate the risk of a potential explosion due to the combustible dust in the atmosphere. Your recommendations should include aspects amongst others, housekeeping methods, prevention of static build-up, appropriate explosion protected electrical equipment used and pressurisation of enclosures where and if necessary. **[10]**

TOTAL: 100

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