DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NON-NATIONAL CERTIFICATE: SPECIALISED ELECTRICAL INSTALLATION CODES
(First Paper)
TIME: 3 HOURS
MARKS: 100

APRIL 2013

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.

QUESTION 1: GENERAL

1.1 What duties are unique to a Master Installation Electrician according to the Occupational Health and Safety Act (Act 85 of 1993)?

1.2 What criteria should a person comply with according to the Chief Inspector before he/she could be registered as a Master Installation Electrician?

1.3 For how long is a registered person's status valid?

1.4 Can a company apply to become a registered Master Installation Electrician?

1.5 Can a person be registered as a Master Installation Electrician without being an electrical contractor or an electrical consultant or electrical engineer? Motivate your answer.

(5 × 2) **[10]**

QUESTION 2: SANS 10142 PART 1 2003

The wiring of premises (Low-voltage installations) SCOPE. Complete the following sentences by writing down the missing words (2.1.1–2.1.5) in the ANSWER BOOK.

This part of SANS 10142 (SABS 0142) covers

2.1 circuits supplied at nominal voltages up to and including ... volts AC **(2.1.1)** or ... volts DC. **(2.1.2)**. (2)

The standard frequency for AC is ... Hz **(2.1.3)**. (1)

The use of other frequencies for special purposes is not excluded:
fixed wiring in the ... **(2.1.4)** ... **(2.1.5)** circuits for telecommunication equipment, signaling equipment, control equipment and the like (excluding internal wiring of apparatus). (2)

2.2 **MEDICAL LOCATIONS**

Define the following terms as used in medical locations:

2.2.1 group 0 location (1)

2.2.2 group 1 location (2)

2.2.3 group 2 location (2)
[10]

QUESTION 3: ELECTRICITY SUPPLY SYSTEMS

3.1 Select from the group below the description best describing the different electrical supply systems. Write down only the correct corresponding letter of the description (A–C) next to the question number (3.1.1–3.1.3) in the ANSWER BOOK.

3.1.1 IT supply system

3.1.2 TNS supply system

3.1.3 TT supply system

(A) All exposed conductive parts of a consumer's installation are connected to a consumer's earth electrode which is electrically independent of the source earth.

(B) The source of energy is either connected to earth through a deliberate introduced high earthing impedance or it is isolated from earth (typically more than 1 000 Ω). All exposed conductive parts of a consumer's installation are connected to an earth electrode.

(C) The protective conductor (PE), which is connected to the source earth, is either a separate conductor or the armour of the cable if the resistance of the armouring is such that the earth fault loop-impedance complies with the requirements of 8.7.5. All exposed conductive parts of a consumer's installation are connected to this protective conductor via the supply earth terminal.

(3 × 1) **[3]**

QUESTION 4: GENERAL

4.1 A hazardous location classification study should only be undertaken once all the information regarding the process is known. Describe FIVE types or categories of information needed in this regard. (5)

4.2 The classification of locations where flammable gas or vapour atmospheres could be present comprises of a few basic steps. Name these steps that should be followed. (5)

4.3 When the classification of atmospheres containing flammable/combustible dust is done there are two main factors that would influence the classification. Name these TWO factors. (2)

4.4 Name TWO other standards that should primarily be used with SANS 10108 for the classification of both atmospheres containing flammable dust or vapours and gases. (2)

4.5 Give FOUR examples (not definitions) of areas containing flammable atmospheres that would fall under the following area classifications:

4.5.1 Zone 0 (4 × ½) (2)

4.5.2 Zone 2 (4 × ½) (2)

4.5.3 Zone 20 (4 × ½) (2)

4.6 The direct example method of area classification can be applied to FIVE types of processes/activity areas. List these areas. (5)
[25]

QUESTION 5: SANS 60079 PART 0 2009

Electrical apparatus for explosive gas atmospheres Part 0: General requirements

5.1 Define the scope of this standard. (3)

5.2 Flammable gases and vapours are divided into different classes and subclasses.

Name these different classes and subclasses. (5)

5.3 Where more than one type of protection is used in an electrical apparatus, what is the requirement in terms of order for the symbols that appear on the equipment? (1)

5.4 This standard provides specifications for the limitation of light metals such as aluminium, magnesium and titanium where the construction of enclosures are concerned, especially for group I and II gases. What is the reason for this? (1)
[10]

QUESTION 6: SANS 600 79 PART 10 – 1 2010

Classification of hazardous areas with explosive gas atmospheres

6.1 State the THREE grades of release as mentioned in this standard. (3)

6.2 Explain the meaning of the following: LEL (Lower Explosive Limit) and UEL (Upper Explosive Limit). (2)

6.3 Explain the principle *relative density* of a gas or vapour. (2)
[7]

QUESTION 7: SANS 60079 PART 10 – 2 2009

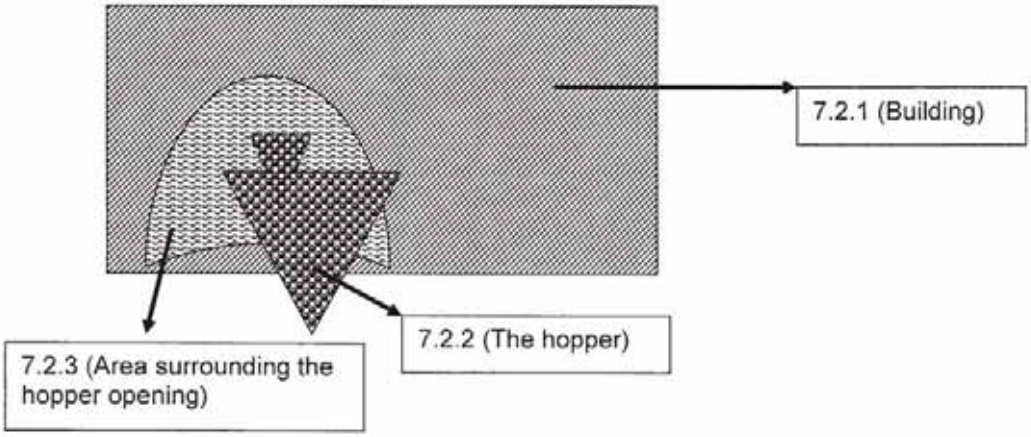
Classification of areas where combustible dusts are or may be present

7.1 According to this standard there are 4 principles to be followed when the classification for hazardous areas containing combustible dust is done.

Explain these FOUR principles. (4)

7.2 **Bag emptying station without exhaust ventilation within a building**
In the following example bags are manually emptied frequently into a hopper from which the contents are conveyed pneumatically into some other part of the plant. Part of the hopper is always filled with product.

Provide the classification of the following areas: 7.2.1; 7.2.2; and 7.2.3. Explain why you have allocated this classification to every area.



(3 × 2) (6)
[10]

QUESTION 8: SANS 61241 PART 4 2001

Electrical apparatus for use in the presence of combustible dust Part 4: Type of protection 'pD'

State the requirements regarding the following:

8.1 Type of electrical apparatus which may be energised in the absence of pressurisation located in a Zone 21 area (1)

8.2 The location of visible or audible alarms (2)

8.3 Devices to be used to monitor the satisfactory functioning of the pressurisation. (2)
[5]

QUESTION 9: SABS 0123 2011

The control of undesirable static electricity

9.1 Provide a short explanation on how static electricity is generated between two different surfaces of two different pieces of equipment which have different purposes. (4)

9.2 State the basic control methods for the prevention of static build-up that could cause ignition of a flammable atmosphere if discharged in the following cases:

9.2.1 Mobile apparatus such as trolleys

9.2.2 Rotating shafts

9.2.3 Non-conductive objects (3 × 2) (6)
[10]

QUESTION 10: APPLICATION

The following list contains industries that have process areas in their production facilities that contain possible flammable atmospheres. Describe TWO of the areas for each industry. Your description should be clear enough for a person not familiar with the processes to understand why these areas could contain a flammable atmosphere.

NOTE: Consider the production process used in each case. For the purpose of this question flammable stores (oil/paint) are not considered part of the production process.

10.1 Animal-feed production facilities

10.2 Paint manufacturing plants

10.3 Motor vehicle body-repair areas

10.4 Steel manufacturing plants

10.5 Sewerage treatment plants

(5 × 2) **[10]**

TOTAL: 100