higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

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NATIONAL CERTIFICATE

SPECIALISED ELECTRICAL INSTALLATION CODES

(First Paper)

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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: OCCUPATIONAL HEALTH AND SAFETY ACT, ACT 85 OF 1993 – ELECTRICAL INSTALLATION REGULATIONS

1.1 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (1.1.1–1.1.7) in the ANSWER BOOK.

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

1.1.2 Fixed equipment, fittings and appliances do not form part of a plant.

1.1.3 Any person may register as an electrical contractor.

1.1.4 Vehicles, trains and aircraft do not form part of the description of premises.

1.1.5 If a registered person has issued a certificate of compliance to a user the certificate remains valid even if the user does not pay the registered person for the certificate.

1.1.6 An approved inspection authority may enter any premises at any time to carry out an inspection.

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

(7 × 1) (7)

1.2 Complete the following sentences by filling in the missing word or words. Write only the word or words next to the question number (1.2.1–1.2.3) in the ANSWER BOOK.

1.2.1 When an employer has more than … employees he/she must have a fully equipped first aid box available at the place of employment for use by employees in case of an incident.

1.2.2 'Safe' means being free from any …

1.2.3 1 May 2009 is a significant date for the electrical industry because …

(3 × 1) (3)

[10]

QUESTION 2: SANS 10142–1 : 2012: MEDICAL LOCATIONS

2.1 Explain the following terms used in the medical locations section of SANS 10142-1:2012:

2.1.1 Applied part (2)

2.1.2 Group 0 location (2)

2.1.3 Group 2 location (3)

2.2 Insulation monitoring devices connected to circuits which supply power to equipment and socket outlets located in group 2 medical locations are equipped with two alarm indications, visual and audible.

Name and discuss the working principles of the TWO indications. (3)
[10]

QUESTION 3: SANS 60079 –0 : 2012 ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES PART 0 – GENERAL REQUIREMENTS

Write short notes on each of the following:

3.1 Enclosures constructed out of light metal compositions for use in a zone 1 area (2)

3.2 Lockout mechanisms for isolators suitable for use with gas group 1 atmospheres (2)

3.3 Interlock devices for socket outlets and plugs (4)

3.4 Mounting of luminaries (2)
[10]

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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

Read the following extract from SANS 60079–10 : 2005/IEC 60079 : 2002 and answer the questions.

If it is established that the item may release flammable material into the atmosphere, it is necessary, first of all, to determine the grade of release in accordance with the definitions, by establishing the likely frequency and duration of the release.

4.1 Discuss the meaning of the extract above as well as the influence it will have when choosing the risk profile (zone) for a particular flammable atmosphere. (6)

4.2 The characteristics of flammable substances (gas/vapour/liquid) as well as their behavior under process-related activities play an important role when area classification is conducted.

Keeping the above statement in mind, use the following statements as headings and write short paragraphs on each:

4.2.1 Structures housing plants when lighter versus heavier than air gases are present (4)

4.2.2 The extent of the zone (3)

4.2.3 Upper and lower explosive limits of flammable gases and vapours (4)

4.2.4 Main types of ventilation (2)

4.2.5 Degrees of ventilation (6)

[25]

QUESTION 5: SANS 61241–4 : 2001 ELECTRICAL APPARATUS FOR USE IN THE PRESENCE OF COMBUSTIBLE DUST PART 4 : TYPE OF PROTECTION 'pD'

5.1 Explosive and combustible dust atmospheres have two distinct dangerous conditions which can lead to deflagration or an explosion.

Name these TWO dangers and give a short description of how each can contribute to an area being classified as a hazardous location. (4)

5.2 When conducting area classification for an area containing combustible dust three important contributing factors regarding the process activity in the area where the dust is generated must be considered.

Write short notes on each of the steps that you must follow. (6)

5.3 Ex pD certified enclosures must include certain safety features and in the absence of these safety features the maintenance staff must follow certain procedures when maintaining these enclosures.

Describe these safety features or procedures by writing short notes on the following:

5.3.1 Live electrical supply inside the enclosure with no pressure

5.3.2 Interruption of inert overpressure to enclosure still in operation

5.3.3 Switching power back on after enclosure was opened and serviced

5.3.4 Pressure inside the enclosure dropping for whatever reason below the permitted minimum

5.3.5 Positioning of visible or audible alarms

(5 × 2) (10)

5.4 What should the minimum overpressure in Ex pD certified enclosures be? (1)

5.5 The static pressurisation safety principle used in Ex pD certified enclosures relies on certain measures/procedures to be followed.

Write short notes on the following measures required when used with Ex pD certified enclosures:

5.5.1 Filling process of the enclosure with an inert gas

5.5.2 Required level of overpressure

5.5.3 Characteristics of the inert gas used for overpressure

5.5.4 Maximum temperature of the atmosphere inside the Ex pD certified enclosures

(4 × 1) (4)

[25]

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QUESTION 6: SANS 10123 : 2014 THE CONTROL OF UNDESIRABLE STATIC ELECTRICITY

6.1 The following is an extract from the standard SANS 10123 : 2014.

Choose the correct word or words from those in brackets. Write only the word or words next to the question number (6.1.1–6.1.12) in the ANSWER BOOK.

Static electricity is generated when electric charges are 6.1.1 (separated/ discharged) into equal quantities of 6.1.2 (neutral/opposite) polarity by 6.1.3 (discharging/separation) or relative movement between contacting surfaces of 6.1.4 (nonexisting/different) physical and/or chemical structures.
Generation of a charge 6.1.5 (can/will not) occur between two substances that are apparently identical but have differing surface properties due to the presence of solid or liquid contaminants.
Generation of static charge 6.1.6 (can/will not) occur within a liquid or mass of dust undergoing internal movement due to agitation. Under these conditions equal quantities of charges of 6.1.7 (opposite/neutral) polarity may be physically separated and can give rise to internal static generation 6.1.8 (within/above) the liquid or dust.
When two electrostatically charged bodies are separated, an electrical stress (expressed in terms of field strength or potential gradient) is 6.1.9 (removed/created) that tends to 6.1.10 (isolate/reunite) the charges and opposes further separation. Energy has therefore been applied to the system to bring about this 6.1.11 (merging/separation) and part of the energy is contained in the electric stress so formed. When the electric stress exceeds the breakdown strength of the medium between the separated bodies a static 6.1.12 (formation/discharge) will occur. (12 × 1) (12)

6.2 Static electricity could be one of a number of potential ignition sources in a flammable/combustible atmosphere.

Name FOUR factors that will qualify static electricity as an ignition source. (4)

6.3 Choose the correct word or words from those in brackets. Write only the word or words next to the question number (6.3.1–6.3.2) in the ANSWER BOOK.

6.3.1 A (spark/arc) is a maintained discharge of energy.

6.3.2 Discharge of static electricity will create a/an (arc/spark).

(2 × 1) (2)

6.4 What measures can be used to eradicate the accumulation of unwanted static charges in objects constructed of conductive material? (1)

6.5 State the maximum resistance allowed between an object constructed from conductive material and the general mass of the earth. A bigger resistance value will require the installation of a separate earthing conductor between the object and earth. (1)

[20]

TOTAL: 100

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