higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

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NATIONAL CERTIFICATE

SPECIALISED ELECTRICAL INSTALLATION CODES (Second Paper)

(8080644)

4 April 2018 (X-Paper)
09:00–12:00

This question paper consists of 6 pages.

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
SPECIALISED ELECTRICAL INSTALLATION CODES
(Second 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.

QUESTION 1: GENERAL

The following are terms used when risk profiles for explosive atmospheres are considered.

Give a brief explanation of each.

1.1 Upper explosive limit (UEL) of a gas or vapour

1.2 Lower explosive limit (LEL) of a gas or vapour

1.3 Ignition temperature of a flammable liquid

1.4 Flash point of a gas or vapour

1.5 Relative density of a gas or vapour

(5 x 3) **[15]**

QUESTION 2: SANS 10142 PART 1: THE WIRING OF PREMISES (LOW VOLTAGE INSTALLATIONS)

2.1 Certificate of compliance

2.1.1 According to the standard, what is the duration of validity of a certificate of compliance? (3)

2.1.2 Name FOUR documents you will have to attach to a certificate of compliance for a specialised electrical installation and which are asked for on the certificate itself. (4)

2.1.3 A graduate electrical engineer with five years' experience in the petrochemical industry may issue a certificate for a specialised electrical installation without being registered by the Department of Labour as a master installation electrician.

Is this statement TRUE OR FALSE? Write only ‘true’ or ‘false’ next to the question number (2.1.3) in the ANSWER BOOK. (1)

2.1.4 Who may classify an area containing a flammable atmosphere according to its risk profile into different zones? (2)

[10]

QUESTION 3: SANS 60079 PART 14:2009 THE INSTALLATION, DESIGN, SELECTION AND ERECTION OF EQUIPMENT USED IN EXPLOSIVE ATMOSPHERES

3.1 Define the following terms:

3.1.1 Verification dossier (2)

3.1.2 Competent body (2)

3.1.3 Galvanic isolation (3)

3.2 This standard also covers areas where the atmospheres, due to the substance/s used, are explosive, but because of the nature of the activity (laboratories), explosion-protection electrical equipment cannot be used.

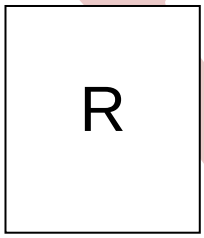
State FOUR requirements that these areas have to comply with before they are deemed compliant with an approved safety standard. (4 x 2) (8)

[15]

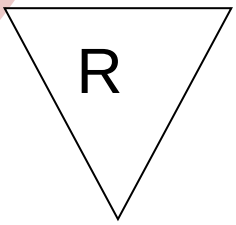
QUESTION 4: SANS 10086-3:2001 THE INSTALLATION, INSPECTION AND MAINTENANCE OF EQUIPMENT USED IN EXPLOSIVE ATMOSPHERES PART 3: REPAIR AND OVERHAUL OF APPARATUS USED IN EXPLOSIVE ATMOSPHERES

4.1 Explain the difference between the following TWO symbols when applied by a certified repairer to explosion-protected electrical equipment that has been repaired:

4.1.1



4.1.2



(2)

4.2 Repairs that do not affect the integrity of the explosion features need not be marked.

Is this statement TRUE or FALSE? Write only 'true' or 'false' next to the question number (4.2) in the ANSWER BOOK. (1)

4.3 All other repaired and overhauled apparatus shall be marked on the main part on a visible place.

Give FIVE types of information that must be applied on the marking plate by the repairer after completion of the repairs. (5)

4.4 Who may conduct repairs on certified explosion-protected electrical equipment? (1)

[9]

QUESTION 5: SABS 089-2: THE PETROLEUM INDUSTRY PART 2: ELECTRICAL INSTALLATIONS IN THE DISTRIBUTION AND MARKETING SECTOR

5.1 Explain the difference between a *flammable liquid* and a *combustible liquid*. (5)

5.2 Explain the difference between class I, II and III products. (5)

5.3 If a road fuel tanker is used to fill up the tanks at a local petrol station, what necessary measures would you, as a specialised installation electrician, take before commencing with the off-loading of the fuel into the petrol storage tanks? (3)

5.4 Explain how you would provide for additional earthing and bonding of an underground petrol storage tank which is covered with an insulated fibreglass layer. (3)

[16]

QUESTION 6: APPLICATION

Read the following paragraph and answer the questions.

The electrical superintendent in charge of a large industrial plant employs an installation electrician to carry out an inspection of the electrical equipment in a certain section of the plant still identified as a class I division 1 hazardous location. The superintendent asks the installation electrician to compile a fault list as well as give recommendations on the repairs/modifications required to be compliant with electrical standards. Production in this process area is continuous, 24 hours a day, 7 days a week. The process area contains lights, electric motors, lockable stop and start switches and instruments.

6.1 The person employed to carry out the work must be a registered *master* installation electrician.

Is the above statement TRUE or FALSE? Write only 'true' or 'false' next to the question number (6.1) in the ANSWER BOOK. EXPLAIN your answer. (2)

6.2 What should the person who has to carry out the inspection do if the engineer cannot provide the MSDS (material safety certificates) for the products to be used in the process area? (1)

6.3 The person carrying out the task is confronted with a 24 hour a day, 7 day a week production schedule.

What inspection method can be used that will not require isolating any of the process equipment? (2)

6.4 Name ALL the types of explosion-protection techniques that can be used on electrical equipment to be found in this process area. (5)

6.5 If the flange surfaces of Exd equipment suffer from rust, make a recommendation to the engineer on how to treat the affected surfaces. (4)

6.6 After a request, the engineer provides a small plant stoppage (production halt) for some tests to be conducted.

What step is critical before the person can commence with the testing? (2)

6.7 According to the Occupational Health and Safety Act (Act 85 of 1993), what is the maximum interval between inspections of explosion-protected electrical equipment in hazardous locations? (1)

6.8 Cathodic-protected metallic parts form part of the process equipment in this area.

Explain the principle used with this method of protection. (5)

6.9 Some of the electric motors used in this process area are of the variable speed type.

What critical aspect unique to this type of motor should be considered when conducting the inspection? (2)

6.10 Most of the instrumentation used is intrinsically safe explosion-prevention technique equipment class 'a' (Exia).

What is the difference between the 'Exia' and 'Exib' levels of intrinsically safe equipment? (4)

6.11 If the registered person conducting the inspection finds that the installation does not comply and even poses a threat, what steps should he/she take? (2)

[30]

QUESTION 7: SANS 61241-4: 2001 ELECTRICAL APPARATUS FOR USE IN THE PRESENCE OF COMBUSTIBLE DUST PART 4: TYPE OF PROTECTION 'PD'

7.1 Describe the *pressurisation principle* (Ext) used to protect people and plant against possible dust explosions. (2)

7.2 Where doors and covers for Ext enclosures are provided to permit inspection or service, they shall carry labels with instructions on them (opening doors/covers).

Describe how these instructions should read. (3)

[5]

TOTAL: 100