higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1630**(E)**(J26)T

NATIONAL CERTIFICATE

SPECIALISED ELECTRICAL INSTALLATION CODES
(First Paper)

(8080654)

26 July 2019 (X-Paper)
09:00–12:00

This question paper consists of 6 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: OCCUPATIONAL HEALTH AND SAFETY ACT (ACT 85 OF 1993)

1.1 You are the safety officer representing the employer on an industrial plant.

State EIGHT duties that you should perform to comply with the provisions of Section 8 of the Occupational Health and Safety Act (Act 85 of 1993), to maintain a workplace that is safe and without risk to the health of the employees. (8)

1.2 You are a manufacturer and installer of articles and also a supplier of substances to industrial companies.

State TWO of your duties towards your clients that should be performed to comply with the provisions of Section 10 of the Occupational Health and Safety Act (Act 85 of 1993). (2)

1.3 You are appointed as the work permit issuer in a factory and shall ensure that the equipment in need of maintenance work, is prepared and made safe for the maintenance team. You shall sign in the appropriate space on the permit form.

State FIVE of your responsibilities as the person to issue work permits. (5)
[15]

QUESTION 2: GENERAL

Your supervisor gave you the following list of industries which all have potentially explosive atmospheres and asked you to answer the questions:

2.1 Sewage-treatment plants

Which flammable substance is associated with this plant? (1)

2.2 Sugar mills and refineries

Name ONE main product and ONE by-product that can pose an explosion risk in this industry. (2)

2.3 Gas pipelines and distribution centres

What role does cathode protection play or what purpose does it serve in this industry? (3)

2.4 Printing industries, paper and textiles

What ignition source besides naked flames poses the most likely risk during typical mixing activities in this industry? (1)

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2.5 Aircraft refuelling

What ignition source, besides naked flames, poses the most likely risk during this activity? (1)

2.6 Chemical processing plants

Explain an exothermic reaction and indicate the threat it poses to this industry. (3)

2.7 Grain handling and storage

Name TWO preventive measures that can be used to effectively manage explosion risks in this industry. (2)

2.8 Metal-surface grinding, especially aluminium dust and particles

Name the liquid and the explosive gas that it generates when it comes into contact with the products used, manufactured or handled in this industry. (2)

2.9 Surface-coating (applying solvent-based paints) industries

Which specific process area in this industry has a high explosion-risk profile? (1)

2.10 Underground coal mines

Explain the term *fire damp*. (2)

2.11 Woodworking areas

Which TWO methods are the most effective in eliminating the explosion risk associated with this industry? (2)

2.12 Oil refineries, oil rigs and processing plants

Which THREE zones are most likely to be found in these industries? (3)

2.13 Shipping industry

Name ONE product, shipped from the Middle-East that poses a major explosion risk during loading and off-loading? (1)

2.14 Power plants

Name the flammable gas used for cooling generators. (1)

[25]

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QUESTION 3: SANS 10142, PART 1: THE WIRING OF PREMISES (LOW-VOLTAGE INSTALLATIONS)

3.1 ELECTRICITY SUPPLY SYSTEMS (EARTHING)

3.1.1 Draw a fully labelled TN-C-S system earthing diagram. (4)

3.1.2 Explain what the first and second letters (TN) denote. The designation TN is further subdivided depending on the arrangement of the neutral and protective conductors. In this case explain what C and S denote. (4)

3.2 MEDICAL LOCATIONS

Define the following terms as applicable to medical locations:

3.2.1 Applied part (2)

3.2.2 Medical IT system (2)

3.2.3 Group 0 location as applicable to medical locations (1)

3.2.4 Group 1 location as applicable to medical locations (2)

[15]

QUESTION 4: SABS-IEC 61241, PART 4, 2001: ELECTRICAL APPARATUS FOR USE IN THE PRESENCE OF COMBUSTIBLE DUST. PART 4: TYPE OF PROTECTION 'PD'

4.1 Explain the difference between an enclosure equipped with static pressurisation and an enclosure fitted with pressurisation that has a continuous flow of protective gas. (2)

4.2 Explain the term *hybrid dust mixture*. (2)

4.3 Differentiate between *explosive protective equipment Ex Pg* and *explosive protective equipment Ex Pd.* (2)

4.4 Explain the sequence of events which could cause a primary dust explosion to develop into a secondary dust explosion. (3)

4.5 Why is the moisture content of maize products critical for purposes of mass storage in bulk silos? (2)

4.6 Which method of explosion prevention for electrical equipment (Ex) is the most suitable for the prevention of the ignition of combustible dust atmospheres? (1)

[12]

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QUESTION 5: SANS 60079-0:2012 ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES PART 0: GENERAL REQUIREMENTS

5.1 Define the *scope of this standard*. (3)

5.2 State the maximum surface temperatures allowed in an authorised design of Group-1 explosion-protected equipment. (2)

5.3 Briefly discuss the following:

5.3.1 Blanking elements (2)

5.3.2 Gasket retention (2)

5.3.3 Disconnectors (4)

5.3.4 Documentation that the manufacturer must supply to the consumer (2)

5.3.5 When you are marking Ex components, state SEVEN markings that you would include on the components. (7)

[22]

QUESTION 6: SANS 10123:2011 THE CONTROL OF UNDESIRABLE STATIC ELECTRICITY

6.1 You are asked to do an investigation on the factors affecting the generation of static electricity that occurs frequently during handling and processing of dust in an industry.

State FIVE factors that you are likely to find. (5)

6.2 State the ways in which you will dissipate or minimise the generation of static electricity in the following apparatus or items used in this industry.

6.2.1 Outlet nozzles for dust (2)

6.2.2 Objects in dust streams (1)

6.2.3 Sampling devices for dust (1)

6.2.4 Bags for collecting and transporting dusts.

What would you do to maintain conductivity before re-using the bags? (2)

[11]

TOTAL: 100

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