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higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

SPECIALISED ELECTRICAL INSTALLATION CODES

(First paper)

(8080654)

31 March 2020 (X-paper)

09:00–12:00

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. Use only a black or blue pen.
 5. Write neatly and legibly.
-

**QUESTION 1: OCCUPATIONAL HEALTH AND SAFETY ACT, ACT 85 OF 1993 –
ELECTRICAL INSTALLATION/MACHINERY REGULATIONS**

- 1.1 Discuss FOUR general duties of manufacturers and others regarding articles and substances for use at work (Section 10 of the Act). (4 × 2) (8)
- 1.2 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.2.1–1.2.2) in the ANSWER BOOK.
- 1.2.1 An approved inspection authority for electrical installations may ...
- A enter any premises and conduct an inspection at any time without any permission.
 - B enter premises and conduct an inspection, test or investigation only when contracted by the chief inspector or provincial director for a specific electrical installation.
 - C enter premises and conduct an inspection, test or investigation only when requested by Eskom.
 - D also operate as an electrical contractor.
- 1.2.2 Design and construction of an electrical installation:
- A Items of an electrical installation not covered by an incorporated health and safety standard and the conductors between the point of supply and the point of control, shall be installed at the discretion of the owner.
 - B A registered person shall exercise general control over all electrical installation work being carried out and no person may allow such work without such control.
 - C No person except the contractor may authorise, design, install, permit or require the installation of an electrical installation, other than in accordance with a health and safety standard incorporated into these Regulations under section 50 of the Act.
 - D An experienced person or tenant shall exercise general control over all electrical installation work being carried out and no person may allow such work without such control. (2 × 1) (2)
- 1.3 State TWO regulations in the above Act that specifically deal with the electrical industry. (2)

- 1.4 The following is an extract from Section 8 of the Occupational Health and Safety Act, Act 85 of 1993. Choose the correct option from those given in brackets, to be found in the original text. Write the answer next to the question number (1.4.1–1.4.8) in the ANSWER BOOK.



Establishing, as far as is reasonably practicable, what 1.4.1 (hazards/danger) to the health or safety of persons are attached to any work which is performed, any article or substance which is produced, processed, used, handled, stored or transported and any plant or machinery which is used in his business, and he 1.4.2 (can/shall), as far as is reasonably practicable, further establish what precautionary measures should be taken with respect to such work, article, substance, plant or machinery in order to protect the health and safety of persons and he shall provide the necessary means to apply such precautionary measures;

Providing such information, instructions, training and supervision as may be necessary to ensure, as far as is reasonably practicable, the health and safety at 1.4.3 (home/work) of his 1.4.4 (employees/family) as far as is reasonably practicable, 1.4.5 (not permitting/permitting) any 1.4.6 (employee/contractor) to do any work or to produce, process, use, handle, store or transport any article or substance or to operate any plant or machinery, unless the precautionary measures contemplated in paragraphs (b) and (d), or any other precautionary measures which may be prescribed, have been taken;

Taking all necessary measures to ensure that the requirements of this Act are complied with by every person in his employment or 1.4.7 (off/on) the premises under his control where plant or machinery is used;



1.4.8 (encouraging/enforcing) such measures as may be necessary in the interest of health and safety.

(8 × 1)

(8)

[20]

QUESTION 2: GENERAL

- 2.1 Explain the following terms as applicable to areas where combustible dusts are or may be present:

2.1.1 Explosive dust atmosphere

2.1.2 Hybrid mixture

2.1.3 Dust containment

2.1.4 Combustible dust

(4 × 3)

(12)

- 2.2 Generally, electrical safety in a hazardous area is ensured by the implementation of one of two considerations with regard to electrical apparatus.



State the TWO considerations that have to be taken into account.

(2)

[14]

QUESTION 3: SANS 60079 PART 10: CLASSIFICATION OF HAZARDOUS AREAS WITH EXPLOSIVE GAS ATMOSPHERES AND SANS 61241 PART 10: CLASSIFICATION OF AREAS WHERE COMBUSTIBLE DUSTS ARE OR MAY BE PRESENT

- 3.1 State the THREE grades of release as mentioned in the above standards. (3)
- 3.2 Explain the term *ambient temperature*. (2)
- 3.3 Explain the term *sealed gas-tight cell or battery*. (3)
- 3.4 Explain the FOUR steps to be followed, according to the above standards, when the classification of hazardous areas containing combustible dust is done. (4)
- [12]

QUESTION 4: SANS 60079, PART 10: ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES – PART 0: GENERAL REQUIREMENTS

- 4.1 CLASSIFICATION OF MAXIMUM SURFACE TEMPERATURES FOR GROUP II ELECTRICAL APPARATUS (1)

Choose a maximum surface temperature value from COLUMN B that matches a temperature class in COLUMN A. Write only the letter (A–H) next to the question number (4.1.1–4.1.6) in the ANSWER BOOK.

COLUMN A		COLUMN B	
4.1.1	T1	A	300 °C
4.1.2	T2	B	100 °C
4.1.3	T3	C	200 °C
4.1.4	T4	D	450 °C
4.1.5	T5	E	135 °C
4.1.6	T6	F	85 °C
		G	105 °C
		H	95 °C



(6 × 1) (6)

- 4.2 Hazardous areas are classified into three zones based on the frequency of the occurrence and duration of an explosive gas atmosphere.


Name these THREE zones and briefly describe each zone. (9)

[15]


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


- 5.1 Define the following terms:
- 5.1.1 Type of protection 'pD'
 - 5.1.2 Pressurisation 
 - 5.1.3 Static pressurisation
 - 5.1.4 Pressurisation with leakage compensation
 - 5.1.5 Pressurisation with continuous flow of the protective gas (5 × 2) (10)
- 5.2 State FIVE ways in which combustible dust can be ignited by an electrical apparatus. (5)
- 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. 
- Briefly describe these safety features or procedures regarding the following:
- 5.3.1 Interruption of inert overpressure to an enclosure still in operation (4)
 - 5.3.2 Switching power back on after enclosure was opened and serviced (3)
 - 5.3.3 Pressure inside the enclosure drops for whatever reason below the permitted minimum (3)
- [25]

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

- 6.1 Define the following terms:
- 6.1.1 Flammable or explosive mixture
 - 6.1.2 Intrinsically safe circuit 
 - 6.1.3 Earthing (grounding) (3 × 2) (6)

- 6.2 The following is an extract from the standard SANS 10123. Choose the correct word or words from those given in brackets. Write only the answer next to the question number (6.2.1–6.2.8) in the ANSWER BOOK.

Static electricity is of common occurrence but often causes danger, discomfort or inconvenience. Under some conditions electrostatic 6.2.1 (voltages/currents) can reach a value in excess of the dielectric strength of air or other medium and a spark discharge then occurs. 

Electrostatic charges can be 6.2.2 (discharged/induced) on a conductive object that is brought into the vicinity of a 6.2.3 (discharged/charged) body. The part of the object that is closest to this body will exhibit a charge of 6.2.4 (same/opposite) polarity to that on the body. Under such conditions the overall electrostatic charge on the object is 6.2.5 (maximum/zero), but 6.2.6 (substantial/minimal) charges, with their inherent dangers, can be present at particular parts of the object. 

6.2.7 (Charges/Discharges) of static from conductive objects are generally in the form of spark discharges and usually 6.2.8 (charge/dissipate) all the electrical energy stored in the object. (8 × 1)

(8)
[14]

TOTAL: 100