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QUESTION 1: GENERAL

1.1 Name at least FOUR areas/places that could be potentially hazardous locations in an industrial environment. (4)

1.2 Name at least FOUR combustible dust used in industrial environments. (4)

1.3 State FOUR requirements that a person must comply with, according to the chief inspector, before this person can be accredited as a master installation electrician. (4)

1.4 What is the maximum interval between inspections of specialised electrical installations in hazardous locations, according to the Electrical Machinery Regulations in the OHS Act? (1)
[13]

QUESTION 2: OCCUPATIONAL HEALTH AND SAFETY ACT, 1993 (ACT 85 OF 1993)

2.1 For how long is a certificate of compliance valid? (1)

2.2 Who is responsible for the safe use and maintenance of an electrical installation? (1)

2.3 What is the responsibility of the Electrical Contracting Board? (1)

2.4 For how long is the license issued by the Department of Labour to an accredited person valid? (1)

2.5 Who in accordance with the Act (OHS Act) may issue a certificate of compliance for an electrical installation? (1)

2.6 Safe means free from any ... . (1)

2.7 Can an accredited person be prosecuted for only one contravention of the Occupational Health and Safety Act? (1)

2.8 Can the accredited person be held accountable for a certificate of compliance that was issued by him/her four years ago? (1)

2.9 May the Approved Electrical Inspection Authority suspend an accredited person's accreditation? (1)

2.10 What is the maximum number of employees in your employ before you are required to have a copy of the Act and relevant regulations available at the workplace? (1)

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2.11 Hazard means a source of or exposure to ... . (1)

2.12 On construction sites, the contractor shall ensure that all temporary electrical installations are inspected at least ... a week, before use on a construction site by competent persons and the records of these inspections are recorded in a register to be kept on site. (1)

2.13 The contractor shall ensure the control of all temporary electrical installations on the construction site is designated to a ... who has been appointed in writing? (1)

2.14 Can a notice served by an inspector of the Department of Labour be valid if it is left at the usual or last-known place of residence or business of a person? (1)

2.15 Which Regulation with sub section is applicable to hazardous locations? (1)

2.16 On construction sites, the contractor shall ensure that all temporary electrical installations are inspected at least once a week and electrical machinery ..., before use, on a construction site by competent persons and the records of these inspections are recorded in a register to be kept on site. (1)
[16]

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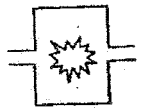
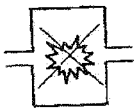
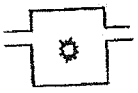
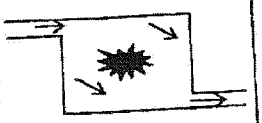
QUESTION 3: SANS 10108

The classification of hazardous locations and the selection of apparatus for use in such locations.

Complete the question by writing the answer against the corresponding question number (3.1.1 - 3.1.16) in the ANSWER BOOK. The first row serves as an example.

Symbol	Type of Protection	Abbreviation	Description
	"d" Flameproof Enclosure	Exd	Apparatus in which the parts that can ignite an explosive atmosphere are placed in an enclosure that can withstand the pressure developed during an internal explosion of a defined explosive mixture and that prevents the transmission of the explosion to the explosive atmosphere surrounding the enclosure.
	e 3.1.1 increased safety electrical apparatus	Exe 3.1.2	Electrical apparatus in which measures are applied to prevent, with a minor degree of security, the possibility of excessive temperatures and of the occurrence of arcs or sparks in the interior and on the external parts of electrical apparatus that does not produce such arcs or sparks in normal service
	i 3.1.3 intrinsically safe circuit	Exi 3.1.4 circuit	A circuit in which any spark, arc or thermal effect, whether produced normally (that is, by breaking or closing circuit) or accidentally (short circuit or and earth fault) is incapable, under prescribed test conditions, of causing ignition of a prescribed gas or vapour
	p 3.1.5 pressurised electrical apparatus	Exp 3.1.6	Electrical apparatus in which the entry of surrounding atmosphere into the enclosure of the electrical apparatus is prevented by maintaining, inside the said enclosure, a protective gas at a higher pressure than that of the surrounding atmosphere. The overpressure is maintained either with or without a continuous flow of the protective gas (that is, instrument air).

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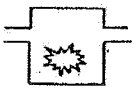
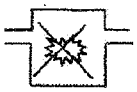
	m 3.1.7 Encapsulated electrical app	3.1.8 EX m apparatus	Electrical apparatus in which parts that could ignite an explosive atmosphere by either sparking or heating are enclosed in a compound in such a way that this explosive atmosphere cannot be ignited.
	q 3.1.9 powder filled electrical app	3.1.10 Ex q	Electrical apparatus of which the enclosure is so filled with material in a finely granulated state that, in the intended conditions of service, any arc occurring within the enclosure will not ignite the surrounding atmosphere, and ignition will not be caused either by fame or by excessive temperature of the surfaces of the enclosure.
	n 3.1.11 Non sparking electrical app	Ex n 3.1.12 apparatus	Electrical apparatus that, in normal operation and in the absence of electrical or mechanical failure cannot, because of its construction, because of its method of operation or because of its enclosure, ignite mixtures of air and prescribed flammable gases or vapours.
	s 3.1.13 Specially protected	Ex s 3.1.14 apparatus	Electrical apparatus that by its nature, cannot easily comply with, or be tested to, other established standards, but that can be shown, by test or otherwise, to be unlikely to cause ignition of an explosive atmosphere.
Dust ignition Protected apparatus	electrical 3.1.15 D / P	D / P 3.1.16 apparatus	Electrical apparatus so enclosed as to prevent: The entry of enough dust to be ignited or to impair the performance of the electrical apparatus; and Arcs, sparks and heat, generated or liberated in the enclosure, from igniting either accumulation of dust on the outside of the enclosure or atmospheric suspensions of dust in the vicinity of the enclosure.

(16 × ½) (8)

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① by direct example (cl 5)
② based on well known sources of release and vent levels

3.2 Name TWO techniques for the classification or zoning of hazardous locations. (2)

3.3 The marks below represent a marking scheme known as 'ATEX'. Use the question number (3.3.1 - 3.3.7) below each symbol/character and explain the meaning of each mark/symbol:

3.3.1 

3.3.2 II

3.3.3 2

3.3.4 D

3.3.5 

3.3.6 MI

3.3.7 1

G

(7)

3.4 Product conformity for explosion-protected apparatus is established through testing and certification by making use of one or more of THREE methods. Name these methods. (3)

ARP0108

3.5 What is significant about the characteristics in the following?

ANNEXE A

3.5.1	Lighter than air gasses	1	(2)
3.5.2	Heavier than air gasses	2	(2)
3.5.3	Same density as air gasses	3	(2)
			[26]

QUESTION 4: SANS 60079 – 0 2005

Electrical apparatus for explosive gas atmospheres.Part 0: General requirements.

4.1 Write the scope of this standard. (3)

4.2 State the requirements when using a gasket to provide the degree of protection offered by an enclosure when the enclosure has to be opened for maintenance and inspection purposes. (3)

4.3 State the requirements regarding disconnecting devices which are integrated into explosion prevention technology equipment (Ex) switch gear. (4)
[10]

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QUESTION 5: SANS 600 79 – 10 2005

Electrical apparatus for explosive gas atmospheres. Part 10: Classification of hazardous areas.

5.1 Name the TWO main types of ventilation that can be used to dilute a flammable atmosphere. (2)

5.2 State the THREE grades of gas release and give TWO samples of each. (6)

5.3 Artificial ventilation makes it possible to provide an effective and reliable ventilation system in an indoor situation. An artificial ventilation system which is designed for explosion protection should meet certain requirements. Name FOUR of these requirements. (4)
[12]

QUESTION 6: SABS-IEC 61241 PART 10 2004 (SANS 61241 PART 10 2005)

Electrical apparatus for use in the presence of combustible dust. Part 3: Classification of areas where combustible dusts are or may be present.

6.1 Name the THREE steps that should be used to identify the zones of risk pertaining to explosive dust atmospheres. (3)

6.2 Dust released into the atmosphere surrounding process equipment is categorized into two grades of release. Name these TWO grades and give an example of each. (2)
[5]

QUESTION 7: SABS IEC 61241 part 4

Electrical apparatus for use in the presence of combustible dust. Part 4: Type of protection 'pD'. In designing a pressurization system, there are FOUR basic principles that should be applied. Write short notes on each one of these principles:

7.1 Protective gas (2)

7.2 Automatic disconnection or alarm (2)

7.3 Cleaning/purging (2)

7.4 Discharge of protective gas (2)
[8]

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QUESTION 8: APPLICATION

As an accredited person, you are required, as a member of a hazardous location classification committee to provide the committee with information on how to go about classifying an area as a hazardous location and what type of zoning it should have. Write notes in your ANSWER BOOK that you will present on the first meeting which will serve as an information session for the rest of the members of the committee. Your input (notes) must provide the other members with enough information so that they would understand what causes an area to become a hazardous location and what the different risk profiles for the different zones are.
Also give attention to what characteristics of the flammable substances will influence the zone allocation to the specific areas where the substances are used. The company manufactures different types of domestic cleaning agents of which some of them contain flammable compounds. **[10]**

TOTAL: 100