

Minerals Council South Africa



EXAMINATION PAPER

SUBJECT: OCCUPATIONAL HYGIENE CHAMBER OF MINES OF SOUTH AFRICA – CERTIFICATE IN MINE ENVIRONMENTAL CONTROL PAPER 5 - OCCUPATIONAL HYGIENE SUBJECT CODE: COMMEC 5 EXAMINATION DATE: 06 MAY 2025 TIME: 14h00 – 17h00 (3 Hours)	EXAMINER: S Bergh MODERATOR: Sarah Wheeler TOTAL MARKS: 100 PASS MARK: 60%
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NUMBER OF PAGES: 4

SPECIAL REQUIREMENTS:

All candidates are advised to read the below instructions/requirements and adhere to them. Not adhering to them could lead to the loss of marks.

THIS IS NOT AN **OPEN BOOK EXAMINATION**. **FORMULA HANDOUT IS AVAILABLE**

INSTRUCTIONS TO CANDIDATES:

1. Answer all questions **legibly** in English.
2. Write your **ID number** on the outside cover of each book used and on any graph paper or other loose sheets handed in.

NB: Your name **must not** appear on any answer book or loose sheets.

3. Show all calculations **and check calculations on which the answers are based.**
4. Hand-held electronic calculators may be used for calculations.
5. Write **legibly** in ink on the **right-hand page** only – **left hand pages will not be marked.**
6. Illustrate your answers by means of sketches or diagrams wherever possible.
7. Answers must be given to an accuracy which is typical of practical conditions.

NB Ensure that the correct unit of measure (SI unit) are recorded as marks will be deducted from answers if the incorrect unit is used. (even if the calculated value is correct).

8. In answering the questions, full advantage should be taken of your practical experience as well as data given.
9. Please note that you are not allowed to contact your examiner or moderator regarding this examination.
10. Cell phones and other smart devices are **NOT** allowed in the examination room.
11. You are encouraged to make use of the CoMCert Tip-off Hotline whenever you witness or suspect any wrongdoing related to the CoMCert Examinations on landline 0800 118 998 or alternatively you can use email COMCert@tip-offs.com. This tip-off hotline and tip-off email is managed anonymously and confidentially through an independent service provider

QUESTION 1**(Total Marks 20)****1.1.** Define the following:**(10)**

1.1.1 Occupational Hygienist

1.1.2 Biological hazard

1.1.3 Threshold limit value (TLV)

1.1.4 Farsightedness

1.1.5 Mutagens

Answer the following questions:

1.2 Define the condition “Sick Building Syndrome” and list three (3) symptoms associated with Sick Building Syndrome **(5)**

1.3 Name and briefly discuss the effects of shift work on employees. **(5)**

QUESTION 2**(Total Marks 20)**

2.1 Please explain the new MHSC Milestones in terms of Occupational Hygiene that were adopted in October 2024.

2.1.1 Elimination of Occupational Lung Diseases

<i>Elimination of Occupational Lung Diseases</i>	<i>Reduction of over exposure to respirable crystalline silica</i>	2.1.1.1 (2)
	<i>Reduction of over exposure to respirable coal dust.</i>	2.1.1.2 (2)
	<i>Reduction of over exposure to respirable platinum mine dust</i>	2.1.1.3 (2)
	<i>Elimination of occupational lung disease / pneumoconiosis</i>	2.1.1.4 (2)

2.1.2 Elimination of Noise Induced Hearing Loss (Machinery)

<i>Elimination of Noise Induced Hearing loss</i>	<i>Elimination of Noise Induced Hearing Loss through Quietening of Equipment</i>	2.1.2.1	(2)
		2.1.2.2	(2)

2.1.3 List the four components into which respiration is subdivided

(4)

2.1.4 Name the three auditory ossicles and explain their function

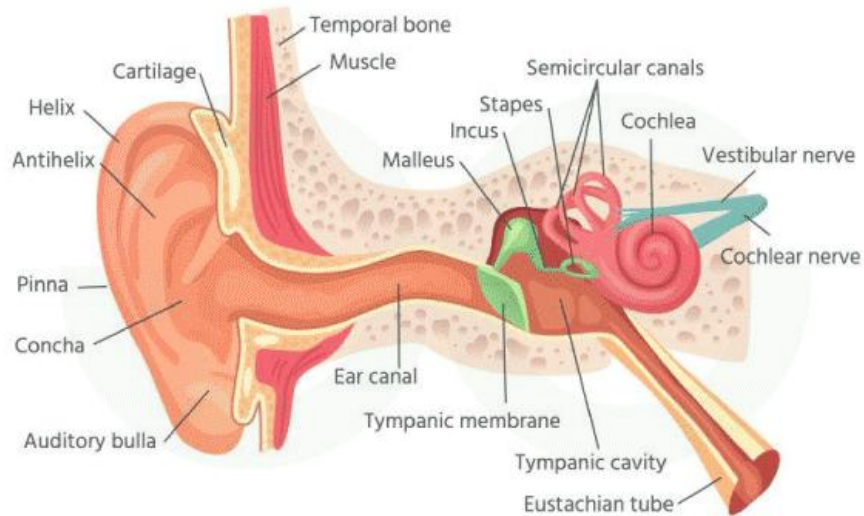
(4)**QUESTION 3****(Total Marks 20)**

Diagram of Ear



3.1 Use the above diagram to describe the physiology of:

(6)

3.1.1 The outer ear:

3.1.2 The middle ear:

3.1.3 The inner ear:

3.2 List four (4) symptoms of fatigue and four (4) causes giving rise to fatigue.

(8)

3.3 List four (4) physiological effects of exposure to vibration

(4)

3.4 Discuss the two main purposes of an audiometric programme.

(2)

Question 4**(Total Marks 20)**

- 4.1** How much fresh air containing 0.45mg/m^3 of dust should be mixed with $14.6\text{m}^3/\text{s}$ of air containing 2.30mg/m^3 of dust to reduce the dust concentration to 1.5mg/m^3 ? **(4)**
- 4.2** Name the two ways hazardous chemical substances may be classified. **(2)**
- 4.3** Dust control is based on a threefold approach, name and briefly describe each of the approaches. **(6)**
- 4.4** Welding fumes consist of mixtures of airborne gases and fine particles, which if inhaled or swallowed may result in health risks. The degree of risk depends on the composition of the fumes, the quantity of the fume in the air and the duration of the exposure. List and discuss **four** health effects associated with excessive exposure to welding fumes. **(8)**

Question 5**(Total Marks 20)**

- 5.1** The atmosphere in a workplace contains gases with similar toxicological effects. The results from the personal sampling are depicted below. Calculate the combined AQI and comment on the result. **(5)**

Gas	Measured Concentration	OEL
A	15 ppm	CO
B	130 ppm	100
C	30 mg/m^3	30
D	3000 ppm	CO ₂

- 5.2** During ergonomic design or selection of controls for operators, list at least five factors that should be considered. **(5)**
- 5.3** Name the three layers of the skin **(3)**
- 5.4** List and give a brief explanation of the three types of cells in the epidermis **(3)**
- 5.5** Give a brief description of the following: **(3)**
- 5.5.1** Tidal Volume
- 5.5.2** Inspiratory reserve volume
- 5.5.3** Residual Volume
- 5.6** There are different lung capacities. A spirometer is used to measure which one? **(1)**

TOTAL (100)

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