

Minerals Council South Africa



EXAMINATION PAPER

SUBJECT: CHAMBER OF MINES OF SOUTH AFRICA – CERTIFICATE IN MINE ENVIRONMENTAL CONTROL PAPER 4 – RISK MANAGEMENT. INFORMATION MANAGEMENT, FIRES & EXPLOSIONS, GASES AND STATISTICS SUBJECT CODE: COMMEC4 EXAMINATION DATE: 12 May 2023 TIME: 14:30 – 17:30 (3 HOURS)	EXAMINER: T. Zamisa MODERATOR: R.A Rabaji TOTAL MARKS: [100] PASS MARK: (60%)
NUMBER OF PAGES: 4 including this cover page	
SPECIAL REQUIREMENTS: THIS IS NOT AN OPEN BOOK EXAMINATION. FORMULA HANDOUTS AVAILABLE INSTRUCTIONS TO CANDIDATES: 1. Answer all 4 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) is recorded as marks will be deducted from answers if the incorrect unit is used. (Even if the calculated value is correct). 8. Please note that you are not allowed to contact your examiner or moderator regarding this examination. 9. Cell phones and any other electronic devices are NOT allowed in the examination room. Only Calculator 10. In answering the questions, full advantage should be taken of your practical experience as well as data given.	

Question 1 Risk and Information Management

- 1.1. Give examples of continuous risk assessments and list what is required to make this form of risk assessment effective (6)
- 1.2. Discuss three risk management control strategies. (10)
- 1.3. List 4 different stakeholders that may require environmental / occupational hygiene reports and the reasons why they would they require these report (4)
- (20)**

Question 2 Statistics

The table below depicts a set of measurements on TID (Total Inhalable Dust) exposures taken in different sections of a mine.

Section	1	2	3	4	5	6	7	8	9	10	11	12
Exposure (mg/m ³)	0.24	0.35	0.29	0.58	7.11	0.65	0.14	0.86	0.49	1.53	1.70	0.77

- 2.1. Describe the following parameters of the distribution of exposures. (5)
- 2.1.1. Mean
- 2.1.2. Geometric mean
- 2.1.3. Median
- 2.1.4. Standard Deviation
- 2.1.5. 90th Percentile
- 2.2. Calculate the above parameters of the distribution of exposures. (Show all the calculations) (5)
- (10)**

Question 3 Fires and Explosions

- 3.1 List eight duties that a senior environmental official will have to undertake, in the control room, during an underground fire. (8)
- 3.2 List twelve legal requirements for a refuge bay. (6)
- 3.3 During an underground mine fire, describe how you will know the following.
- 3.3.1. Fire is still burning freely.
- 3.3.2. Fire is being starved of oxygen.

- 3.3.3. Fire is under control
- 3.3.4. Seal leakage
- 3.3.5. Fire is considered to be extinguished (10)
- 3.4 What is the purpose of constructing a fire seal? (2)
- 3.5 What could cause the fire seals to fail and what would be the danger in the seal failing? (2)
- 3.6 Give three reasons why monitoring the atmosphere in a sealed fire is essential (3)
- 3.7 Differentiate between explosion proof and explosion resistant stopping (3)
- 3.8 List at least six common problems experienced with fire detection systems or instruments? (6)

[40]

Question 4 Explosions and Gases

- 4.1 What are chemical and mechanical explosions and name the different types of these explosions (6)
- 4.2 Describe and list advantages and disadvantages of the forcing system and the exhaust overlap system for ventilation systems, where there is a likelihood of flammable gases occurring. (10)
- 4.3 A force fan delivers $5.4\text{m}^3/\text{s}$ of fresh air to the face velocity of a development end. The concentration of the flammable gas in the return is measured as 4.0%
 - 4.3.1. How much flammable gas is made in the end? (5)
 - 4.3.2. What should the force quantity be to ensure the concentration of flammable gas does not exceed 1.5%? (5)
- 4.4 Explain what is meant by the following terms. (4)
 - 4.4.1. Somatic effects
 - 4.4.2. Genetic effects (hereditary)
 - 4.4.3. Matter
 - 4.4.4. Element

[30]

TOTAL MARKS 100