

Minerals Council South Africa



EXAMINATION PAPER

SUBJECT: CHAMBER OF MINES OF SOUTH AFRICA: INTERMEDIATE CERTIFICATE IN MINE ENVIRONMENTAL CONTROL INTERMEDIATE PAPER 1 SUBJECT CODE: COMIMEC1 EXAMINATION DATE: 15 MAY 2026 TIME: 14:00 to 17:00	Examiner: Mervin van Rooyen Moderator: Inus Labuschagne TOTAL MARKS: [100] PASS MARK: [60%]
NUMBER OF PAGES: 3 (Including this page)	
<u>SPECIAL REQUIREMENTS:</u> <i>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.</i> THIS IS NOT AN OPEN BOOK EXAMINATION. THERE IS NO FORMULA HANDOUTS FOR THE CANDIDATES - Answer all 4 questions legibly in English. - 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. - Show all calculations and check calculations on which the answers are based. - Hand-held electronic calculators may be used for calculations. - Write legibly in ink on the right-hand page only – left hand pages will not be marked. - Illustrate your answers by means of sketches or diagrams wherever possible. - 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 or no units are used. (Even if the calculated value is correct). - Please note that you are not allowed to contact your examiner or moderator regarding this examination. - Cell phones and any other electronic devices are NOT allowed in the examination room. Only Calculator - 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

- 1.1 Give four reasons why a mine is ventilated. (4)
- 1.2 List six factors that are essential to control and maintain satisfactory ventilation and thermal conditions underground. (6)
- 1.3 Duplicate the table below and complete the table regarding the ventilation objective guidelines. (7)

Parameters	Stoping	Development
Wet Bulb Temperature		
Air Velocity		
Air Quantity delivered		
Wet Kata		
SCP		
Dust		
Work Performance		
Force column delivery from face		
Stope ventilation controls from face		

- 1.4 What are the objectives of reporting? (3)
[20]

Question 2

- 2.1 List any five of the main sources of fires in underground mines. (5)
- 2.2 What are the basic principles of all fire detection systems? (5)
- 2.3 List the essential factors for an effective escape strategy? (5)
- 2.4 List ten criteria that must be shown on the Mine Rescue and Ventilation plans? (5)
[20]

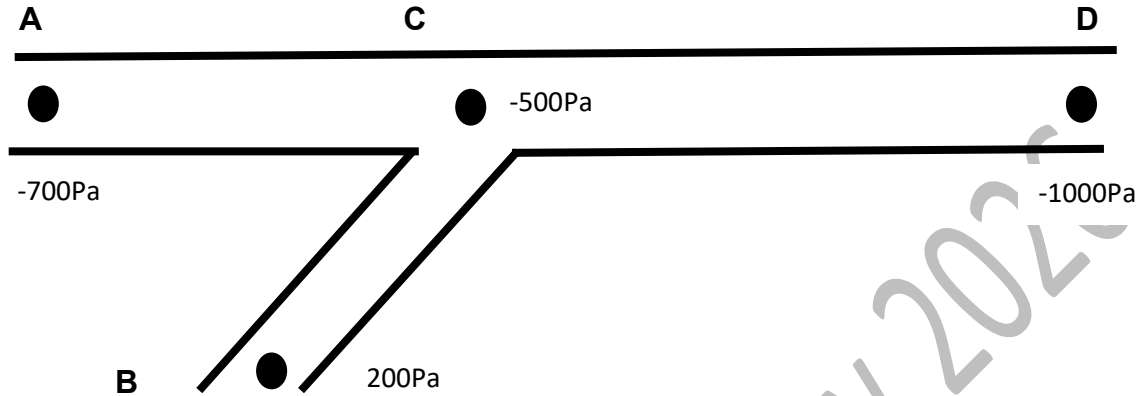
QUESTION 3

- 3.1 Explain the "Heat Absorption Process" found in deep mines and provide a sketch to illustrate all the relevant system components. (14)
- 3.2 List any three types of refrigeration systems. (3)
- 3.3 List any two methods of cooling used in deep mines, and state which one has a much better positional efficiency? (3)
[20]

QUESTION 4

4.1 A pump motor gives off 14kW as heat to the air. The motor input power is 86kW. Calculate the efficiency of the pump motor. (4)

4.2 Determine the direction of airflow in the given sketch. (5)



4.3 Calculate the friction factor of a haulage, 690m long, which is 3.6m x 3.1m. The air density is 1.1kg/m^3 and resistance of the haulage is 0.1292Ns/m^8 . (7)

4.4 When $12\text{m}^3/\text{s}$ of air flows through a haulage with a resistance of $2.0\text{Ns}^2/\text{m}^8$, the pressure required is 200Pa. Calculate the quantity if the air pressure is increased to 480Pa at the same resistance and ignore changes to density. (4)

[20]

QUESTION 5

5.1 Duplicate the table below and provide the definitions and units of measure for each element of electricity. (5)

	Unit of measure	Definition
Current		
Resistance		
Potential Difference		
Power		
Fan		

5.2 A fan handles $85\text{m}^3/\text{s}$ @ 750Pa. The fan is driven by a 3 phase AC motor that consumes 65 amps from a 1000-volt supply and the power factor is 0.9. The motor efficiency is 95%, the drive efficiency is 92% and the fan efficiency is 72%. Add a sketch to complement your answer. (15)

Calculate:

- The motor input power
- The motor output power
- The drive output power
- The fan air power (output power)

[20]

TOTAL MARKS: [100]