

Minerals Council South Africa



EXAMINATION PAPER

SUBJECT: CHAMBER OF MINES OF SOUTH AFRICA: INTERMEDIATE CERTIFICATE IN MINE ENVIRONMENTAL CONTROL PAPER 1 SUBJECT CODE: COMIMEC1 EXAMINATION DATE: 11 OCTOBER 2024 TIME: 14:30 17:30	Examiner: Mervin van Rooyen Moderator: Inus Labuschagne TOTAL MARKS: [100] PASS MARK: [60%]
NUMBER OF PAGES: 3	
SPECIAL REQUIREMENTS: THIS IS NOT AN OPEN BOOK EXAMINATION. THERE IS NO FORMULA HANDOUT INSTRUCTIONS TO CANDIDATES: 1. Answer all questions <u>legibly</u> in English. 2. Write your <u>ID number</u> on the outside cover of each book used and on any graph paper or other loose sheets handed in. NB: Your name <u>must not</u> appear on any answer book or loose sheets. 3. Show all calculations <u>and check calculations on which the answers are based.</u> 4. Hand-held electronic calculators may be used for calculations. 5. Write <u>legibly</u> in ink on the <u>right-hand page</u> only – <u>left hand pages will not be marked.</u> 6. Illustrate your answers by means of sketches, diagrams and tables 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 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

- 1.1. Besides the Legal responsibility of the Environmental Department, what other work is done by the department? List any eight activities. (8)
- 1.2. List in a table format the advantages and disadvantages for a force-exhaust ventilation system. (8)
- 1.3. List any four of the ideal characteristics of an ideal dust filter. (4)

[20]

QUESTION 2

- 2.1 Describe precautions to be taken to reduce the occurrence of fires. (4)
- 2.2 What is the role of an early warning device? List any three devices. (3)
- 2.3 What factors must be considered before selecting a type of breathing apparatus? List any five. (5)
- 2.4 What is required to ensure that Escape Routes form an integral part of the mine Escape Strategy? List any three. (3)

[15]

QUESTION 3

- 3.1 Draw the Refrigeration Plant Cycle, including the “Hot” and “Cold” Circuits and name every component of the cycle. (20)

[20]

QUESTION 4

- 4.1 Define and state the S.I. units for the following terms:
 - 4.1.1 Atmospheric Pressure with approximate pressures for:
 - i) Gauteng,
 - ii) Free State
 - iii) Klerksdorp and
 - iv) Sea Level. (4)
 - 4.1.2 Mass Flow Rate. (2)
 - 4.1.3 Capture/Catch Velocity. (2)
- 4.2 Calculate the resistance of a heavily timbered haulage, 400m long, 3.2m high and 3.1m wide. Show all calculations and units of measure. (6)

- 4.3 Calculate the quantity in a 570mm diameter ventilation pipe if the velocity pressure measured with a Pitot tube is 70Pa. The air density is $1,05\text{kg/m}^3$.
(6)

[20]

QUESTION 5

- 5.1 The following figures were obtained from a fan test conducted on a direct driven axial flow fan:

Fan speed: 13.5 r/s
Air density: $1,012\text{ kg/m}^3$

Quantity (m^3/s)	Pressure (Pa)	Input Power (kW)
0	1280	4,0
2	1200	5.2
4	1300	6.4
6	1130	8.5
8	960	10.8
9	740	13.1
10	460	16.4
11	250	20.6
12	0	16.5

Using the table above, draw the fan performance curve and input power curve.
Calculate the following:

1. Air Power
 2. Fan Efficiency (20)
- 5.2. The fan is to be installed in a 760mm galvanised duct, 54m long, having a frictional factor of $0,0035\text{ N s}^2/\text{m}^8$.
(5)

[25]

TOTAL MARKS: 100