

Minerals Council South Africa

EXAMINATION PAPER



SUBJECT: CHAMBER OF MINES OF SOUTH AFRICA – INTERMEDIATE CERTIFICATE IN MINE ENVIRONMENTAL CONTROL PAPER 2 SUBJECT CODE: COMIMEC2 EXAMINATION DATE: 15 OCTOBER 2018 TIME: 14:30 – 17:30	EXAMINER: M VAN DER BANK MODERATOR: N. KRUGER TOTAL MARKS: 100 PASS MARK: 60
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NUMBER OF PAGES: 6

SPECIAL REQUIREMENTS:

THIS IS **NOT** AN OPEN BOOK EXAMINATION. THERE IS **NO** FORMULA HANDOUT

INSTRUCTIONS TO CANDIDATES:

1. Answer all 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. **Psychrometric charts at 82.5 kPa and 87.5 kPa, 105.0 kPa, and 110.0 kPa are provided for Question 4.2.**

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

2. Show all calculations **and check calculations on which the answers are based.**
3. Hand-held electronic calculators may be used for calculations.
4. Write **legibly** in ink on the **right hand page** only – **left hand pages will not be marked.**
5. Illustrate your answers by means of sketches or diagrams wherever possible.
6. 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).

7. In answering the questions, full advantage should be taken of your practical experience as well as data given.
8. Please note that you are not allowed to contact your examiner or moderator regarding this examination.
9. Cell phones are **NOT** allowed in the examination room.

QUESTION 1

1.1 State the thermal capacity values of:

- Ice (1)
- Coal (1)
- Quartzite (1)

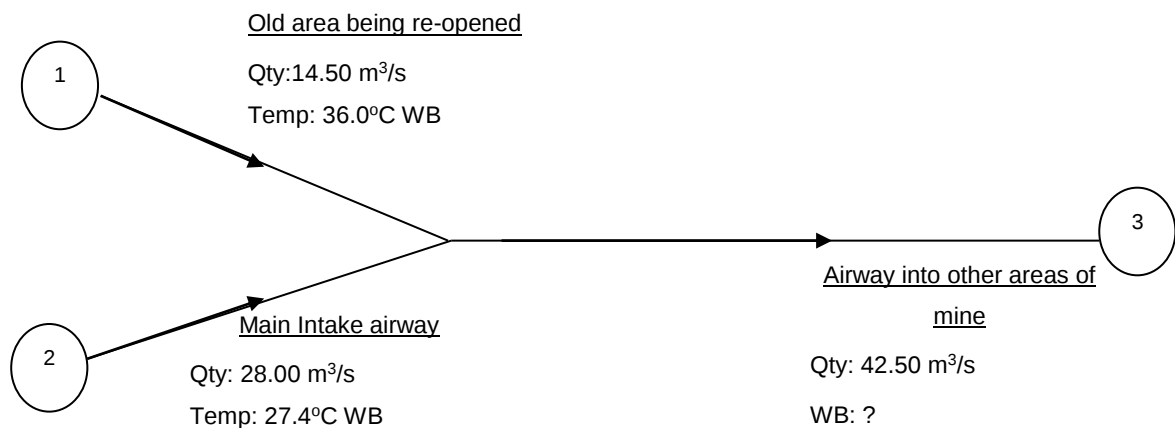
1.2 Define the following:

- Power (2)
- Latent Heat of Fusion (2)
- Latent Heat of Evaporation (2)
- Heat Transfer Processes (2)
- Wet-Bulb Temperature (2)

1.3 Heat can affect a human in three different ways. Please explain all three ways and explain in detail of the different effects. (5)

1.4 What are the main methods of reducing the effects of heat? (5)

1.5 You are required to calculate the wet-bulb temperature of an area that will be opened for mining to be done soon. Can you calculate the wet-bulb temperature after mixing of the airstream and give comment if the condition will be conducive for mining to be done going into other areas of the mine at point 3? (5)

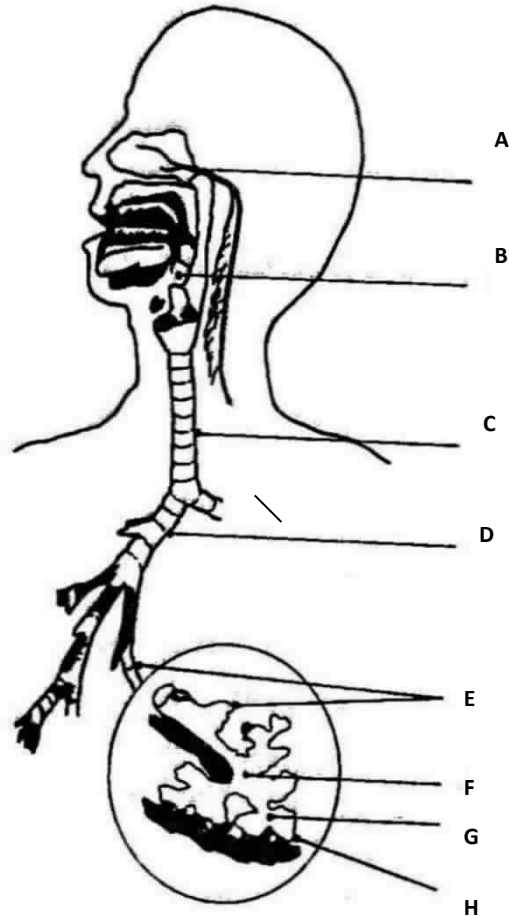


QUESTION 2

- 2.1 Flammable gas is a known danger in mines. In some instances, the most common system failures can lead to gas accumulations, fires or disastrous explosions. Indicate these system failures. (5)
- 2.2 What is the normal procedure to take when testing for flammable gas layering? (7)
- 2.3 What are the effects or symptoms on people when they are exposed to oxygen deficiency at the following levels? (5)
1. At 17% Oxygen
 2. At 14% Oxygen
 3. At 13% Oxygen
 4. At 10% Oxygen
 5. At 9% Oxygen
- 2.4 You are instructed to accompany a team into an old worked out area to investigate potential mineable ground. What instruments would you take to measure the environmental conditions? (5)

QUESTION 3

- 3.1 The diagrammatic sketch of the human respiratory system below indicates the air passages consist of the human, please indicate all the parts on the sketch below: (8)



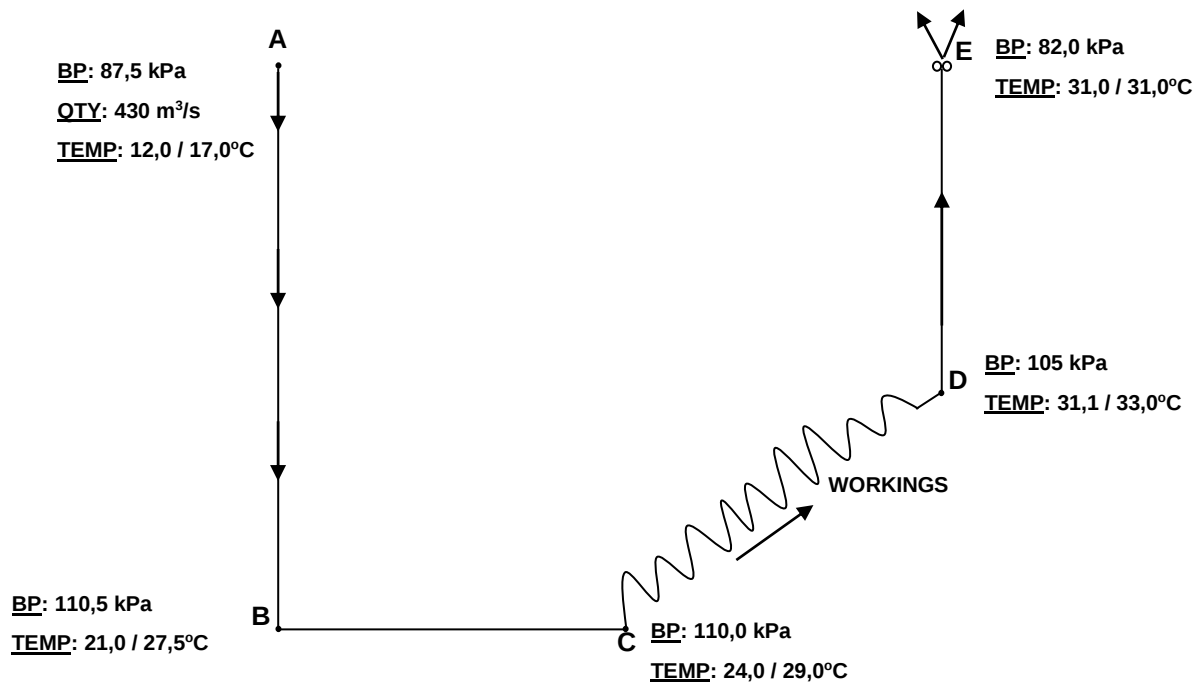
Magnified lung unit

- 3.2 Name five of the physical characteristics of airborne particulates of dust. (5)
- 3.3 Name the characteristics of a real-time ideal dust measuring instrument (Tyndalometer)? (6)
- 3.4 What is the five factors to be considered for industrial water supply? (5)
- 3.5 Explain the effects of good and poor illumination and give two examples of each. (4)

QUESTION 4

4.1 The attached sheet marked Annexure A indicates an example of a Psychrometric Chart. Name all the components of the chart in the sketch attached? (8)

4.2 From the below sketch, can you calculate the quantities at B, C, D and E assuming there are no air leakages? (10)



4.3 Define the following:

- Charles' Law (2)
- Universal Gas Law (2)

[22]

TOTAL MARKS: [100]

