



UNIVERSITY OF SWAZILAND
FACULTY OF HEALTH SCIENCES

DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE

BACHELOR OF SCIENCE IN ENVIRONMENTMANAGEMENT &
OCCUPATIONAL HEALTH

DECEMBER, 2018 FINAL EXAMINATION PAPER

TITLE OF PAPER : SAFETY MANAGEMENT IN MINES
COURSE CODE : EHS 439
DURATION : 2 HOURS
MARKS : 100

INSTRUCTIONS

1. Read the questions & instructions carefully
2. Question 1 is compulsory
3. Then answer ANY OTHER THREE (3) questions
4. Each question is weighted 25 marks
5. Write neatly and clearly
6. Numbering within a chosen question should be in a sequential order
7. BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.

**DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY
THE INVIGILATOR.**

QUESTION 1

For the following questions please chose the most appropriate response (2 marks each).

- a) Carbon monoxide is
 - i. a gas found in all mining operations;
 - ii. a normal constituent of air
 - iii. detected during a mine fire or explosion
 - iv. a product of the breathing process
- b) An elevated concentration of carbon dioxide in mine air can be harmful because;
 - i. it is highly explosive
 - ii. it increases the breathing rate
 - iii. it is highly toxic in small concentrations
 - iv. all the above
- c) An elevated concentration of nitrogen in mine air can be harmful because;
 - i) It can lower the oxygen content of the air
 - ii) it is highly explosive
 - iii) it is highly toxic
 - iv) All the above
- d) The most likely source of ethane, propane, or butane in a mine is;
 - i. use of diesel equipment
 - ii. battery charging stations
 - iii. leakage from adjacent gas or oil wells
 - iv. all the above
- e) Mine rescue teams are required by USA Federal law to have available:
 - i. one detecting device for every gas listed as dangerous by the U.S. Bureau of Mines
 - ii. one detecting device for each gas normally encountered in the mine(s) the team serves
 - iii. two detecting device for each gas normally encountered in the mine(s) the team serves
 - iv. One detecting device for each team member.
- f) Atmospheric pressure and temperature are important factors because they;
 - i. affect the rate of diffusion of a gas by ventilation
 - ii. can cause false readings on gas detection instruments
 - iii. lower oxygen content in the mine
 - iv. all the above
- g) A nontoxic gas can still be dangerous because it can:
 - i. a. displace oxygen
 - ii. b. burn

- iii. c. explode
 - iv. d. all the above
- h) Some gases can neither be toxic nor explosive yet can still pose a hazard to the mines because they;
- i. are not found in mine atmospheres
 - ii. are not dangerous
 - iii. can be dangerous because they can displace oxygen
 - iv. cannot be detected with today's detection instruments
- i) Name three ways in which oxygen deficiency can occur in a mine (6)
- j) Why is it important for you to know about the solubility of certain gases in water? (3)

MARKS: 25

QUESTION 2

- a) Outline the gases that can be detected by color, odor, or taste, and explain what these identifying features are. (7)
- b) What are the 5 major damps that may be found in a mine? Explain what each mixture contains and why it is dangerous? (15)
- c) How do you protect yourself in an oxygen-deficient atmosphere? (2)
- d) What is a dead finger? (1).

MARKS: 25

QUESTION 3

- a) What can you determine if you know the specific gravity of a particular gas? (4)
- b) Give a brief description of coal ranking (5)
- c) Which two gases must rescue teams know how to test in the mine and why are they of importance compared to the other gases? (4)
- d) Discuss the Anderton shearer (4)
- e) A mining accident is said to be an unplanned event at any mine that has the potential to cause an injury or disease to persons at work. What are the four possible attributes of such an accident? (4)
- f) Write short notes on any 4 principal methods of underground mining (4)

MARKS: 25

QUESTION 4

- a) Outline the possible environmental impact that may be ascribed to mining (9)
- b) If a mine has been closed down, what would be its potential uses after closure? (7)
- c) Name the type of coal that is represented by each of the following percentages. (8)
 - i. 35% to 45% carbon
 - ii. 86% to 98% carbon
 - iii. 25% to 35% carbon,
 - iv. 45% to 86% carbon
- d) If one burns one (1) ton of black coal how many tones of CO₂ does one get? (1)

MARKS: 25

QUESTION 5

- a) What reasons could prompt a rescue team to return to fresh air base before the completion of a rescue mission? (12).
- b) Discuss briefly what is involved during mine rescue “first stop and route marking”? (8)
- c) What is the order of travel for the rescue team after entering an irrespirable zone? (5)

MARKS: 25