



EXAMINATION PAPER- MEMORANDUM

SUBJECT: CHAMBER OF MINES OF SOUTH AFRICA - EXAMINATION FOR THE CERTIFICATE IN MINE ENVIRONMENTAL CONTROL PAPER 6 THE MINE HEALTH AND SAFETY ACT AND REGULATIONS SUBJECT CODE: COMMEC EXAMINATION DATE: 16 MAY 2017 Time: 08:30 to 11:00	Examiner: JJ Beukes Moderator: R McIntyre TOTAL MARKS: [100] PASS MARK: 60%
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NUMBER OF PAGES: ??

Examination Instructions:

1. Answer all the questions in *English*.
2. Put your identity 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. This is an **OPEN BOOK EXAM**. References, including guidance notes, guidelines for mandatory codes of practices, the Mine Health and Safety Act and Regulations and Regulations in force in terms of Schedule 4 of the Mine Health and Safety Act are permitted. **NO OLD PAPERS FROM PREVIOUS EXAMS WILL BE ALLOWED.**
4. Write in ink on the **right hand page** only – the left hand page **will not** be marked.
5. Illustrate your answers by means of sketches or diagrams wherever possible.
6. Please quote all the relevant regulation numbers.
7. Keep your answers short and to the point, it is not necessary to provide word-perfect reproductions of the regulations. In many cases a single word or phrase will suffice.
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 - Guidelines and Guidance Notes

(25 marks)

A. Guidance Note for Multiblasting Operations - Re-Entry interval after blasting and permission to blast more than once in 24 hours in terms of Regulation 9.2(1)."**1.1 Define****1.1.1 Time-blasting: (1)**

- *Blasting operations taking place not more than once in any 24-hour cycle. (1)*

1.1.2 Multi-blasting (2)

- *Multiple blasting including shaft sinking operations, (½)*
which could take place during any working shift. (½)
Such blasting may only take place where efficacious means of separating intake and return air e.g. a dedicated return airway is provided. (1)

1.1.3 Fixed-time Multi-blasting (3)

- *Blasting more than once per 24 hours, (½)*
but not more than once per shift, (½)
for both stoping and development, (½)
taking cognisance of a re-entry period sufficient to clear all airways where persons are expected to work or travel. (½)
- *The re-entry period must be determined by a risk assessment and validated whenever key factors, that can have a significant effect on the re-entry conditions, change. (1)*

B. Guideline For The Compilation Of A Mandatory Code Of Practice For The Prevention Of Fires At Mines**1.2 Define****1.2.1 Fire Detection System (2)**

- *means the combination of Fire Alarm Systems and (1)*
Fire detectors; (1)

1.2.2 Flame Retardant (3)

- *means a self-extinguishing substance or material (1)*
that will inhibit the formation or the spread of a flame (1)
on a surface to which it is applied; (1)

1.2.3 Hot Work (3)

- *means work involving burning,* (½)
- heating,* (½)
- welding,* (½)
- grinding* (½)
- or a similar operation* (½)
- that is capable of initiating fires or explosions;* (½)

C. Guideline For The Compilation Of A Mandatory Code Of Practice For An Occupational Health Programme On Thermal Stress**1.3 Define****1.3.1 Abnormally hot environment for underground operations (1)**

- *means any environment where $DB > 37.0^{\circ}\text{C}$ and/or $WB > 32.5^{\circ}\text{C}$* (1)

1.3.2 Abnormally hot environment for surface operations. (3)

- *means the time weighted average WBGT Index,* (1)
- determined over a period of one hour,* (1)
- exceeding 30 in the environment in which an employee works* (1)

1.3.3 Hot environment (3)

- *means any environment where $DB < 37.0^{\circ}\text{C}$,* (1)
- Globe temperature $< 37.0^{\circ}\text{C}$,* (1)
- a WB range of 27.5 to 32.5° C inclusive.* (1)

1.4 Describe the Formal Monitoring Period for Cold Stress (4)

- *To be conducted during the coldest quarter,* (1)
- as determined during the risk assessment.* (1)
- Generally for Cold Stress: Quarter April to June* (1)
- and July to September* (1)

Question 2 – General Regulations**(25 marks)****2.1 List any twelve (12) requirements of a Mine Ventilation and Rescue Plan. (6)**

- *drawn to a legible scale* (½)
- *ventilation districts* (½)
- *the direction of air currents* (½)
- *quantity of air circulating in such ventilation district* (½)
- *the position of each fan* (½)
- *door* (½)
- *regulator* (½)
- *crossing* (½)
- *stopping* (½)
- *telephone* (½)
- *the position of each refuge bay* (½)
- *rope-aided or normal escape route* (½)
- *safe place* (½)
- *first aid room* (½)
- *main water valve* (½)
- *fire fighting equipment site* (½)
- *any area sealed off for fire or spontaneous combustion* (½)

2.2 What is the requirement for the grid that must be displayed on the Mine Ventilation and Rescue Plan? (2)

- *A square grid* (½)
- *lettered horizontally* (½)
- *numbered vertically* (½)
- *drawn to a suitable scale* (½)

2.3 The employer must take reasonably practicable measures to ensure that every refuge bay is examined to ensure compliance, by whom and at what intervals must these examinations be done? (6)

- *at least once every 30 days* (1)
- *by a person appointed in terms of regulation 2.15.1 or 2.17.1* (1)
- *or any other employee of a higher ranking* (1)
- *at least once every 90 days* (1)
- *by a person appointed in terms of section 12 of the Act, or* (1)

- *by a person who holds the Intermediate Certificate in Mine Environmental Control, issued by the Chamber of Mines of South Africa, working under the control of a person appointed in terms of section 12 of the Act* (½)

2.4 Define hazardous location (9)

- *means any location, where there may be a significant risk of igniting gas, dust, mist or vapour, including the following -* (1)
- *for underground coal mines any location where, under normal operating conditions, there is a continuous presence of flammable gas, measured at a concentration of 0.5% or more by volume in the general body of the air, including:* (2)
 - *a return airway, and* (1)
 - *any location determined by risk assessment but not less than 180 m from any working face.* (1)
- *for underground mines other than coal mines any location where, under normal operating conditions, there is a continuous presence of flammable gas measured at a concentration of 0.5% or more by volume in the air.* (2)
- *for surface mines and surface locations at all mines including offshore installations any location as identified in accordance with South African National Standard SANS 10108: 2004 (Edition 5), "The classification of hazardous locations and the selection of apparatus for use in such locations.* (2)

2.5 What must the employer do to prevent employees from being trapped in any underground excavation? (1)

- *The employer must prevent employees from being trapped in any underground excavation by providing whenever practicable, from every underground working place, two exits, each of which is connected to separate means of egress to the surface. (Regulation 13.1(1))* (1)

2.6 Where it is not practicable to provide the option in Question 2.5, what else must the employer do? (1)

- *Where it is not practicable to provide two exits as contemplated in regulation 13.1(1) above, the employer must implement other reasonably practicable measures, determined by the mine's risk assessment, to prevent employees from being trapped in any underground excavation. (Regulation 13.1(2))* (1)

Question 3 - Regulations**(25 marks)**

3.1 The employer must report to the Principal Inspector of Mines in a manner prescribed by the Regulations, any dangerous occurrences at the mine. List the four (4) that will be applicable to you as the Section 12.1 appointee and elaborate under which conditions this must be done. (12)

- *BREAKDOWN OF MAIN VENTILATION FAN* (1)
 - (i) *Breakdown of any main ventilation fan.* (1)
- *FIRES AND EXPLOSIONS* (1)
 - (i) *Any ignition or explosion of gas or dust, or any fire related to mining activities or any indication or recrudescence of fire or spontaneous combustion at or in a mine.* (2)
- *FLAMMABLE GAS* (1)
 - (i) *The presence of flammable gas exceeding one comma four parts per hundred by volume in the general atmosphere at a mine, or any portion of a mine:* (1)
 - 1. *if such flammable gas is detected for the first time; or* (1)
 - 2. *the first time such flammable gas is again detected after not having been detected therein for a continuous period of three months.* (1)
- *EMERGENCY OR RESCUE PROCEDURES* (1)
 - (i) *Any failure of breathing apparatus whilst deployed.* (1)
 - (ii) *The use of emergency escape apparatus, procedures or rescue mechanisms, or the rescue from entrapment, associated with mining or related activities, of any employee.* (1)

3.2 Discuss the regulation in which the employer must ensure that a competent person reports to the employer relating to explosions, fires and flooding. (3)

- *16.1(1) Report to Employer Relating to Explosions, Fires and Flooding - The employer must ensure that a competent person reports to the employer, at appropriate intervals determined in accordance with the mine's risk assessment, (1) on the adequacy of escape and rescue procedures at the mine (1) relating to explosions, fires and flooding. (1)*

3.3 In terms of Question 3.2 above, define the requirements for the competent person that must report to the employer relating to explosions, fires and flooding. (6)

- *22.16(1)*
 - a) *The competent person referred to in regulations 16.1(1) must be in possession of the following -*
 - (i) *Where the competent person performs the obligations underground:* (1)

1. *Certificate in Mine Environmental Control, issued by the Chamber of Mines of South Africa.* (1)
- (ii) *Where the competent person performs the obligations on surface:* (1)
 1. *Intermediate Certificate in Mine Environmental Control, issued by the Chamber of Mines of South Africa, and* (1)
be certified as an Occupational Hygienist by the Southern African Institute for Occupational Hygiene; or (1)
 2. *Certificate in Mine Environmental Control, issued by the Chamber of Mines of South Africa.* (1)

3.4 The employer must establish and maintain a system of medical surveillance as contemplated in section 13, for all employees who are exposed to health hazards. State the limits or requirements at which these systems must be implemented for the following health hazards:

- 3.4.1 Asbestos dust** (1)
- *Regulation 11.5(1) - in excess of 50% of the OEL for asbestos dust as set out in Schedule 22.9(2)(a) and (b)* (1)
- 3.4.2 Coal Dust** (2)
- *Regulation 11.6(1) - in excess of 50% of the OEL for coal dust with less than 5% crystalline silica content as set out in Schedule 22.9(2)(a) and (b)* (1)
 - *If the crystalline silica content of the coal dust is 5% or more, the employer must establish and maintain a system of medical surveillance as contemplated in regulations 11.7(1) to 11.7(7).* (1)
- 3.4.3 Crystalline Silica Dust** (1)
- *Regulation 11.7(1) - in excess of 10% of the OEL for crystalline silica dust as set out in Schedule 22.9(2)(a) and (b).* (1)

Question 4 - Regulations**(25 marks)****4.1 Define booster fan.****(4)**

- *means a fan installed underground* (1)
in the main air stream (1)
or in a split of the main air stream (1)
to assist the main fan to increase airflow and (1)
or overcome resistance through a section of a mine.

4.2 Define main fan.**(2)**

- *means a fan*
that controls the entire air flow of a mine, (1)
or the airflow of one or more of the major air circuits. (1)

4.3 The employer must take reasonably practicable measures with regards to a mobile diesel engine powered unit when not in use. List the regulation number and state what measures must be taken.**(4)**

- *Regulation 8.8 (6)* (1)
The employer must take reasonably practicable measures to ensure that every
mobile diesel engine powered unit, when not in use, (1)
is kept at a location that is sufficiently ventilated to prevent a build up (1)
of diesel fumes in the air at that location sufficient to cause a significant risk when
starting up that engine. (1)

4.4 The employer must take reasonably practicable measures regarding conveyor belt installation. List the regulation number and state what measures must be taken.**(5)**

- *Regulation 8.9* (1)
The employer must take reasonably practicable measures
to prevent persons from being exposed to flames, fumes or smoke arising (1)
from a conveyor belt installation catching fire, (1)
including instituting measures to prevent, (1)
detect and combat such fires. (1)

4.5 A flammable gas measuring instrument or a flammable gas warning device being used on a mine must comply to a certain standard, state the standard to which it must comply and the regulation that stipulates this requirement.**(2)**

- *South African National Standard Specification SANS 1515-1 : 2006, Edition 2.1* (1)
- *Regulation 5.1(5)* (1)

4.6 As the Section 12.1 appointee, you must submit reports to the Regional Principal Inspector of Mines. State the regulation number, list the relevant form numbers that must be submitted and within which what period this must be done. (5)

- *Regulation 9.2(7)* (1)
- *The employer must submit to the Regional Principal Inspector of Mines,*
on forms 21.9(2)(a); (½)
21.9(2)(b); (½)
21.9(2)(c) (½)
and 21.9(2)(d), (½)
21.9.2(e) and (½)
21.9.2(f), prescribed in chapter 21, and (½)
within 60 days from the end of the relevant reporting period as indicated on each
form, (1)
reports which contain information on the airborne pollutant, thermal stress and
noise aspects of the system of occupational hygiene measurements, established and
maintained in terms of regulation 9.2(2).

4.7 The employer of every underground mine must take reasonable measures for the prevention of flammable gas and coal dust explosions during blasting operations. State the regulation number and list these requirements. (3)

- *Regulation 4.13 Prevention of flammable gas and coal dust explosions*
- *The employer of every underground mine must take reasonable measures to ensure that:*
- *Regulation 4.13(1)* (½)
a blow out, (½)
ignition of flammable gas or (½)
initiation of a coal dust explosion does not occur (½)
due to the design and positioning of the shot holes or (½)
due to the type of explosives that are used; (½)