



EXAMINATION PAPER

SUBJECT: CHAMBER OF MINES OF SOUTH AFRICA - CERTIFICATE IN ROCK MECHANICS	EXAMINER: MCB STANDER
PAPER 2: BASIC ROCK MECHANICS PRACTICE	MODERATOR: KR BRENTLEY
SUBJECT CODE: COMRMC	TOTAL MARKS: [100]
DATE: 14 MAY 2019	PASS MARK: (60%)
TIME: 14:30 – 17:30	

NUMBER OF PAGES: 4

THIS IS NOT AN OPENBOOK EXAMINATION – ONLY REFERENCES PROVIDED ARE ALLOWED

SPECIAL REQUIREMENTS:

1. **Answer All the Questions.** Answer the questions legibly in English.
2. 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.

3. Show all calculations and check calculations on which the answers are based.
4. Hand-held electronic calculators may be used for calculations. Reference notes may not be programmed into calculators.
5. Write legibly in ink on the right hand page only – left hand pages will not be marked.
6. Illustrate your answers by means of sketches or diagrams wherever possible.
7. Final answers must be given to an accuracy which is typical of practical conditions, however be careful not to use too few decimal places during your calculations, as rounding errors may result in incorrect answers.

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.

QUESTION 1. GEOTECHNICAL CHARACTERISTICS

- 1.1 List and briefly describe **three fundamental classes** of rock? (6)
- 1.2 With reference to the fundamental classes of rock, classify the following rock types? (3)
Gneiss, Dolomite, Dolerite, Haematite, Kimberlite and Quartzite.
- 1.3 With the aid of annotated sketches explain **reverse** and **normal faulting** and the stress environments in which they are formed? (6)

[15]

QUESTION 2. ROCK AND ROCKMASS BEHAVIOUR & MINE SEISMICITY

- 2.1 Explain how **Rock Quality Designation (RQD)** may be determined from **borehole core** as well as from the **in-situ rock mass**? (4)
- 2.2 Describe the components of **Bieniawski' s RMR system** of rockmass classification? (5)
- 2.3 Explain the **difference** between the terms **hypo-centre** and **epi-centre** used in describing the location of seismic events? (2)
- 2.4 Explain the basic steps that are involved in carrying out a rockburst site investigation? (4)

[15]

QUESTION 3. FUNDAMENTAL PRINCIPLES OF MINING LAYOUTS AND MINING LAYOUT DESIGN

- 3.1 **Mine Call Factor (MCF):**
 - 3.1.1. Define the term **Mine Call Factor (MCF)**?
 - 3.1.2. List and briefly discuss how Rock Engineering strategies, designs or recommendations **may negatively influence the Mine Call Factor**? (6)
- 3.2 **Explain reasons** for attempting to mine an ore reserve at a **constant grade**? (4)
- 3.3 With the aid of annotated sketches **explain two methods** to effectively ventilate a (4)

development end?

- 3.4 On a mine using track bound, electrical locomotives and hoppers to tram ore from the working places and to deliver material and explosives, where may one expect to find possible **Hydrogen accumulations**? (1)

[15]

QUESTION 4. MINING SUPPORT AND MINING SUPPORT DESIGN

- 4.1 Describe the principles of **rock reinforcement**? (5)
- 4.2 Explain the functions of **skin support**? (5)
- 4.3 Explain how **pre-stressed, yielding elongates** should be installed? (5)

[15]

QUESTION 5. INVESTIGATION AND EVALUATION

- 5.1 With the aid of annotated sketches describe the **test equipment** required for uniaxial compressive strength tests? (5)
- 5.2 Explain how **deformation** is derived from **strain gauges** fixed to test samples? (5)
- 5.3 With the aid of annotated sketches explain the **installation and operation** of a **Multiple Point Borehole Extensometer**? (5)

[15]

QUESTION 6. DRILLING AND BLASTING

- 6.1 A section under your area of responsibility is experiencing problems related with their face advance. Poor blasting has been identified as a likely cause of the poor face advance. **List five (5) possible** factors that you would investigate and **explain the possible influence** of each factor on overall blast quality? (10)

[10]

QUESTION 7. LEGAL COMPLIANCE AND GENERAL MANAGEMENT

- 7.1 Section 22 of the Mine Health and Safety Act 29 of 1996, deals with the **Employee's duties for health and safety**. Provide your interpretation of what the Act requires of every employee at a mine? (6)
- 7.2 Regulation 23.4 of the Mine Health and Safety Act 29 of 1996, deals with “**Dangerous occurrences to be reported**”. In your own words, explain when and how the Employer must report dangerous occurrences, pertaining to **Rockbursts and Falls of Ground** and **Caving**, to the Principal inspector of Mines? (9)

[15]

Total Mark = [100]