



CHAMBER OF MINES OF SOUTH AFRICA

EXAMINATION PAPER

SUBJECT: CHAMBER OF MINES OF SOUTH AFRICA – CERTIFICATE IN STRATA CONTROL – METALLIFEROUS SUBJECT CODE: COMCSCM EXAMINATION DATE: 9 MAY 2017 TIME: 14:30 – 17:30	EXAMINER: Y. JOOSTE MODERATOR: D.A. ARNOLD. TOTAL MARKS: [100] PASS MARK: (60%)
NUMBER OF PAGES: 4	
THIS IS NOT AN OPENBOOK EXAMINATION – ONLY REFERENCES PROVIDED ARE ALLOWED SPECIAL REQUIREMENTS: 1. Answer all 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 units) 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 – Definitions

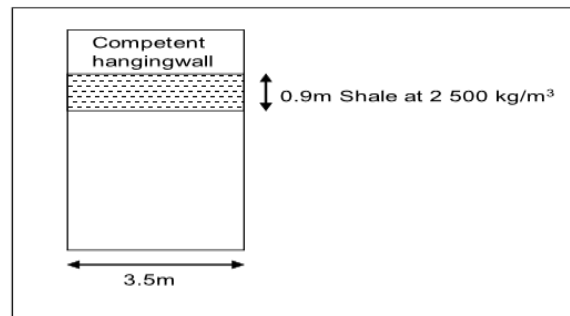
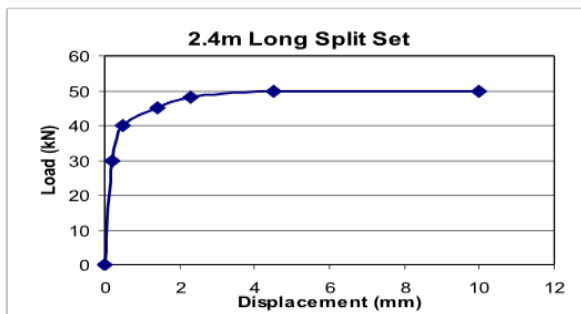
Define the following:

- 1.1 Deformation
- 1.2 Displacement,
- 1.3 Elasticity
- 1.4 Uniaxial tension
- 1.5 Shear stress
- 1.6 Virgin stress
- 1.7 Principal stress
- 1.8 Coefficient of friction
- 1.9 Friction angle
- 1.10 Cohesion

[20]

QUESTION 2 – Support design

2.1 You are required to design the support in the tunnel shown below using 2.4m long friction anchors. Pull-out tests conducted on the 2.4m long split sets indicate a performance shown in the graph below. Assuming a safety factor of 1.5 and the shale/split set interface offers no friction support strength, calculate the tendon density necessary to meet the support requirements.



(10)

2.2 Describe what is meant by the term “rockwall condition factor”. State the RCF formula and describe the component terms. What RCF values denote good, average and poor conditions?

(7)

2.3 Draw a load deformation graph shows the following key support characteristics:

- 2.3.1 Yield load
- 2.3.2 Yieldability
- 2.3.3 Brittle failure
- 2.3.4 Initial stiffness
- 2.3.5 Energy absorption
- 2.3.6 Pretension

(8)

[25]

QUESTION 3 – Rock Strength and Testing

- 3.1 Block A has a base of 500mm x 800mm and is 700mm high, block B has a base of 1.5m x 2.3m and is 1.8m high. Calculate the Volume, Mass, Weight, Force (load) and stress of each block given the density of Block A is 2850kg/m³ and Block B is 1450kg/m³

Show all calculations and units.

(16)

- 3.2 A uniaxial compressive strength test is conducted on a 60mm diameter rock sample and the following data is obtained:

- Load at failure = 248 kN
- Transverse strain = 0.8×10^{-3}
- Axial strain = 3.7×10^{-3}

Determine the Elastic Modulus and Poisson's ratio of the specimen from the data supplied above.

(3)

- 3.3 Describe the method of sample preparation and testing procedure for a suite of triaxial tests. (6)

[25]

QUESTION 4 – Mining and Geology

- 4.1 Describe the functions and responsibilities of the rock engineering staff as defined in the code of practice of your mine. (5)
- 4.2 Sketch the following geological disturbances in detail, indicating the fundamental differences between each pair: (10)
- Reverse fault and Normal fault
 - Syncline and Anticline
 - Dyke and Sill
- 4.3 Define the following (10)
- Cross bedding
 - Laminations
 - Ripple marks
 - Striations
 - Slicken Slide

[25]**Question 5 – Reporting**

- 5.1 You are required to investigate a FOG on your mine. List 10 observations and the associated information that you need to include in your report to management. **[5]**

TOTAL MARKS: 100