

EXAMINATION PAPER



SUBJECT: STRATA CONTROL CERTIFICATE SUBJECT CODE: (a) EXAMINATION DATE: 28 NOVEMBER 2007 TIME: 9:00 – 12:00	EXAMINER: N D I MODERATOR: D A ARNOLD TOTAL MARKS: [100] PASS MARK: 60%
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NUMBER OF PAGES: 4

SPECIAL REQUIREMENTS:

1. Answer **ALL FIVE** questions
 2. References other than those provided are not permitted.
 3. Hand-held electronic calculators may be used.
 4. Put your examination 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.**
5. **Write in ink on the RIGHT HAND SIDE of the paper only (only the right hand pages will be marked).**
 6. Show all calculations on which your answers are based.
 7. Illustrate your answers by sketches of diagrams wherever possible.
 8. In answering these questions, full advantage should be taken wherever necessary of your practical experience as well as of the data given.
 9. Answers must be given to an accuracy that is typical of practical conditions.

QUESTION 1 – DEFINITIONS

1.1 Closure

2

1.2 Convergence

2

1.3 Deformation

2

1.4 Ductile

2

1.5 Gravity

2

1.6 Isotropy

2

1.7 Rock Mechanics

2

1.8 Stress

2

1.9 Subsidence

2

1.10 Tensile stress

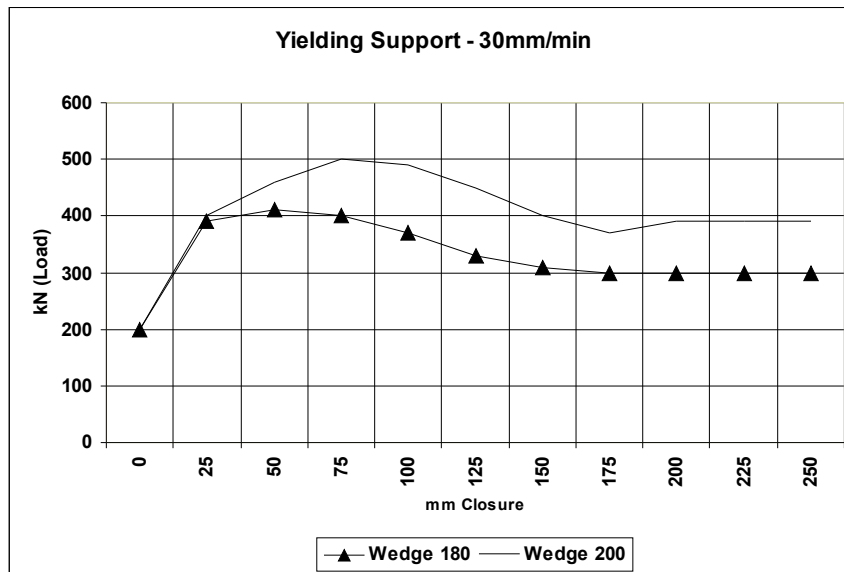
2

[20 Marks]

QUESTION 2 – MINING SUPPORT FOR STOPING

2.1 A cylindrical rock specimen is subjected to an axial load of 200kN. The diameter of the specimen is 50mm. Calculate the stress on the specimen? 4

2.2 The following load deformation graph is supplied with a support unit. The average load that a 200mm prop can generate is 400kN. Your support is spaced 2.0m x 2.0m. Calculate the support resistance? 4



2.3 Under dynamic

conditions you require 200kN/m^2 . Calculate spacing for the above support units?

4

2.4 Under static conditions you require 50kN/m^2 . Calculate spacing for the above support units?

4

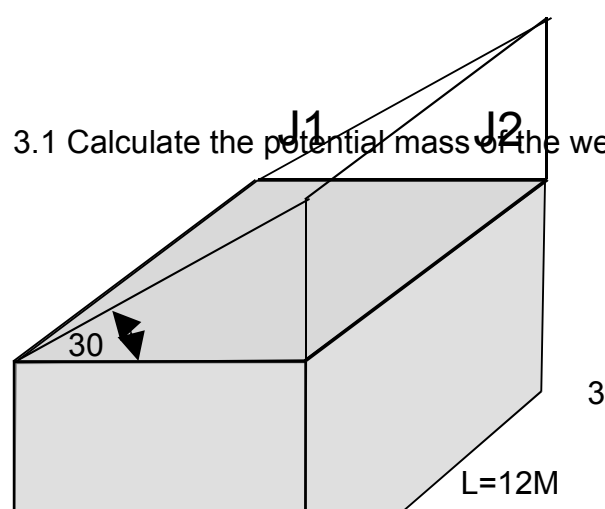
2.5 If the support unit costs R120-00, what will the cost be per m^2 , under dynamic and static conditions?

4

[20 Marks]

QUESTION 3 – MINING SUPPORT FOR DEVELOPING

The Geologist has informed you that two prominent joints run along the length of the hanging wall of the excavation and that they intersect to create a wedge as shown below. You must recommend a support system to prevent the wedge from collapsing into the excavation.



3.1 Calculate the potential mass of the wedge? The rock density is 3100kg/m^3 .

4

W=7.0M

- 3.2. Determine the required support resistance, using a safety factor of 1.6? Gravity can be assumed as 9.81 m/s^2 . 4
- 3.3. Using standard 38 ton cable anchors, determine the amount of anchors required to support the wedge? 4
- 3.4. What minimum length of anchor would you recommend and motivate your answer? 4
- 3.5. Work out how you would space the anchors to ensure even loading? 4

[20 Marks]

QUESTION 4 – ROCKMASS CLASSIFICATION

It is planned to re-open and continue sinking Daisy shaft, which has a diameter of 10.0m. A diamond drill hole from the middle of the present shaft bottom has intersected an intensely jointed zone at approximately 900m below surface.

The zone is some 30m in length and 240 joints have been recorded from the core. There appear to be two distinct joint sets, dipping at roughly 30 and 70 degrees respectively. Traces of serpentinite filling, varying from 0-3mm are visible in the joint planes. No water seems to be present. There also appears to be a 0.8m thick lamprohyre dyke running through the middle of this zone, at an angle of 45 degrees.

- 4.1 Calculate the rockmass quality by conducting a rock mass rating. Motivate your reason for each value chosen used in the rock mass rating? Attached is a rock mass rating form. 15
- 4.2 As the Acting Strata Control Officer, recommend support for the sinking shaft through this zone, remembering that the expected shaft life is 20 years? 5

[20 Marks]

QUESTION 5 – GENERAL

- 5.1. Sketch a section view of the fracture zone ahead of a typical deep stope. Sketch the stresses 5m, 10m, and 15m ahead of the stope face and indicate on all your sketches the necessary scales. Also indicate a suitable location for re-raising ahead of a collapsed panel, stating your reasons? 10
- 5.2. Describe the behaviour of rock with increasing confining pressure. Schematically indicate on a stress/strain diagram, with increasing confinement, brittle and ductile behaviour as well as the residual strength of rock? 10

[20 Marks]

[Total 100]