

Minerals Council South Africa

CHAMBER OF MINES OF SOUTH AFRICA



EXAMINATION FOR THE CERTIFICATE IN STRATA CONTROL

COAL OPTION

SUBJECT: CHAMBER OF MINES OF SOUTH AFRICA CERT. IN STRATA CONTROL (COAL.)	EXAMINER: DANIE SNYMAN
SUBJECT CODE: COMCSC <u>C</u>	MODERATOR: MARC HENDERSON
EXAMINATION DATE: <u>9 OCTOBER</u> NOVEMBER 2018 <u>2018</u>	TOTAL MARKS: [100]
TIME: 3 HOURS <u>14:30 – 17:30</u>	PASS MARK: 60%

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NUMBER OF PAGES: 4

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SPECIAL REQUIREMENTS:

1. Answer ALL the questions

- References other than those provided are not permitted.
- Hand-held electronic calculators may be used.
- 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.

- Write in ink on the **RIGHT HAND SIDE** of the paper only (only content on the right hand pages will be marked).
- Show all calculations on which your answers are based.
- State all assumptions you have made.
- Illustrate your answers by sketches or diagrams wherever possible.
- In answering these questions, full advantage should be taken wherever necessary of your practical experience as well as of the data given.

10. Answers must be given to an accuracy which is typical of practical conditions.

11. The use of cellular phones are prohibited.

QUESTION 1 (MONITORING)

1.1 A high potential incident occurred in a bord and pillar section at your mine as a result of a failure of an intersection. List the main observations to be considered and recorded by the Strata Control Officer when investigating the roof fall accident on site. (13)

1.2 Section 41 and Section 23 are bord and pillar coal mining sections that are mining with similar mining dimensions and at the same depth. There is a dolerite dyke cutting through the panel of Section 41 and a dolerite sill 5.0m on top of Section 23 coal seam. Briefly explain the expected strata conditions in both sections. (4)

1.3 List the instruments normally used for monitoring the following:

- a) Seam closure. (2)
- b) Bed separation of the roof strata. (2)
- c) The onset of a goaf in a pillar extraction section. (2)
- d) The pretension supplied to a roofbolt during installation. (2)

(25)

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QUESTION 2 (SUPPORT DESIGN)

2.1 Sketch and describe the support you would recommend in the following situations:

- a) A slip dipping at 60° in the roof of a normal roadway.
- b) A slip of which the bottom daylight in a pillar corner.
- c) The area 20.0m on either side of a dolerite dyke intrusion.
- d) A highly stressed roof zone.
- e) The boxing area in an intersection that was excavated too wide.
- f) Where a vertical brow was left in the sidewall (14)

2.2 With the aid of a sketch explain how the vertical and horizontal stresses are redistributed around a newly excavated underground roadway. ____ (3)

2.3 List the equipment and material necessary to install a full column resin roof bolt with an electric-hydraulic roof bolter. (5)

2.4 What do you understand about passive and active support? ____ (3)

(25)

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QUESTION 3 (BASIC PRINCIPLES)

3.1 Sketch, describe and explain the axial stress-strain graph for a rock specimen in uniaxial compression. (11)

3.2 Calculate the minimum thickness of a competent sandstone beam to span between supporting posts that are 7.0m apart. Show all assumption. (6)

3.3 If the beam in part 3.2 above consisted of coal explain how it would influence its minimum stable thickness? (3)

3.4 If the sandstone beam in 3.2 were only clamped on one side, what would the maximum length be before it fails? (5)

(25)

QUESTION 4 (MINE DESIGN)

4.1 With the aid sketches explain any pillar extraction method that can be utilised to extract the pillar of a bord and pillar operation. Include the following:

- a) Cutting sequence.
- b) Specialised support units.
- c) Monitoring.
- d) Risk zones classifications. (15)

4.2 Explain with the aid of sketches the basic layout of a longwall section. (5)

4.3 Give the recommended safety factors for the pillars at your mine? (5)

(25)

TOTAL MARKS: 100

FORMULA SHEET

$$S = 7,2 \frac{w^{0.46}}{h^{0.66}}$$

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$$S = 5.47 \frac{w^{0.8}}{h}$$

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$$L = \frac{0.025HC^2}{w^2}$$

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$$FS = \frac{S}{L}$$

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$$FS = 288 \frac{w^{2.46}}{Hh^{0.66}(w+b)^2}$$

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$$\theta_t = \frac{\gamma L^2}{2t}$$

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$$\theta_t = \frac{3\gamma L^2}{t}$$

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$$\theta_t = \frac{3\gamma L^2}{4t}$$

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$$L_a = \frac{\rho g S^2 t_i}{\tau \pi D_i} + 0.05$$

Formatiert

TOTAL MARKS (100)