

EXAMINATION PAPER

SUBJECT: CERTIFICATE IN STRATA CONTROL (COAL) SUBJECT CODE: EXAMINATION DATE: OCTOBER 2012 TIME:	EXAMINER: D. NEAL MODERATOR: B. MADDEN TOTAL MARKS: [100] PASS MARK: 60%
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NUMBER OF PAGES: 4

SPECIAL REQUIREMENTS:

1. Answer **ONLY 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.

CERTIFICATE IN STRATA CONTROL (COAL)

QUESTION 1

A coal seam is auger mined on a highwall. The seam is 3m thick and the highwall is 25m from surface to the base of the seam. Auger hole of 2.2m diameter are drilled each separated by 0.3m. After a set of 6 auger holes a pillar 4m wide is left. All holes are 200m deep.

- 1.1 Calculate the volume and mass of coal ($RD=1.5$) from a set of holes (5)
- 1.2 Calculate the percentage extraction of the coal seam (5)
- 1.3 Calculate the pillar safety factor (6)
- 1.4 Comment safety around the working area during and after mining (4)

[20 MARKS]

QUESTION 2

- 2.1 Draw a typical borehole column for a multi-seam area, with the various rock types noted on it along with typical thicknesses. (8)
- 2.2 Name the 3 main rock Group designations and give examples that are found in a coal mine environment. (6)
- 2.3 Describe with the use of sketches multiple slips including the variables that can influence their stability. (6)

[20 MARKS]

QUESTION 3

2 seams are 5m thick, separated by a 15m parting. If the floor of the lower seam is 100m calculate the square pillar dimensions on both seams for a bord width of 7m and safety factor of 1.7. Apply Salamon's multi-seam guidelines.

[20 MARKS]

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QUESTION 4

A weak roof skin 0.5m thick with a density of 2200 kg/m³ must be suspended onto a massive sandstone roof using full column resin anchored roof bolts. The resin pullout shear resistance in sandstone is 3000 kPa. 17 ton capacity, 20mm roof bolts are used in 26mm holes. Calculate the required bolt length and spacing to suspend the weak layer with a 1.5 safety factor.

[20 MARKS]

ANSWER EITHER QUESTION 5 OR QUESTION 6

QUESTION 5

List 10 items that would be found in the mines support rule and comment on the importance of each item listed.

[20 MARKS]

QUESTION 6

List 10 items that must be included in an opencast highwall and spoils inspection list and discuss each one.

[20 MARKS]

Strata Control Formulae

$$S = 7,2 \frac{w^{0,46}}{h^{0,66}}$$

$$S = 3.5 \left(\frac{w}{h} \right) (MPa)$$

$$L = \frac{25 H C^2}{w^2}$$

$$\eta = \eta_o \left(1 + \frac{2 \Delta w_o}{w} \right)^{2,46}$$

$$n = SF \frac{pgt}{Pf}$$

$$Lb = \frac{d_c^2 Lc}{D^2 - d^2}$$

$$\tau = \frac{Pf}{\pi . D . Lb}$$

$$\eta = \frac{\gamma L^4}{32 E t^2}$$

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

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

$$\sigma_s = 7.2 \frac{R_o^{0.5933}}{V^{0.0667}} \left\{ \frac{0.5933}{\varepsilon} \left[\left(\frac{R}{R_o} \right)^\varepsilon - 1 \right] + 1 \right\}$$

$$\tau = c + \sigma_n \tan \phi$$

$$V_s = \frac{4 \pi r^3}{3}$$