

Mak-32.317 APPLIED ROCK MECHANICS FOR HARD ROCK MINING
Examination 26.10.2003, 12:00 - 15:00, Hall V1

Part 1, questions without course material

1. Select suitable rock bolt for a 6 x 5 m main ramp which will be used at least 50 years:
 - dominant rock type is granite with blocky structure
 - required minimum bolt length is 2.5 m
 - bolt spacing will vary with local conditions
 - local minor inflow of groundwater
 - some instant support and mechanized installation preferred

Explain the reasons for your selection.

Describe the structure and installation procedure of the selected bolt (12 p)

2. a) Explain the three modes of support of mine backfill. (9 p)
- b) In conventional cut and fill mining, the backfill is your working platform. What operational problems too weak backfill can produce? (3 p)

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Part 2, questions with course material

3. A stope with rectangular cross-section, with vertical walls and horizontal roof is planned in the depth of 400 m. The stope width is 18 m, height 18 m and length 45 m. The rock is gabbro-type, coarse grained with density of 3300 kg/m^3 . The in-situ horizontal/vertical stress ratio is 1.6 and the longitudinal axis of the stope is to the north. There are three joint sets (dip direction/dip):
- 250/55
 - 80/45
 - 350/20

Joint surfaces are planar, rough and slightly altered. Joint spacing is about 0.5 m and length is 1-2 m. Only minor local groundwater inflow has been observed. The RQD is 92%. The UCS for intact rock samples is 80 MPa.

- a) Estimate the stability of roof and sidewalls with Stability Graph -method. In this case, you can omit the short endwalls of the stope. (18 p)
- b) Design the cablebolting for roof and sidewalls, if needed. (6 p)
- c) Calculate the modulus of elasticity, Poisson's ratio, uniaxial compressive and tensile strength, cohesion and friction angle of the rock mass. (12 p)

