HELSINKI UNIVERSITY OF TECHNOLOGY
European Mining Course
Juha Antikainen

17.10.2002

Mak-32.317 APPLIED ROCK MECHANICS FOR HARD ROCK MINING
Examination 17.10.2002, 14:00 - 17:00, Hall V1

Part 1, questions without course material

1. Select suitable rock bolt for a 4 x 4 m sublevel drift which will be used about 3 years:
   - pyrite-rich ore with blocky structure
   - required bolt length is 2.1 m
   - 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. Explain the three modes of support of mine backfill. (12 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):

   240/55 East
   80/45 West
   350/20 Roof

   Joint surfaces are planar, rough and slightly altered. Joint spacing 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) Estimate the modulus of elasticity, Poisson's ratio and uniaxial compressive and tensile strength of the rock mass. (12 p)