

Rak-32.3510 APPLIED ROCK MECHANICS FOR HARD ROCK MINING
Examination 20.10.2006, 14:00 - 17:00, Hall V1

Part 1, questions without course material

1. Draw and explain the ground reaction and support reaction curves (12 p)

2. a) Explain the three modes of support of mine backfill. (9 p)
b) Why it is advantageous to fill the stopes as completely as possible? (3 p)

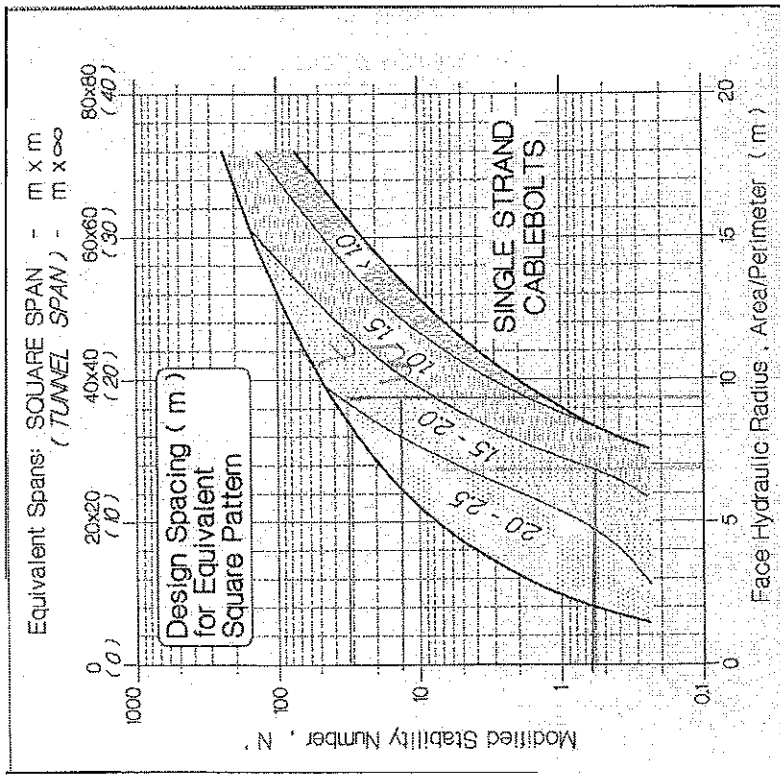
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Part 2, questions with course material

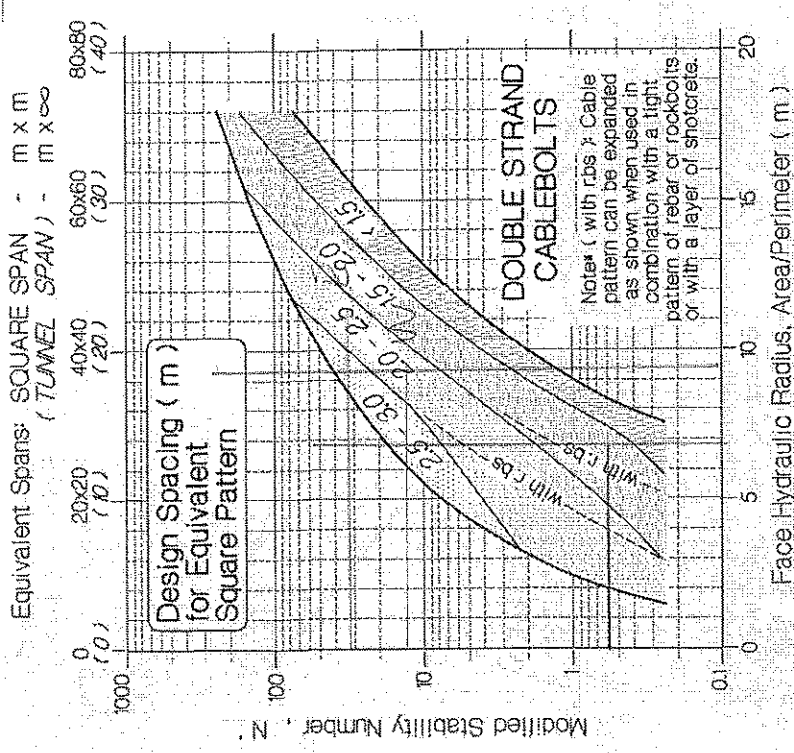
3. A stope with rectangular cross-section, with vertical walls and horizontal roof is planned in the depth of 400 m. The stope width is 18 m, height 27 m and length 60 m. The rock is gabbro-type, coarse grained with density of 3300 kg/m^3 . The in-situ horizontal/vertical stress ratio is 2 and the longitudinal 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 with aperture below 0.1 mm. Joint spacing is about 0.5 m and joint length is 1 - 2 m. Only minor local groundwater inflow has been observed. The RQD is 92%. The UCS for intact rock samples is 70 MPa.

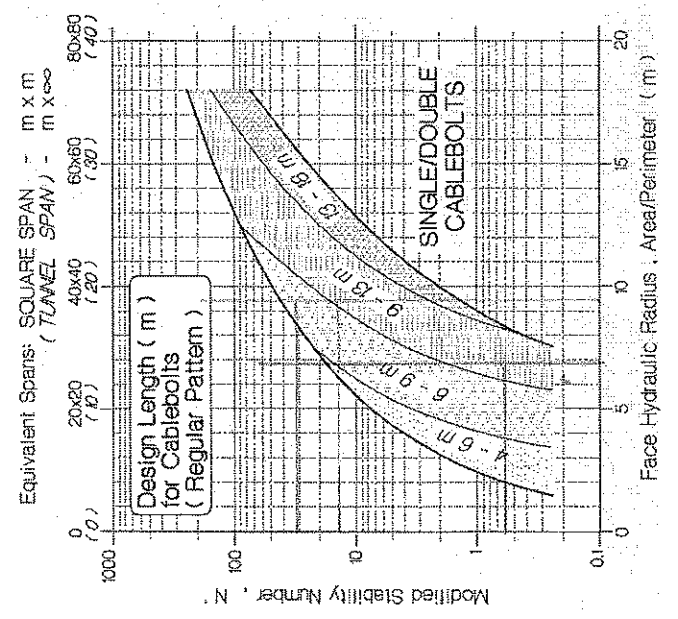
- a) Estimate the stability of roof and sidewalls with Stability Graph -method. In this case, you can omit the short endwalls of the stope. (18 p)
- b) Design the cablebolting for the roof and sidewalls, if needed. (6 p)
- c) Calculate the modulus of elasticity, Poisson's ratio, uniaxial compressive strength, tensile strength, cohesion and friction angle of the rock mass. (6 p)
- d) The stope is excavated with small scale blasting and filled with cemented backfill. One long wall of the backfilled stope will be exposed during the mining of adjacent stope. Estimate the required uniaxial compressive strength of 150 mm diameter backfill specimens. (6 p)



R 1.5m
W 1.75m
E 2.0m



R 1.75m
W 2.25m
E 2.75m



Effect of slope shape (H/W = 1, 1.5 and 2) on tangential boundary stress at the centre of boundary segment
Elastic BEM model E=50 GPa Poisson=0.25 P₂=10 MPa

