Examination

Mining Engineering 1, Underground Mining

1st attempt

16.01.2006

Name:

Please read first:

1. The maximum number of marks to score in this exam is 50. In order to pass the exam successfully a minimum score of 25 marks is necessary. The number of marks for each of the tasks is given in brackets.
2. The full number of marks for a correct answer will be achieved only when it is provided with a comprehensive solution (i.e. formulas, calculations, units marks)
3. The use of programmable calculators and supplementary material is NOT permitted.
4. This exam consists of 9 consecutively paginated sheets. Please make sure that this examination form is complete.
5. Write your name on every single page!
6. Read all questions before starting to answer.
7. Good luck and please write readable!!!

1   Mineral Economy / Mine Development (20)

1.1   (6)   Deposits of Minerals are not equally distributed and consumed over the world. Give for each of the listed commodities the annual world mining production and the three largest countries of production.

Hard Coal
(2002)

Lignite
(2002)

Gold
(2001)

1.2   (5)   In comparison to the conventional industry Mining is concerning the investment payback a long term decision. Mark on the following time axis the 5 stages in the life of a mine, name them and give a approximate typical duration.

time [a]

1.3   (4) Describe the difference between Reserves and Resources.

1.4   (5)   To access a mineral deposit the location and type of the access is to be adapted to the surface contour and the geometrical shape of the mineral deposit. Sketch and describe all of the principal ways to access a mineral deposit depending whether the contour of the surface is flat or mountainous.

2   Road Heading (15)

The supplier of a Bolter Miner tells you that his machine is capable of an advance rate of 50 m per day (Assuming 100% availability /no maintenance time/ no haulage bottle necks). For a 3.6 m high and 5 m wide roadway the rock conditions require wire mesh support with W- Straps, 5 roof bolts and on each side wall 2 rib bolts. The bolting row spacing is 1 m.

The supplier provides you with the following performance data:

<u>Cutting</u>

Single Cutting Depth:	[m]	0.5
Switch on cutter Head	[min]	0.2
Lift arm and bring machine in position	[min]	0.6
Sump in	[min]	0.5
Cutting	[min]	1.5
Move machine back to clean up	[min]	0.5
Additional loading time	[min]	0.6
Switch on bolting mode	[min]	0.4

2 X

1X

<u>Bolting:</u>

Number of roof bolting units:		2
Number of rib bolting units (one on each side)		2
Time to set one bolt (incl. drilling)	[min]	3
Set timber jack	[min]	1.5
Transport and install W-straps / wire mesh	[min]	5

2.1   (4) Calculate the required time of cutting before setting a new row of bolts.

2.2   (4) Calculate the required time to install one row of bolts.

2.3   (3) Is the machine capable to achieve the promised advance rate?

(If 3.1 is not solved take 10 min as the required cutting time per row of bolts,

If 3.2 is not solved take 20 min as the required bolting time per row)

2.4   (4) Road development can be done in the case of medium hard rock by conventional or cutting techniques. Name advantages and disadvantages.

	Cutting techniques	Conventional techniques
Advantages		
Dis-advantages		

3   Mining Methods (15)

3.1   (6) Explain the classification system for underground mining methods and give at least one example for each class of underground mining methods.

3.2 (4) A hard coal mine with a room and pillar mining method will enter a new level. Currently the pillar and room dimensions are as follows:

Pillar length: 30 m
Pillar width: 10 m
Room width: 6 m

Calculate the current exploitation rate of the mine as percentage of the whole deposit.

3.3 (5) Sketch an ore body mined by sublevel caving. Mark the steps of stope preparation and mining as well as the vertical and horizontal mining direction.