

Prince of Songkla University
Faculty of Engineering

Midterm Examination : Semester II
Date : 23 December 2003
Subject : 235-402 Geotec Mining Engin.

Academic Year : 2003
Time : 13.30-16.30 p.m.
Room : A 400

Instructions

1. There are three parts. Do all questions and answer them in the given papers and do rear papers allowed
2. All books and materials (calculator without programming capability) are allowed
3. Write your name in each page and returned all papers to controllers
4. Total scores are 147 or 30 %

Part	Question No.	Full Scores	Assigned Scores
1	1-9	27	
2	1-4	20	
3	1	20	
	2	20	
	3	20	
	4	20	
	5	20	
	Total Scores	147	

Name Surname ID

Bonne Chance et bon courage
Danupon Tonnayopas
16 Dec 2003

Part 1. Short answers the following questions (each 3 points)

1.1 Can you think of a way to obtain more representative measures of rock mass deformation at the site as opposed to intact rock testing in the lab?

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1.2 Underground construction of mines, tunnels and powerplants will relieve confining stresses to an unconfined state at the rock faces exposed by construction. What potential problems will there be during and after construction as stresses are relieved?

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1.3 The angle of internal friction (ϕ) of a rock depends on

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1.4 How does orientation of a drill hole combine with orientations of rock mass discontinuities to introduce bias into RQD percentages and interpretation of rock mass quality?

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1.5 The van shear test is performed

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1.6 Index properties is meant

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1.7 When the plasticity index of a soil is zero, it is

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1.8 The most common disturbing agent affecting the stability of a slope is

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1.9 What is considered in different between rock materials and rock mass ?

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2. Calculate or describe the following questions (each 5 points)

2.1 A soil sample (sp. gr. 2.7) has a degree of saturation of 40% at water content of 20%. The void ratio of sample is

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2.2 A borrow soil has a dry density of 1.76 t/m^3 . How many cubic metres of this soil will be required to construct an embankment (with dry density 1.68 t/m^3) of 100 m^3 .

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2.3 Calculate modulus of elasticity from test data of Chaiyapum rock salt, NX core. Its has length 0.15 m., bulk density is 2.453 g/cm^3 . P-wave travel time through core is 2.550 microsec and S-wave travel time through core is 4.960 microsec.

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2.4 Describe instrument types and applications of stress and deformation measurements in tunnel and slope stability.

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3. Calculate the following questions

3.1 Testing Carnalite cylinder 4.15 in. long and 2.10 in. diameter was done on an unconfined compression in the Table below. Determine the rock strength in MPa and calculate the tangent and secant moduli in MPa (20 points)

Load in lbs	Change in length(x0.001 in)	Load in lbs	Change in length(x0.001 in)
0	0	15000	41.1
1000	4.6	16000	43.5
2000	8.3	17000	45.9
3000	11.7	18000	48.3
4000	14.7	19000	50.7
5000	17.1	20000	53.1
6000	19.5	21000	55.5
7000	21.9	22000	57.7
8000	24.3	23000	60.3
9000	26.7	24000	62.7
10000	29.1	25000	65.1
11000	31.5	26000	67.7
12000	33.9	27000	70.1
13000	36.3	28000	74.1
14000	38.7	28500	76.4 –failure

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3.2 An underground crusher station is to be excavated in the Ordovician limestone footwall of a lead-zinc ore body and it is required to find the span which can be left unsupported. The analysis is carried out as follows:

Rock quality is good, joint sets is observed two sets, condition of joint is roughness, filled with clay gouge and large inflow of water. Stress reduction factor is medium stress.

(20 points)

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3.3 A soil has a void ratio of 0.85, $S = 40\%$ and $G_s = 2.7$. Find the water content, porosity, bulk density and dry density. By how much can the water content be increased without changing γ_d ? (20 points)

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3.4 Data for wedge problem consists of joint No 1 is $330^{\circ}/40^{\circ}$, joint No. 2 is $050^{\circ}/46^{\circ}$, cut slope is $003^{\circ}/40^{\circ}$, friction angle 45° (for each joint). Examine the slope is stable or unstable. (20 points)

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3.5 Constructing Mohr diagram for triaxial data for granite tests given below.

Rock test data-granite (stresses in psi1000)

	σ_1	σ_3
Test 1	31.0	0
Test 2	45.0	2
Test 3	67.2	5

Compare the graphic and calculated value for obtained in this test. Which do you think is more accurate and why? (20 points)

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