Prince of Songkla University

Faculty of Engineering

Final Examination: Semester I
Date: October 7th, 2009
Subject: 235–402 Geotecniques

Academic Year: 2009
Time: 01.30-04.30 p.m.
Room: S 203

Instructions

1. This is a closed examination, attempts question (5) in total 9 pages.
2. Answer all questions in the given papers and do rear papers allowed
3. Dictionary or electronic-dictionary, calculator without memory program and necessary stationary are allowed
4. Write your name in each page and returned all papers to controllers
5. Total scores are 135 or 35% of subject.

Part	No.	Full Scores	Assigned Scores
1	1	25	
2	2	30	
	3	25	
	4	40	
	5	15	
Total scores		135	

"ทุจริตในการสอบ โทษขั้นต่ำปรับตกในรายวิชานั้น และพักการเรียน 1 ภาคการศึกษา สูงสุด ให้ออก"

Name ..... **Surname** ..... **ID** .....

Bonne Chance et bon courage
Danupon Tonnayopas
Instructor
26 Sept 2009

Name ..... *Surname* ..... *ID* .....

Part 1. Answer these questions in brief. (each 5 points)

1. What is pozzolan and how benefit for shotcrete?

Ans:.....

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2. What are developments in shotcrete technology in recent years and indicate samples?

Ans:.....

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3. What are the different between wet mix shotcrete and dry mix shotcrete systems?

Ans:.....

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4. Describe of types of the rock bolts?

Ans:.....

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5. What is the soil nail and process of installing it?

Ans:.....

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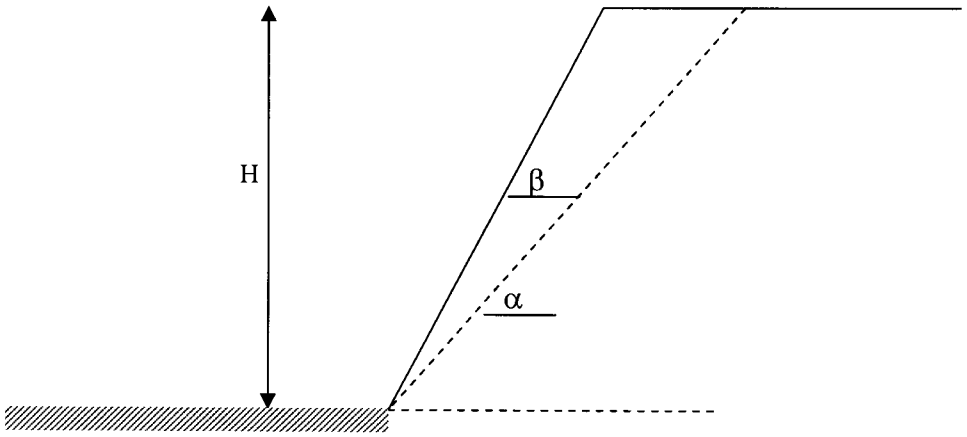
Part 2. Calculate each question in details.

2. Given the possible planar block slide shown in the sketch with $\alpha = 35°$, $\beta = 45°$, c = 0.207 MPa, $\phi = 28°$, $\gamma = 24.7$ kN/m^3, H = 122 m, determine the slope safety factor. Further suppose a seismic force in a zone where the seismic coefficient is 0.10. Determine the safety factor. (30 point)



Solution

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3. Find the depth of the subsurface layer in a ore deposit area, the following measuring were obtained from refraction seismic records? (25 points)

Geophone #	Distance, m	Time, msec.
1	1.5	2.5
2	3.0	5.2
3	5.0	8.8
4	7.0	9.8
5	8.0	10.8
6	10.0	12.0
7	12.0	13.3
8	13.0	14.2
9	15.0	15.5
10	17.0	16.6
11	19.0	17.4
12	20.0	17.9
13	21.0	18.4
14	23.0	19.3

4. A view from Kho Hong overlook toward a potential plane failure in a road cut slope in 9 m high of meta-phyllite. Average structural details in below.

   1. Cut slope face orientation = 180°/80°.

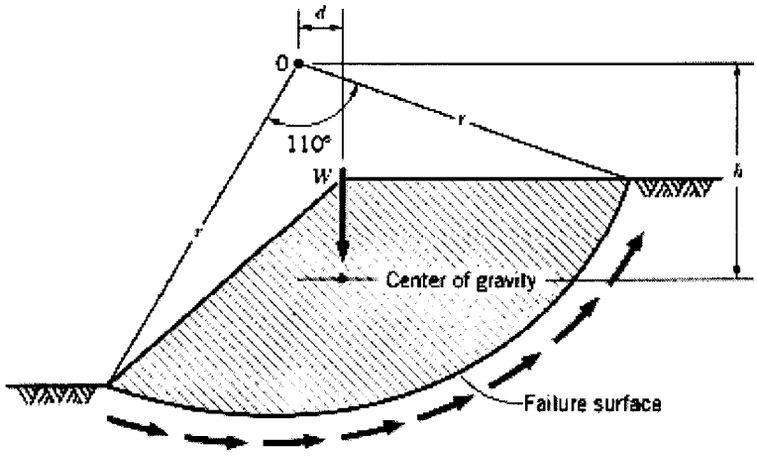
   2. Upper slope = 180°/20°.

   3. S_2 foliation = 230°/70°.

   4. S_3 foliation = 140°/70°.

   To analyses slope stabilities by stereo-net method. If friction angle of rock slope (ϕ) = 35°, cohesion = 0. Unit weight of meta-phyllite = 2,723 kg/m^3. Calculate these values produced a factor of safety. (40 points)

5. A cut slope of clay is shown below, assume the following data W = 3,600 kN, r = 15 m, d = 3.3 m, c = 32 kN/m^2, and ϕ = 0. Determine the safety factor against sliding on the circular surface shown. (15 points)



Available Equations

$$X = \frac{\sin\theta_{24}}{\sin\theta_{45}.\cos\theta_{2na}} \quad ; \qquad Y = \frac{\sin\theta_{13}}{\sin\theta_{35}.\cos\theta_{1nb}} \qquad A = \frac{\cos\psi_a - \cos\psi_b.\cos\theta_{na.nb}}{\sin\psi_5.\sin^2\theta_{na.ab}} \quad ;$$

$$B = \frac{\cos\psi_b - \cos\psi_a.\cos\theta_{na.nb}}{\sin\psi_5.\sin^2\theta_{na.nb}} \qquad Z_2 = \frac{x_2}{2}\sqrt{\left(\frac{V_3 - V_2}{V_3 + V_2}\right)} + Z_1\left[\frac{V_3\sqrt{V_2^2 - V_1^2} - V_2\sqrt{V_3^2 - V_1^2}}{V_1\sqrt{V_3^2 - V_2^2}}\right]$$

$$\rho = \pi\left(L^2 / 2l\right)R \quad ; \qquad \rho = 2\pi a.R$$

$$F = \frac{c.\mathrm{A} + (\mathrm{W}\cos\psi_p - \mathrm{U} - \mathrm{V}\sin\psi_p)\tan\phi}{\mathrm{W}\sin\psi_p + \mathrm{V}\cos\psi_p}; \qquad F = \frac{c}{\gamma_{sat}\mathrm{T}\cos^2\beta.\tan\beta} + \frac{\gamma_{sat} - \gamma_w}{\gamma_{sat}}\frac{\tan\phi}{\tan\beta}$$

$$\mathrm{A} = \frac{(\mathrm{H} - \mathrm{z})}{\sin\psi_p} \qquad ; \qquad \mathrm{U} = \tfrac{1}{2}\gamma_w z_w.\mathrm{A}$$

$$\mathrm{V} = \tfrac{1}{2}\gamma_w.z_w^2 \qquad : \qquad z = \mathrm{H}.\left(1 - \sqrt{\cot\psi_f.\tan\psi_p}\right)$$

$$b = \mathrm{H}.\left(\sqrt{\cot\psi_f.\cot\psi_p} - \cot\psi_f\right)$$

$$\mathrm{W} = \tfrac{1}{2}\gamma_r.\mathrm{H}^2\left\{\left[1 - \left(\frac{Z}{\mathrm{H}}\right)^2\right]\cot\psi_p - \cot\psi_f\right\}$$

$$\mathrm{W} = \tfrac{1}{2}\gamma.\mathrm{H}^2\left\{\left(1 - \frac{\mathrm{Z}}{\mathrm{H}}\right)^2\cot\psi_p\left(\cot\psi_p.\tan\psi_f - 1\right)\right\}$$

$$F = \frac{c\mathrm{A} + \left(\mathrm{W}\cos\psi_p - \mathrm{U} - \mathrm{V}\sin\psi_p + \mathrm{T}\cos\theta\right)\tan\phi}{\mathrm{W}.\sin\psi_p + \mathrm{V}.\cos\psi_p - \mathrm{T}\sin\theta}$$

$$F = \frac{c\mathrm{A} + \left\{\mathrm{W}(\cos\psi_p - \alpha\sin\psi_p) - \mathrm{U} - \mathrm{V}\sin\psi_p\right\}\tan\phi}{\mathrm{W}\left(\sin\psi_p + \alpha\cos\psi_p\right) + \mathrm{V}\cos\psi_p} \quad ; \qquad \mathrm{U} = \tfrac{1}{4}\gamma_w\frac{\mathrm{H}_w^2}{\sin\psi_p}$$

$$t_i = \frac{2Z_1.\sqrt{V_2^2 - V_1^2}}{V_1V_2} \qquad Z_1 = \frac{x_c}{2}.\sqrt{\left(\frac{V_2 - V_1}{V_2 + V_1}\right)}$$

$$\mathrm{W} = \tfrac{1}{2}\gamma_r.\mathrm{H}^2\left(\cot\psi_p - \cot\psi_f\right)$$

$$F = \frac{cA}{W\sin\alpha} + \cot\alpha.\tan\phi \quad ; \qquad F = \frac{cLr}{Wx}$$

Name ..... *Surname* ..... *ID* .....