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EXAM # 2 (11-8-1416)

QUESTION 1

- (a) List three disadvantages of the direct shear test.
- (b) How would you recommend the shear strength be determined for the following design situations, undrained (UU) or drained (CD):
- (i) Foundation on a soft, saturated normally consolidated clay.
 - (ii) Foundation on a loose, saturated sand.
 - (iii) Long-term stability of a foundation on an overconsolidated clay.

QUESTION 2

A normally consolidated clay sample is tested in a consolidated-undrained triaxial compression test. The sample fails when the total all-around confining pressure is 45 kN/m^2 and the deviator stress ($\sigma_1 - \sigma_3$) is 52 kN/m^2 . At failure, the recorded pore water pressure is 20 kN/m^2 .

- (a) Sketch the Mohr's circles at failure for both total and effective stresses and compute:
- (i) c_{cu} and ϕ_{cu}
 - (ii) c_d and ϕ_d
 - (iii) A_f
- (b) Determine the deviator stress ($\sigma_1 - \sigma_3$) at failure for an identical sample at an all-around confining pressure of 75 kN/m^2 .

QUESTION 3

- (a) What inclination is required to have a factor of safety of 1.2 for a slope 30 m high to be cut in an area where uniform soils exist with $c_u = 106 \text{ kN/m}^2$ and $\gamma = 17 \text{ kN/m}^3$? A rock stratum exists 60 m below the ground surface.
- (b) What type of failure circle is likely to occur?