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Total No. of Pages : 02

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M.Tech.(Soil Mechanics and Foundation Engineering)/(Geo Technical Engineering) (2013 Batch) (Sem.–2)

SHEAR STRENGTH OF SOILS

Subject Code : CESE-6

Paper ID : [A2666]

Time : 3 Hrs. **Max. Marks : 100**

INSTRUCTION TO CANDIDATES :

1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**

Q.1 a) What are the black cotton soils and laterite? What are their special properties? Why the black cotton soils are expansive?

b) What are murrum and kankar? How are they formed and what are their uses? (10,10)

Q.2 a) What is the difference between frictional strength and cohesive strength? Describe the two ways in which the measured cohesion of a sand can be non-zero.

b) List and discuss in detail the factors which influence the frictional strength of soils. (10,10)

Q.3 a) The angle of shearing resistance in terms of total stresses for aclay as obtained from a UU test is zero. Does this mean that the strength of clay cannot be attributed to friction?

b) A CU test was conducted on a soil sample with cell pressure of 1kg/ cm^2. The deviator stress was observed to be 0.6kg/cm^2.The soil is known to have effective strength parameters as c=0 and ϕ = 30° and a c_{Cu}=0 and ϕ_{Cu}=13.3°. What was the pore water pressure at failure? (8,12)

Q.4 a) What is the significance of pore pressure coefficients? How are the pore pressure parameters determined?

b) In a triaxial test a soil specimen was consolidated under an all-round pressure of 800kN/m^2 and a back pressure of 400kN/m^2. Thereafter under un-drained conditions the all-round pressure was raised to 900kN/m^2, resulting in a pore water pressure of 495kN/m^2, then axial load was applied to give a principal stress difference of 585kN/m^2 and a pore water pressure of 660kN/m^2. Calculate the values of pore pressure coefficients A and B. (8,12)

Q.5 An oil tank is to be constructed on a deposit of saturated clay. In an oil tank the main load consists of the weight of oil, oil is pumped into the tank from some source and the filling process is quite rapid. For investigating the foundation for bearing capacity failure discuss :

a) What strength parameters or shear strength is relevant and why?

b) What tests will provide this relevant property?

c) On what soil samples would these tests be run? (20)

Q.6 Draw and discuss in detail for a normally consolidated saturated soil, the failure envelopes in terms of total stress and effective stress for the UU, $\overline{CU}$ and CD tests. (20)

Q.7 The pre consolidation stress for a clay soil was determined to be 300kN/m^2 from consolidation tests. Two samples of this clay were tested under CU conditions in triaxial compression and the following results were recorded :

Specimen No.	σ'_c (kN/m^2)	$(\sigma_1 - \sigma_3)_f$ (kN/m^2)	U_f (kN/m^2)
1	50	175	5
2	500	420	300

Determine the value of A_f for both tests. Draw the Mohr circles at failure for both total and effective stresses. What is the value of Φ for the normally consolidated range and values of c' and Φ for the over-consolidated range.

Q.8 Write short notes on :

a) Difference between normally consolidated and over consolidated soils.

b) Factors affecting parameters A and B.

c) Effect of water content on effective strength in sandy soils.

d) Variation of pwp with strain in loose and dense sand on shearing. (4×5=20)