KERALA AGRICULTURAL UNIVERSITY

B.Tech.(Agri. Engg) 2017 Admission
IV Semester Final Examination- June 2019

Lwre.2205

Soil Mechanics (2+1)

Marks: 50
Time: 2 hours

Fill in the blanks. **(10x1=10)**

1 Darcy's law is valid when the flow through soils is .....
2 In the friction circle method, the forces considered are .....
3 A soil is said to be non-plastic when its plasticity index = ...
4 A pycnometer is used to determine .....
5 A steep grain size distribution curve represents ..... -graded soil.

State True/False

6 The neutral stress at the water table in a soil is zero.
7 Water content of soil can never be greater than 100 %.
8 Vane shear test is suitable for sensitive clays.
9 To effectively compact chunks of clay, the roller to be used is smooth-wheel.
10 If the time required for 50% consolidation of a remoulded sample of clay with single drainage is '*t*', then the time required to consolidate the same sample of clay with same degree of consolidation but with double drainage is '*t/4*'.

Write short notes on ANY FIVE **(5x2=10)**

1 Structure of Kaolinite.
2 Derive a correlation among γ_{sat}, γ, γ_d and S_r.
3 Determine the degree of saturation of a soil in natural state if its void ratio (e) = 0.75, water content (w) = 20% and specific gravity (G) = 2.67.
4 Factors affecting compaction. How density can be controlled in the field?
5 Characteristics and applications of Flow net.
6 The coefficient of permeability of a soil sample is found to be $1x10^{-3}$ cm/sec at a voids ratio of 0.4. Estimate its permeability at a voids ratio of 0.6.
7 Coefficient of compressibility and coefficient of consolidation.

Answer any FIVE of the following. **(5x4=20)**

1 The values of liquid limit, plastic limit and shrinkage limit of a soil were reported as: w_L=60%, w_P=30%, w_S=20%. If a sample of this soil at liquid limit has a volume of 40cc and its volume measured at shrinkage limit was 23.5cc, determine the specific gravity of the solids.
2 Corrections to be applied to hydrometer readings.
3 A sample of sand above water table was found to have a natural moisture content of 15% and a unit weight of 18.84 kN/m^3. Laboratory tests on a dried sample indicated values of e_{min}=0.50 and e_{max}=0.85 for the densest and loosest states respectively. Compute the degree of saturation and the relative density. Assume G = 2.65.
4 Advantages of triaxial compression test over the direct shear test.

P.T.O

5 During a consolidation test, a sample of fully saturated clay 3.00cm thick is consolidated under a pressure increment of 200 kN/m^2. When equilibrium is reached, the sample thickness gets reduced to 2.60cm. The pressure is then removed and the sample is allowed to expand and take water. The final thickness is observed as 2.80cm and the final moisture content is determined as 24%. If the specific gravity of the soil solids is 2.70, find the void ratio of the sample before and after consolidation.

6 Show how the average permeability of stratified soil deposits depends upon the direction of flow with relation to the direction of the bedding planes.

7 In a falling head permeability test, the time taken for the head to fall from h_1 to h_2 is t. If the test is repeated with the same initial head, what would be the final head in a time interval of t/2 ?

IV **Answer any ONE of the following** **(1x10=10)**

1 Different modes of earth slope failure. Describe Swedish slip circle method.

2 Determine the lateral earth pressure at rest per unit length of the wall shown below. Also determine the location of the resultant earth pressure. Take $K_0 = 1 - \sin \phi'$ and $\gamma_w = 10\ kN/m^3$.

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