SV-41

Total No. of Pages : 4

Seat No.	

T.E. (Civil) (Part - I) (Semester - V) (Revised) Examination, May -2019

GEOTECHNICAL ENGINEERINE - I

Sub. Code : 66238

Day and Date : Monday, 6 - 05 - 2019 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make assumptions wherever necessary.**
4) **Use of non-programmable calculator is allowed.**

SECTION - I

Q1) Answer the following.

a) Derive the relation for unit weight of partially saturated soil in terms of specific gravity of soil solids, void ratio, degree of saturation and unit weight of water. **[6]**

b) Explain Casagrande's laboratory method for determination of liquid limit. **[6]**

c) 50 gm of oven dried soil passing 75 micron sieve was taken in a hydrometer analysis. The corrected hydrometer reading in 1000 ml soil suspension at 2 minute elapsed interval ws 25. The effective depth corresponding to above hydrometer reading is 12.1 cm. Considering specific gravity and poisson's ratio as 2.7 and 0.01 poise Calculate particle size in mm and percent finer of the soil. **[6]**

OR

A soil has liquid limit 22%, plastic limit 15%, flow index 12% and natural water content as 20%. Determine the plasticity index, toughness index, liquidity index and the relative consistency. **[6]**

P.T.O.

Q2) Answer the following.

a) Explain laboratory method for determination of coefficient of permeability for coarse grained soil with equation and sketch. **[8]**

b) Calculate effective stress, pore water pressure and total stress at 6 m. below ground level where water table is 3 m below ground level. Properties of the soil as below, Dry unit weight of soil - 16.5 KN/ cu.m, moisture content of the soil above water table - 15% and specific gravity of soil - 2.7. **[8]**

OR

During a pumping out test observation wells and a test well were sunk through strata of dense soil 10 m deep overlying on impervious strata. Observation wells were drilled at 15 m and 6.75 m from the test well. Initially the water level was 2.5 m below the ground level. After pumping until steady condition had been achieved the water level in the observation wells had dropped 0.50 m and 1.95 m. If the steady discharge was 9 lit/ sec through test well. Determine the coefficient of permeability of soil. **[8]**

Q3) Answer the following.

a) Explain **[10]**

i) Proctor theory of compaction.

ii) Normally consolidated and Over consolidated soil.

OR

Explain laboratory method for determination of consolidation characteristics by fixed ring type consolidometer with sketch. **[10]**

b) The maximum dry density of a soil sample by the standard proctor compaction test is 1.78 gm/ cu.cm and optimum moisture content of 15%. Find porosity due to air and the degree of saturation if specific gravity is 2.67. What would be the corresponding value of zero air void dry density at optimum moisture content? **[6]**

SECTION - II

Q4) Answer the following.

a) State assumptions made in the Westergaards theory. [6]

OR

Explain Newmark's chart and its application. [6]

b) A concentrated load of 30 kN acts on the ground surface. Find the stress intensity at a depth of 8 m and at a horizontal distance of 6m. Use Boussinesq's equations. [6]

c) Determine the vertical stress intensity at a depth of 5 m below the center of a rectangular loaded base 3 m X 4 m, carrying a loading of 200 kN/m^2, using equivalent point load method. [6]

Q5) Answer the following.

a) What are the three standard triaxial shear test w.r.t. drainage conditions? Explain with reasons the situations for which test are to be performed. [6]

b) A consolidated undrained triaxial test was conducted on a normally consolidated clay yielding the following data: [10]

cell pressure = 250 kN/m^2 deviator stress = 275 kN/m^2.

Determine

i) The angle of friction

ii) Angle which the failure plane makes with the major principal plane and

iii) Normal stress and shear stress on the failure plane.

OR

Two identical soil specimens were tested in a triaxial apparatus. First specimen failed at a deviator stress of 770 kN/m^2 when the cell pressure was 200 kN/m^2. Second specimen failed at a deviator stress of 1370 kN/m^2 when the cell pressure was 400 kN/m^2. Determine the shear strength parameters of the soil by analytical method. If the same sample is tested in a direct shear apparatus with a normal stress of 600 kN/m^2. Estimate the shear stress at failure. [10]

Q6) Answer the following.

a) What are the different types of earth pressure and state the assumptions made in the Rankine's earth pressure theory. **[8]**

b) Compute the intensities of active and passive earth pressure at a depth of 6 m in dry cohesionless sand with an angle of internal friction of 30° and unit weight of 18 kN/m^3. What will be the intensities of active and passive earth pressures if the water level rises to the ground level? Take saturated unit weight of sand as 22 kN/m^3. **[8]**

OR

A retaining wall of 6 m height supports earth with its face vertical. The earth is cohesionless with specific gravity 2.69, = 35° and porosity 40.5%. The earth surface is horizontal and level with the top of the wall. Determine the active earth thrust and its point of application on the wall if the earth is water logged to level 2.5 m below the top surface. Neglect wall friction. Draw the pressure diagrams. **[8]**

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