Seat No. 24070

Total No. of Pages : 3

T.E. (Civil) (Part - I) (Semester - V) Examination, December - 2014
GEOTECHNICAL ENGINEERING - I (Revised) (New)
Sub. Code : 45537

Day and Date : Tuesday, 09 - 12 - 2014

Time : 02.30 p.m. to 05.30 p.m.

Total Marks : 100

Instructions :
1) Question No. 1 from Section - I and Question No. 5 from Section II are compulsory. Attempt any two questions from the remaining in each Section.
2) Figures to the right indicate full marks.
3) Make assumptions wherever necessary.
4) Use of non-programmable calculator is allowed.

SECTION - I

Q1) All questions are compulsory :-

$[3 \times 6 = 18]$

a) Derive an expression for dry unit weight of soil in terms of porosity due to air, specific Gravity, unit weight of water, water content.

b) Explain plasticity chart with sketch. What is the use of it in I.S. classification of soil.

c) Enlist and explain factors affecting permeability.

Q2) a) Sketch a graph showing variation of volume of soil with respect to water content, explain salient features in it in accordance with consistency limits. **[8]**

b) Calculate effective stress, pore pressure and total stress at 6 Mt. below ground level where water table is at 3 Mt. below ground level. For following properties of soil, Dry unit weight of soil 16.5 KN/cu. Mt., moisture content of soil above water table 15% and Sp. Gravity of soil 2.7. **[8]**

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Q3) a) List the methods for determination of coefficient of consolidation. Explain any one time fitting method with appropriate sketches. **[10]**

b) Flow net is developed for a homogenous earthen dam, related data is as below,

Total head causing seepage - 15 meter.

Length of dam – 75 meter.

No of potential drops – 12

No of flow channels – 10

Coefficient of permeability for the material of the dam – 5.6×10^{-5} cm/sec. Determine the seepage loss in cubic meters per day per meter of dam. **[6]**

Q4) a) What is mean by field compaction control? Explain any one method. **[8]**

b) A falling head permeability test is to be performed on a soil sample whose permeability is 9.2×10^{-3} cm/s. What diameter of stand pipe should be used if the head is to drop from 27.5cm to 20 cm in 4 minutes. The cross sectional area and length of soil sample are 12 sq. cm and 10 cm respectively. Will it take the same time for the head drop from 37.5 cm to 30 cm. **[8]**

SECTION - II

Q5) All questions are compulsory :- **[4 × 5 = 20]**

a) State the assumptions made in Westergards analysis in stress distribution.

b) Write the applications of shear strength parameters in the field.

c) Discuss the classification of shear test based on drainage conditions.

d) What are the different types of earth pressure? Give examples.

Q6) a) Discuss the use of Newmark's influence chart. [6]

b) A concentrated load 10 kN acts on the surface of a soil mass. Use Boussinesq analysis find the vertical stress and shear stress at points.

i) 3m below the surface on the axis of loading and

ii) At radial distance of 2 m from the axis of loading but at same depth of 3 m [9]

Q7) a) Explain Mohr-Coulomb failure theory. [6]

b) A consolidated drained test is performed on a sand sample with a cell pressure of 100 kPa. The sample fails at a deviator stress of 200 kPa. Determine the inclination of the failure plane (α_f), angle of shearing resistance (φ'_f), and maximum shear stress(τ_{max}). [9]

Q8) a) Discuss Coulombs wedge theory. [6]

b) A retaining wall with a smooth vertical back retain a two layer dry cohesionless backfill with the following properties.

$0-4$ m depth $c=0$, $\phi=30°$: $\gamma = 17$ kN/m^3

$4-8$ m depth $c = 0$, $\phi = 34°$: $\gamma = 20$ kN/m^3

Determine the total lateral earth force acting on the wall and its line of action. [9]

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