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53 (CE 403) GTEN

2019

## GEOTECHNICAL ENGINEERING

Paper : CE 403

Full Marks : 100

Time : Three hours

**The figures in the margin indicate full marks for the questions.**

Answer **any five** questions out of six.

- (a) What do you understand by phase diagram of soil? Explain with suitable figures three phase and two phase system of soil.  $4+6=10$

(b) Explain briefly wet sieve and hydrometer analysis of classification of soil. What are the main differences among uniformly graded, well graded, and poorly graded soil?  $4+4+2=10$

Contd.

2. (a) What are the basic constituents of soil minerals? Explain with suitable figures Tetrahedral Silica unit and Octahedral Gibbsite unit. 4+6=10

(b) What is Darcy's law of permeability? Explain the various factors effecting permeability. 3+7=10

3. (a) What is the main difference between compaction and consolidation of soil? Explain the standard proctor compaction test to determine the Maximum Dry Density (MDD) and Optimum Moisture Content (OMC) of a soil. 3+7=10

(b) A 5 m thick saturated soil stratum has a compression index of 0.25 and coefficient of permeability  $3.2 \times 10^{-3}$  mm/sec. If the void ratio is 1.9 at vertical stress of  $0.15 \text{ N/mm}^2$ , compute the void ratio when vertical stress is increased to  $0.2 \text{ N/mm}^2$ . Also calculate settlement due to above stress increase and time required for 50% consolidation. 10

4. (a) What are the different types of shear test used in laboratory to determine, the cohesion and angle of internal friction of soil? Briefly explain the unconsolidated undrained (UU) and consolidated undrained (CV) test. 5+5=10

(b) Explain Active and Passive earth pressure of soil. Derive the expression for coefficients of earth pressure at (a) Rest condition (b) Active condition (c) Passive condition. 4+6=10

5. (a) Explain Standard Penetration Test (SPT) for soil exploration, involved in a S.P.T. test. Briefly explain each correction. 6+4=10

(b) With the help of suitable assumptions, draw a Borehole log chart/Borelog and show different components on it. (Assume N-value, soil layers etc.) 10

6. (a) What is consistency of soil? Explain with suitable figures different consistency limit of soil. 3+7=10

(b) With suitable figures, explain the constant head and falling head permeability test for determination of coefficient of permeability. 5+5=10

