BTS(C) – V – 08 – 056 – J

B. Tech Degree V Semester Examination, November 2008

CE 501 A/B GEOTECHNICAL ENGINEERING I

(2002 Scheme)

Time : 3 Hours Maximum Marks : 100

I. (a) Define the terms porosity, degree of saturation, air content, dry density and submerged mass density. (5)

(b) Describe oven drying method for the determination of water content of a soil sample in a laboratory. (5)

(c) In a compaction test on a soil, the mass of wet soil when compacted in the mould was 1.855 kg. The water content of the soil was 16% . If the volume of the mould was 0.945 litres, determine the dry density, voids ratio, degree of saturation and percentage air voids. Take G = 2.68. (10)

OR

II. (a) Differentiate between :

(i) Liquidity index and consistency indices
(ii) Flow index and toughness index
(iii) Plasticity and consistency
(iv) Activity and sensitivity (8)

(b) What are the six different types of soil structures which can occur in nature? Describe in brief. (12)

III. (a) List out the two methods for determination of the coefficient of permeability in a laboratory. Discuss their limitations. (12)

(b) Discuss the eight factors that affect permeability of soils. (8)

OR

IV. (a) Describe the soil method and electrical analogy method of flow net construction. (10)

(b) A sandy layer 10m thick overlies an impervious stratum. The water table is in the sandy layer at a depth of 1.5m below the ground surface. Water is pumped out from a well at the rate of 100 litres per second and the draw down of the water table at radial distance of 0.3m and 25.0m is 3.0 and 5.0m respectively. Determine the coefficient of permeability. (10)

V. (a) What is the coefficient of consolidation? What is its use in the settlement analysis? How is it determined? (10)

(b) Differentiate between compaction and consolidation. (10)

OR

VI. (a) A sample of soil was prepared by mixing a quantity of dry soil with 10% by mass of water. Find the mass of this wet mixture required to produce a cylindrical, compacted specimen of 15 cm diameter and 12.5 cm deep and having 6% air content. Find also the void ratio and the dry density of the specimen if G = 2.68. (10)

(b) Define the following terms :

(i) Coefficient of compressibility (ii) Coefficient of volume change
(iii) Compression index (iv) Expansion index
(v) Recompression index (10)

VII. (a) Describe the triaxial shear test. What are the advantages of triaxial shear test over the direct shear test? (10)

(b) Discuss the shear characteristics of cohesion less soil and cohesive soil. (10)

OR

VIII. (a) Discuss the modified failure envelop. What are its advantage and disadvantages over the standard failure envelop? (10)

(b) What is Mohr's circle? Discuss the important characteristics. (10)

IX. (a) What are the different methods of compaction adopted in the field? How would you select the type of roller to be used? (10)

(b) What is a compaction curve? Give its salient features. What is a zero-air void line? (10)

OR

X. (a) Describe standard proctor test and modified proctor test. (10)

(b) How is slope is analysed using Swedish circle method? Derive an expression for the factor of safety. (10)

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