[4857]-1003

S.E. (Civil) (First Semester) EXAMINATION, 2015

GEOTECHNICAL ENGINEERING

(2012 PATTERN)

Time : Two Hours　　　　　　　　　**Maximum Marks : 50**

N.B. :— (i)　Answer Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**; Q. No. **5** *or* Q. No. **6** and Q. No. **7** *or* Q. No. **8**.

(ii)　Neat diagrams must be drawn wherever necessary.

(iii)　Figures to the right indicate full marks.

(iv)　Use of calculator is allowed.

(v)　Assume suitable data if necessary.

1. (a)　Derive with usual notations :　　　　　　　　[6]

$$\rho = \frac{(1 + \omega)\, G\, \rho_\omega}{(1 + e)}$$

(b)　In a falling head permeameter a soil sample with 75 mm in diameter and 55 mm in length was tested. At the commencement of the test, the initial head was 80 cm and after one hour, the head was 40 cm. Find the coefficient of permeability if the diameter of stand pipe is 1 cm.　　　　　　[6]

Or

2. (a)　A partially saturated soil from an earth fill has a natural water content of 19% and bulk unit weight of 19.33 kN/m³. Assuming the specific gravity of soil solids as 2.6, calculate the degree of saturation, void ratio and porosity.　　　　[6]

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(b) Discuss the factors that influence permeability of soils with relations. [6]

3. (a) Explain how the shear tests are conducted with different drainage conditions and the loading conditions. [6]

(b) Explain standard proctor compaction test with neat sketch. [6]

Or

4. (a) A concentrated load of 300 kN is applied at the ground surface. Compute the vertical pressure : [6]

(i) at a depth of 6 m below the load

(ii) at a distance of 5 m at the same depth.

(b) Describe the vane shear test for measuring in-situ shear strength of soils. Why is it used only in soft sensitive clays ? [6]

5. (a) In a cohesionless soil deposit having unit weight of 15 kN/m^3 and angle of internal friction ϕ of 30°. Determine the active and passive lateral pressure intensities at depth of 10 m. [7]

(b) Define earth pressure at rest. Show that the coefficient of lateral earth pressure at rest K_0 is given by : [6]

$$K_0 = \frac{\mu}{1 - \mu}$$

Or

6. (a) Determine the active thrust on retaining wall when uniform surcharge acts on the ground surface above cohesionless backfill. [7]

(b) What is Coulomb's wedge theory ? Compare Rankine's theory and Coulomb's theory. [6]

7. (*a*) Explain how soil acts as a geochemical trap and state the various remediation techniques. [7]

(*b*) Derive the expression for factor of safety for dry infinite slope and submerged infinite slope in sandy soils. [6]

Or

8. (*a*) Explain how the transportation of the contaminant occurs and describe the vacuum extraction process. [7]

(*b*) State the assumptions in the analysis of slope stability and also state the different types of landslides on clay slopes. [6]