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**, Q. No. **7** or Q. No. **8**.

(ii) Figures to the right indicate full marks.

(iii) Use of logarithmic tables, slide rule, Mollier charts, electronic

pocket calculator and steam tables is allowed.

(iv) Assume suitable data if necessary.

(v) Neat diagrams must be drawn wherever necessary.

1. (a) Starting from first principles derive the following equations

with usual nomenclature :　　　　　　　　　　[6]

$$\gamma = \frac{(G + eS_r)\gamma_\omega}{(1 + e)} .$$

(b) Explain with diagram a method for determining coefficient of

permeability 'K' for clayey soils in the laboratory.　　[6]

P.T.O.

2. (*a*) On a single graph paper, draw neat labelled graphs for : [6]

   (*i*) Uniformly graded soil

   (*ii*) Well graded soil

   (*iii*) Gap graded soil

   (*iv*) Show on the same graph, zones of clay size, silt size, sand and gravel clearly.

   (*b*) State the applications of flownet and explain how seepage through a dam can be determined using flow net. (State the equation and terms involved in it). [6]

3. (*a*) Write a note on Vane Shear Test with neat sketch and the formulae involved. [6]

   (*b*) A load 1000 kN acts as a point load at the surface of a soil mass. Estimate the stress at a point 3 m below and 4 m away from the point of action of the load by Boussinesq's formula. Compare the value with the result from Westergaard's theory. [6]

4. (*a*) Draw a curve showing the relation between dry density and moisture content for Standard Proctor test and indicate the salient features of the curve. [6]

(*b*) Define total and effective stress.

Determine the shear strength in terms of effective stress on a plane within a saturated soil mass at a point where the total normal stress is 200 kN/m^2 and the pore water pressure is 80 kN/m^2. The effective stress shear strength parameters for the soil are $c' = 16$ kN/m^2 and $\Phi' = 39°$. [6]

5. (*a*) Describe Rehbann's construction for determination of earth pressure with neat sketch. [7]

(*b*) Derive the expression for the active state of pressure at any point for a submerged cohesionless backfill along with pressure diagrams. [6]

6. (*a*) Explain how surcharge will affect earth pressure for cohesionless and cohesive soils in active state with pressure diagrams. [7]

(b) A smooth vertical wall retains a level surface with $\gamma = 18$ kN/m^3, $\phi = 30°$, to a depth of 8 m. Draw the lateral pressure diagram and compute the total active pressure in dry condition and when water table rises to the GL. Assume $\gamma_{sat} = 22$ kN/m^3. [6]

7. (a) Write short notes on causes and remedial measures of Landslides. [7]

(b) Explain controlling techniques for subsurface contamination. [6]

Or

8. (a) What is slope stability and how are the different types of factor of safety determined ? [7]

(b) Discuss sources and types of ground contamination. [6]