Seat No.

[4957]-1003

S.E. (Civil) (First Semester) EXAMINATION, 2016

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*) 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*) Explain any *one* method to determine the field density of soil with a neat sketch.   [6]

(*b*) A permeameter of 80 mm diameter with a sample length of 300 mm has been used for constant head tests. While conducting a constant head test the loss of head was 1150 mm for a length of 250 mm and the rate of flow was 2700 mm³/sec. Find the coefficient of permeability in mm/sec.   [6]
If a falling head test was performed on the same sample at the same void ratio, find the time taken for head to fall from 900 to 450 mm. The diameter of stand pipe is 25 mm in the falling head test.

P.T.O.

2. (*a*) Explain quick and phenomenon with a neat skecth and state the equation of critical hydraulic gradient [6]

(*b*) If W_L = 65%, Wp =35%, natural water constant = 45%, determine flow index, liquidity index, consistency index, toughness index. Assume number of jerks for the determination of liquid limit by Casagrande's method, as 48 when water content was 32%. [6]

3. (*a*) With the help of neat sketch, explain direct shear test and state the law of shearing strength. [6]

(*b*) A soil sample has OMC of 15% and bulk density of 1.84 gm/cc. Determine the following : Void ratio, porosity, % of saturation and maximum dry density. Assume G = 2.70. [6]

Or

4. (*a*) A dry sand specimen is put through a triaxial test. Cell pressure is 50 kPa and deviator stress is 100 kPa. Determine the angle of internal friction for the sand specimen. [6]

(*b*) State the assumptions in Boussinesq's theory and explain the equation for vertical stress determination for point load with the terms involved in it. [6]

5. (*a*) Explain Rankine's lateral stress distribution theory for active, passive and at rest state with the assumptions involved. [6]

(*b*) A smooth vertical wall retains a level backfill with γ = 18.5 kN/m^3, ϕ = 30° and C = 0 to a depth of 10 m. Draw the lateral pressure diagram and compute the total thrust on teh retaining wall. What will be the active pressure if water stands at a depth of 4 m ? [7]

6. (*a*) Explain Culmann's graphical method for the determination of earth pressure on retaining wall. [6]

(*b*) Find the expression for the active state of pressure for cohesive backfill with no surcharge. [7]

7. (*a*) What is biosparging ? Also explain vacuum extraction technique with sketch. [7]

(*b*) Explain the factor of safety with respect to shear strength, cohesion and friction. [6]

Or

8. (*a*) Discuss the criteria for slope classification and explain the modes of failure for all these slopes. [7]

(*b*) How is chemical decontamination carried out ? Explain with a neat sketch. [6]