Seat No.	

[5459]-103

S.E. (Civil) (I Sem.) EXAMINATION, 2018

GEOTECHNICAL ENGINEERING

(2015 PATTERN)

Time : Two Hours   Maximum Marks : 50

N.B. :— (*i*) Answers 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*)   Define liquid limit, plasticity index and draw the plasticity chart for classification of fine grained soils.   [6]

   (*b*)   Calculate the coefficient of permeability of a soil sample 6 cm in height and having 50 cm^2 cross-sectional area, if the quantity of water equal to 450 ml passed down in 10 minutes under an effective constant head of 40 cm. On oven drying, the test specimen weighs 495 g. Assuming G = 2.65, determine the seepage velocity of water during the test.   [6]

2. (*a*) What is quick sand condition ? When does it occur ? What is the critical hydraulic gradient of a sand deposit of specific gravity 2.65 and porosity 35%. [6]

(*b*) State the methods for determination of field density. Explain the step by step procedure for any *one* of the methods with neat sketch. [6]

3. (*a*) How are MDD and OMC determined in standard proctor test ? Explain with neat sketch indicating the position of MDD and OMC and also state the significance of ZAV line. [6]

(*b*) Draw a neat sketch of laboratory shear vane. A vane 10.8 cm long, 7.2 cm in diameter, was pressed into soft clay at the bottom of a bore hole. Torque was applied and the value at failure was 45 Nm. Find the shear strength of the clay on a horizontal plane. [6]

Or

4. (*a*) What is pressure bulb ? Explain its significance and draw a neat sketch of pressure bulb for concentrated point loading. [6]

(*b*) State and explain factors affecting shear strength for cohesive and cohesionless soils. [6]

5. (*a*) Derive the relation for determination of active earth pressure for cohesionless soil when backfill is loaded by uniform surcharge and also draw the pressure diagram. [7]

(*b*) State the assumptions in Coulomb's wedge theory and explain the theory with neat sketch. [6]

6. (*a*) A smooth vertical wall retains a level backfill with γ = 18 kN/m^3, φ = 33º, and *c* = 0 to a depth of 8 m. Draw the lateral earth pressure diagram and compute the active and passive thrust with its point of application. [7]

(*b*) Derive the relation lateral earth pressure in active state for cohesive soils along with pressure diagram and concept of H$_c$. [6]

7. (*a*) What are the causative factors of landslides ? Also discuss the types of landslides that can occur. [6]

(*b*) State the remediation techniques for subsurface contamination. Explain the bio-remediation technique for subsurface contamination [7]

Or

8. (*a*) Write a short note on contaminant transport and detection of polluted zones. [6]

(*b*) Explain slope classification with neat sketches. [7]
A cutting is to be made in clay for which the cohesion is 35 kN/m^2 and φ = 0º. The density of soil is 20 kN/m^3. Find the maximum depth for a cutting of side slope 1.5 to 1 if the factor of safety is to be 1.5. Take the stability number for a 1.5 to 1 slope and φ = 0º as 0.17.