Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[5252]-103

S.E. (Civil) (First Semester) EXAMINATION, 2017

GEOTECHNICAL ENGINEERING

(2012 PATTERN)

Time : 2 Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer Q. **1** *or* Q. **2**, Q. **3** *or* Q. **4**, Q. **5** *or* Q. **6**, Q. **7** *or* Q. **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Use of calculator is allowed.

(*iv*) Assume suitable data, if necessary

1. (*a*) Define shrinkage limit and describe its procedure with neat sketch. [6]

(*b*) Derive with usual notations, $\rho = \frac{(1+\omega)G\rho_\omega}{1+e}$ [6]

Or

2. (*a*) State applications of flownet and solve the following : A homogeneous earthen dam, 20 m high is constructed on an impermeable foundation. Coefficient of permeability for dam material is 2.77×10^{-8} m/s. The water level on reservoir side is 18 m from base of the dam and dry on the downstream end. Flownet drawn has 4 flow channels and 18 equipotential

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drops. Estimate the quantity of seepage per unit length in m^3/s through the dam. [6]

(*b*) State and explain the factors affecting permeability with relations involved. [6]

3. (*a*) Draw Mohr circle for unconfined compression test and explain how the shear strength parameters can be determined from the Mohr circle. [6]

(*b*) Explain standard proctor compaction test with neat sketch of apparatus and moisture density relation curve. [6]

Or

4. (*a*) An unconfined compression test was conducted on undisturbed sample of clay. The sample had a diameter of 37.5 mm & was 80 mm long. The load at failure measured by the proving ring was 28N and the axial deformation of the sample at failure was 13 mm. Determine the unconfined compressive strength and undrained cohesion of soil. [6]

(*b*) State Boussinesq's formula for stress due to point load and explain significant depth with relation to pressure bulb. [6]

5. (*a*) State the assumptions in Rankine's theory and explain active, passive and at rest state of plastic equilibrium. [7]

(*b*) Derive the relation for critical height of vertical excavation that can be made without any lateral support and determine it when soil has density, γ = 18 kN/m^3, C = 14 kN/m^2, ϕ = 12º. [6]

Or

6. (*a*) Derive the active thrust on retaining wall when uniform surcharge acts on horizontal ground surface with neat sketch. [7]

(*b*) 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 total active earth pressure showing its point of application. [6]

7. (*a*) Explain how Taylor's stability number is used for slope stability analysis. A slope is to be constructed at an inclination of 30º with the horizontal. Soil has following properties, c = 18kN/m^2, ϕ = 20º and γ = 20kN/m^3. The stability number is 0.0625. Determine the safe height of slope if the factor of safety is 1.5. [6]

(*b*) State methods of remediation for soil contamination and explain any *two* of them. [7]

Or

8. (*a*) Explain process of contaminant transport and how soil acts as a geochemical trap. [6]

(*b*) How are slopes classified ? Also explain the considerations for slope stability for finite and infinite slopes. [7]