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

Seat No.	

[5352]-103

S.E. (Civil) (First Semester) EXAMINATION, 2018

GEOTECHNICAL ENGINEERING

(2012 PATTERN)

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

N.B. :— (*i*) Solve question Nos. 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*) 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]

$$\rho = \frac{(1+w)G\,\rho_w}{1+e}.$$

(*b*) The total unit weight of the soil sample is 18.5 kN/m^2. Calculate the dry unit weight, porosity, void ratio, degree of saturation, if the same soil sample has water content 17% and specific gravity 2.65. [6]

Or

2. (*a*) With the help of neat sketch, explain quick sand phenomenon and derive the relation involved. [6]

P.T.O.

(*b*) A constant head permeability test was run on a sand sample 16 cm in length and 60 cm^2 in cross-sectional are porosity was 40%. Under a constant head of 30 cm, the disharge was found to be 45 cm^3 in 18 seconds. Calculate coefficient of permeability. Also determine the discharge velocity and seepage velocity. [6]

3. (*a*) Write a short note on pressure bulb and its significance. [6]

(*b*) A triaxial test was conducted on sand specimen and the sample failed at a deviator stress of 480 kN/m^2, when the cell pressure was 100 kN/m^2 under drained conditions. Find the effective angle of shearing resistance of sand. [6]

Or

4. (*a*) Describe the procedure of direct shear test with sketch. Also state the merits and demerits of the test. [6]

(*b*) What is compaction ? Compare it with consolidation process ? Discuss any *one* factor affecting compaction. [6]

5. (*a*) Write a note on Culmann's graphical method. [6]

(*b*) A retaining wall, 10 m high retains a cohesionless soil having $\phi = 30^\circ$. The surface of the soil is in level with top of the wall. The top 3 m has a unit height of 18 kN/m^3 and that of the rest is 20 kN/m^3. Determine the magnitude and point of application of active pressure per 'm' length of the wall. The value of ϕ is same for both layers. [7]

Or

6. (*a*) Derive the relation for lateral thrust in active state for submerged backfill with cohesionless soil including its pressure diagram. [6]

(*b*) What is critical height of excavation ? Derive the relation for critical height of an unsupported vertical cut in cohesive soil. [7]

7. (*a*) Explain with sketches modes of failure for infinite and finite slopes. [6]

(*b*) Explain the impact of subsurface constamination on Geoenvironment. [7]

Or

8. (*a*) Explain landslides with its causes and remedial measures. [7]

(*b*) Describe vacuum extraction technique and biosparging. [6]