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[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/m³. 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]

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- (b) A constant head permeability test was run on a sand sample 16 cm in length and 60 cm² in cross-sectional area. Porosity was 40%. Under a constant head of 30 cm, the discharge was found to be 45 cm³ 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/m², when the cell pressure was 100 kN/m² 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 weight of 18 kN/m³ and that of the rest is 20 kN/m³. 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 contamination on Geoenvironment. [7]

Or

8. (a) Explain landslides with its causes and remedial measures. [7]
- (b) Describe vacuum extraction technique and biosparging. [6]