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[5152]-503

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

GEOTECHNICAL ENGINEERING

(2015 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 side indicate full marks.

(iv) Use of calculator is allowed.

(v) Assume suitable data, if necessary.

1. (a) Explain weathering and distinguish between mechanical and chemical weathering giving examples. [6]

(b) Explain in brief six factors affecting permeability of soils. [6]

Or

2. (a) Define and mention the formulae for the following terms :
Void ratio, Porosity, Degree of saturation, Percentage air voids,
Water content, Specific gravity. [6]

(b) State Darcy's law. Define coefficient of permeability and derive equation for coefficient of permeability used in constant head method. [6]

P.T.O.

3. (a) In a standard proctor test the following observations were recorded : [7]

Sample No.	Bulk Density (kg/m ³)	Water Content (%)
1	1310	16.1
2	1515	19.5
3	1875	27.55
4	1860	33.69
5	1775	34.77

Plot the moisture density curve and find MDD and OMC and also draw ZAV line.

- (b) Explain direct shear test with respect to the drainage and loading conditions [6]

Or

4. (a) Write any *four* assumptions made by Boussinesq to evaluate the stress at a point inside the soil mass due to a point load. Also explain in brief stress Isobar. [7]

- (b) Define total and effective stress. Determine the shear strength in terms of effective stress on a plane within a saturated soil mass at a point where the total normal stress is 200 kN/m² and the pore water pressure is 80 kN/m². The effective stress shear strength parameters for the soil are $c' = 16$ kN/m² and $\phi' = 39^\circ$. [6]

5. (a) Differentiate between Rankine's and Coulomb's theories of earth pressure. [6]
- (b) Explain Active, Passive Earth Pressure with respect to wall movements with sketches. [6]

Or

6. (a) Derive the expression for the active state of pressure at any point for a submerged cohesionless backfill along with pressure diagrams. [6]
- (b) Discuss Culmann's graphical method for the determination of active earth pressure. [6]
7. (a) Write short notes on causes and remedial measures of Landslides. [7]
- (b) Derive the expression for factor of safety for dry infinite slope and submerged infinite slope in sandy soils. [6]

Or

8. (a) Discuss sources and types of ground contamination. [6]
- (b) Explain how soil acts as a geochemical trap and state the various remediation techniques. [7]