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**[5057]-2005**

**S.E. (Civil) (First Semester) EXAMINATION, 2016**

**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 indicate full marks.

(iv) Use of calculator is allowed.

(v) Assume suitable data, if necessary.

1. (a) Explain a method of determining the grain size distribution of cohesionless soils. Discuss the significance of the values of uniformity coefficient and coefficient of curvature. [6]

(b) What do you mean by sand boiling ? A masonry dam has pervious sand as foundation. Determine the maximum upward gradient for factor of safety = 4 against sand boiling. Assume porosity,  $n = 45%$ ,  $G = 2.65$ . [6]

P.T.O.

*Or*

2. (a) A sample weighing 310 N has a volume of 0.0183 m<sup>3</sup>. When dried out in oven its weight reduction is 270 N. If specific gravity is 2.65, determine  $\gamma_d$ , porosity,  $n$  degree of saturation,  $S_r$ . [6]
- (b) Explain the variable head permeameter experiment for determination of coefficient of permeability. [6]
3. (a) Three point loads act at points A, B, C on the surface of the soil with the point B between A and C. The distances are AB = 4 m, BC = 8 m. The value of point loads are 200 kN at A, 400 kN at B, 800 kN at C. Find the vertical stress at a point 8 m below B. [6]
- (b) Which shear test is suitable for soft saturated clayey soil ? Describe the test with neat sketch. [6]

*Or*

4. (a) Discuss the moisture-density relation graph for standard and modified proctor test and also explain the significance of ZAV line in the graph. [6]
- (b) A specimen of fine dry sand when subjected to a triaxial compression test, failed at a deviator stress of 400 kN/m<sup>2</sup>. It failed with a pronounced failure plane with an angle of 24° to the axis of the sample. Compute the lateral pressure to which the specimen would have been subjected to. [6]

5. (a) Derive the relation for lateral pressure due to submerged cohesionless backfill with neat sketch. [7]
- (b) A smooth vertical wall retains a level backfill with  $\gamma = 18.5$  kN/m<sup>3</sup>,  $\phi = 30^\circ$  and  $c = 0$  to a depth of 10 m. Draw the lateral pressure diagram and compute the total thrust on the retaining wall. What will be the active pressure if water stands at a depth of 4 m ? [6]

*Or*

6. (a) A retaining wall 13 metres high is proposed to hold sand in :
- (i) loose state
- (ii) dense state.
- The values of the void ratio and  $\phi$  in loose state are 0.6 and  $30^\circ$  while in the dense state they are 0.4 and  $40^\circ$ . Assuming the sand to be dry and having  $G = 2.7$ , compare the values of active earth pressure in both cases. [7]
- (Assume  $\gamma_w = 10$  kN/m<sup>3</sup>)
- (b) Derive an expression for the vertical cut that can stand unsupported in a purely cohesive soil. [6]

7. (a) Discuss the role of soil in geoenvironmental applications and state the process governing contaminant transport. [6]
- (b) Which are the causative and resistive factors resulting into landslides ? Discuss the remedial measures to be taken to reduce the effect of these factors. [7]

*Or*

8. (a) What is Taylor's stability number ? How can it be used to check the stability of slopes ? [6]
- (b) Explain the vacuum extraction technique for insitu treatment of soil contamination. [7]