

GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER V • EXAMINATION – WINTER – 2012

Subject code: 150604**Date: 16-01-2013****Subject Name: Geotechnical Engineering - I****Time: 02:30 pm to 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q-1** (a) Define residual soil and transported soil and give their example. **07**
 (b) Define specific gravity and void ratio and establish relation between saturated density, specific gravity, Degree of saturation, void ratio and density of water. **07**

- Q-2** (a) Explain about Grain size distribution curve with neat sketch. **07**
 (b) Explain laboratory method to find out liquid limit and plastic limit of the given soil sample. **07**

OR

- (b) Explain sand replacement method. **07**

- Q-3** (a) Give effect of void ratio and compacting energy on the compaction. **07**
 (b) Enlist and explain factors affecting Permeability. **07**

OR

- Q.3** (a) Describe I.S. Classification system for soil. **07**
 (b) A soil sample 20 cm² in c/s area and 10 cm long is tested for permeability in a variable head permeameter. The stand pipe has a c/s area of 1 cm² and the head drops from 30 cm to 10 cm in 6 minutes and 20 seconds. Find the permeability of the soil. **07**

- Q.4** (a) The following are the observation of a compaction test **07**

water content (w %)	7.7	11.5	14.6	17.5	19.5	21.2
Wt. of wet soil W (N)	16.67	18.54	19.92	19.52	19.23	18.83

If the volume of compaction mould is 950 cc. Assuming $G=2.65$. Draw compaction curve. Report maximum dry unit weight and optimum moisture content (OMC). Draw 100% saturation line (zero air void line). What is the degree of saturation at OMC ?

- (b) Explain soil water. **07**

OR

- Q.4** (a) Explain Modified Mohr-coulomb's theory. **07**
 (b) Two identical specimen of a soil were tested in a triaxial apparatus. First specimen failed at a total stress of 470 kN/m² when the cell pressure was 100 kN/m² while the second specimen failed at a total stress of 770 kN/m² under a cell pressure of 200 kN/m². Determine the value of c & Φ for the soil. If the same soil is tested in a direct shear apparatus, estimate the shear stress at which the sample will fail under a normal stress of 200 kN/m². **07**

- Q.5** (a) How will you find coefficient of consolidation? **07**

(b) Explain theory of spring analogy for primary consolidation. 07

OR

Q.5 (a) A layer of soft saturated clay, 5m thick, lies under a newly constructed building. The effective pressure due to overlying strata on the clay layer is 300 kN/m^2 , and the new construction increases the effective over-burden by 120 kN/m^2 . If the compression index of clay is 0.45, compute the settlement, assuming the natural water content of the clay layer to be 43% and the specific gravity of its soil grains as 2.7. 07

(b) Explain void ratio and effective stress relation for normally consolidated soil. 07
