

**B.Tech. Civil (Construction Management) /
B.Tech. Civil (Water Resources Engineering)**

Term-End Examination

December, 2013

ET-501(A) : SOIL MECHANICS

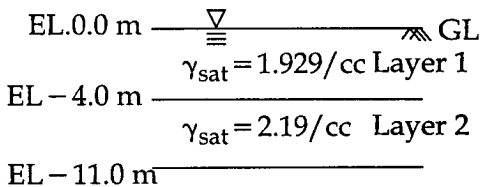
Time : 3 hours

Maximum Marks : 70

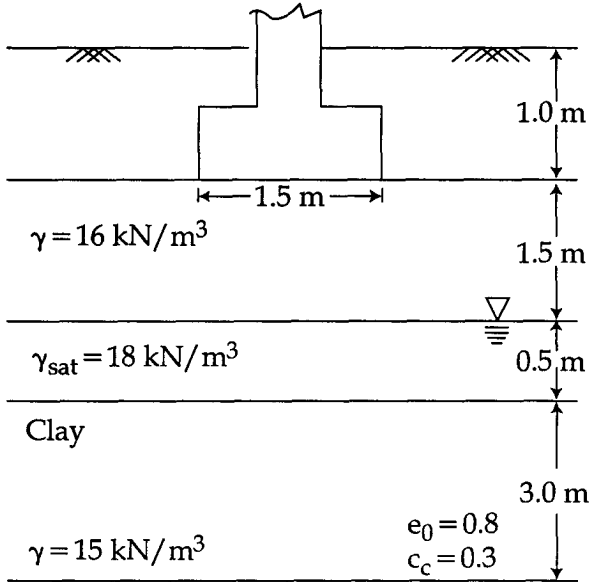
Note : Answer *any five* questions. Assume any missing data.
Use of calculator is *permitted*.

1. (a) A 10 cm diameter and 30 cm long soil sample extracted from ground weighs 4.125kg. A moist specimen of the sample weighs 12.7g and after oven drying 9.2g. Specific gravity of solids is 2.65. Determine
 - (i) Total density,
 - (ii) Water content,
 - (iii) Void ratio,
 - (iv) Degree of saturation, and
 - (v) Dry density of the soil sample.
- (b) Discuss Relative Density of soil. 4
2. (a) What is particle size distribution curve ? 7
What is its use in soil Engineering ?
- (b) The following results were obtained from the laboratory. Classify the soil according to the Indian standard soil classification system : LL = 34% PL = 18% passing 75 micron size is 52. 7

3. (a) What are different methods for determination of the coefficient of permeability in a laboratory ? Discuss their limitations. 7
- (b) A sample of clay has cross sectional area of 90 cm^2 and a length of 6 cm is subjected to falling head permeability test. The area of stand pipe is 0.65 cm^2 and during the test, head dropped from 65 cm to 42 cm in 80 minutes. Compute the coefficient of permeability. 7
4. (a) Describe standard proctor compaction and the modified proctor compaction. 7
- (b) A sand deposit was compacted dry to an in-place void ratio of 0.45. For this sand $e_{\max} = 0.7$ and $e_{\min} = 0.3$. Determine relative density and relative compaction of this sand deposit. $G_s = 2.65$ 7
5. (a) What are the principles of drawing flow nets and draw flow net for the case of seepage below an impermeable wall. 7
- (b) For the soil deposit shown in the figure, draw Total stress, pore water pressure and effective stress diagrams. The ground water level at Elevation 0.0m. 7



6. A footing has a size of 3.0m by 1.5m and it causes a pressure increment of 200 kN/m^2 at its base. 14



Determine the consolidation settlement of the middle of the clay layer. Assume 2:1 (V:H) pressure distribution and consider the variation of pressure across the depth of the clay layer. $\gamma_w = 10 \text{ kN/m}^3$.

7. (a) Discuss different laboratory tests used for determining the shear strength parameters of a soil. 7
 (b) What are the methods for improving the stability of slopes? Discuss briefly. 7
8. Write short notes on **any four** of the following. 4x3^{1/2}=14
- Liquefaction
 - Critical void ratio
 - Zero air void line
 - Shrinkage limit
 - Activity of clays
 - Compression Index
 - Stability Number