00101

B.Tech. IN CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

December, 2013

BICE-026 : GEO-TECHNICAL ENGINEERING - I

Time : 3 hours *Maximum Marks : 70*

Note : *Answer **any seven** questions. All questions carry equal marks. Use of Scientific calculator is permitted.*

1. Define and explain the liquid limit, and plastic limit of a soil. Also briefly discuss the experimental procedures adopted to find out these properties of a soil. **10**

2. The Alterberg limits of a soil sample are $W_L = 50\%$, $W_p = 30\%$ and $W_s = 15\%$. If the specimen of this soil shrinks from a volume of $10 cm^3$ at liquid limit to $5.94\ cm^3$ when it is oven - dried : **10**

Calculate

(a) Shrinkage ratio, and

(b) Specific gravity of the soil solids.

3. Enumerate the various methods which are used for determining the unit weight of a soil in the field. Discuss in detail any two of these methods. **10**

4. Explain with a neat sketch, a method for determining coefficient of permeability of medium sand in the laboratory. **10**

5. What are the assumptions made in Boussinesq's formulas for stress distribution in soils ? Determine the stress intensity 3m below a point 0.5m inside each of the two adjacent sides of a $1.8m \times 1.8m$ footing transmitting 100 kN/m^2 at the surface, use Boussinesq's point load formula. **10**

6. Explain fully the principles and methods involved in soil compaction. How do you use the proctor test apparatus in the field for checking soil compaction ? **10**

7. Explain the process of consolidation of clay and differentiate between primary and secondary consolidation. **10**

8. Find the time required for 50% consolidation in a soil stratum, 9m thick with a pervious strata on top and bottom. Also determine the coefficient of consolidation given that $k = 10^{-9} m/sec$: $e_o = 1.5$, $a_v = 0.003 m^2/kN$, Time factor $= 0.2$. **10**

9. Briefly discuss the effects of drainage conditions on the shear strength parameters of a clay soil. **10**

10. Explain the Swedish method for the analysis of stability of finite slopes. **10**