

**B.Tech. CIVIL ENGINEERING (BTCLEVI)**

**Term-End Examination**

**June, 2016**

00026

**BICE-026 : GEO-TECHNICAL ENGINEERING - I**

*Time : 3 hours*

*Maximum Marks : 70*

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**Note :** *Attempt any seven questions. All questions carry equal marks. Assume missing data, if any. Use of scientific calculator is permitted.*

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1. What is the purpose of soil classification ?  
Describe the salient features of plasticity chart. 10
  
2. Explain the principle and methods involved in soil compaction. What are the factors affecting compaction ? 10
  
3. (a) Define neutral and effective pressure in soils. What is the rate of change of effective stress in soil mechanism ? 5
  
- (b) Distinguish between normally consolidated and over-consolidated clays. Draw a typical time consolidation curve for an increment of load. 5

4. What are the advantages and disadvantages of a triaxial compression test ? Briefly explain how would you conduct the test and compute the shear parameters for the soil from the test data. 10
5. What are the causes of slope failure ? Explain the concept of factor of safety against failure for an infinite slope, analytically and through failure envelopes. 10
6. What are the factors that affect the compaction ? Define optimum moisture content, maximum dry density and zero air void line with the help of a neat sketch. Also show 40% air voids line and 40% saturation line in the sketch. 10
7. Give the assumption of the Terzaghi's theory for calculation of the rate of One-Dimensional (1-D) consolidation and prove that
- $$\frac{\partial y}{\partial t} = C_v \frac{\partial^2 y}{\partial z^2} . \quad 10$$
8. Write about the consolidated undrained test. Show the curve between
- Volume change versus Time
  - Deviator stress versus Axial strain (for loose and dense sand). 10
9. Discuss the various field and laboratory methods of water content determination of soils. 10

10. What is Boussinesq theory ? Express it mathematically and with assumptions. 10

11. Calculate the final settlement of the clay layer as shown in the following figure due to an increase of pressure of  $30 \text{ kN/m}^2$  of mid-height of the layers. Take  $\gamma_w = 10 \text{ kN/m}^3$ . Also calculate the settlement when water table rises to the ground surface. 10

