

**B.Tech IN CIVIL ENGINEERING (BTCLEVI)****Term-End Examination****December, 2012****BICE-026: GEO-TECHNICAL ENGINEERING - I***Time : 3 hours**Maximum Marks : 70*

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

1. (a) Define Geotechnical Engineering. Give classification of soils based on their occurrence. 4
- (b) An undisturbed sample of soil has volume of 100 cm<sup>3</sup> and weighs 204 gm. On oven drying for 24 hours, the weight reduces to 170 gm. If the specific gravity of soil is 2.72, determine the water content, void ratio and degree of saturation. 6
2. (a) If 'n' is the porosity and 'e' is void ratio of a soil. Establish relationship  $n = \frac{e}{1+e}$  4

- (b) An undisturbed clay has volume  $18.9 \text{ cm}^3$  and a mass of  $30.2 \text{ gm}$ . On oven drying, the mass reduces to  $18.0 \text{ gm}$ . The volume of dry specimen as determined by displacement method is  $9.9 \text{ cm}^3$ . Determine the shrinkage limit. 6
3. (a) Differentiate between : 6  
 (i) Porosity and void ratio  
 (ii) Plasticity Index and liquidity index.
- (b) Explain the method of measuring the field density by core cutler method. 4
4. (a) Differentiate between the total stress and effective stress. In what way pore water pressure affects the affective stress ? 6
- (b) Define permeability and state the Darey's law. 4
5. (a) Discuss briefly Westergaard's analysis for calculating vertical pressure due to point loads. 4
- (b) What will be the ratio of average permeability in horizontal direction to that in vertical direction for a soil deposit consisting of three horizontal layers; if the thickness and permeability of the second layer are twice of those of the first and those of third layer twice those of second. 6

6. (a) Explain the difference between consolidation and compaction. 5  
(b) Discuss the Terzagh's theory for one dimensional consolidation. 5
7. (a) What is the Mohr-Coulomb failure theory for shear strength of soil ? 5  
(b) Define shear strength of soil. Describe the method to determine it by vane shear test in the field. 5
8. (a) Explain the unconfined compression test with neat sketches. 5  
(b) Discuss the drainage conditons for pore water pressure measurement. 5
9. (a) What is Swedish circle method ? Explain briefly. 5  
(b) Explain in brief the Taylor's stability number. 5
10. Write short note on *any two* of the following :  $2 \times 5 = 10$   
(a) I.S. classification of soil.  
(b) Zero air voids line.  
(c) Pressure bulb.
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