B.E.(with Credits)-Regular-Semester 2012-Civil Engineering Sem III

CL304 - Geotechnical Engineering-I

P. Pages : 2 **GUG/W/16/3676**

Time : Three Hours * 3 5 9 6 * Max. Marks : 80

Notes :
1. All questions are compulsory.
2. All questions carry equal marks.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Illustrate your answers wherever necessary with the help of neat sketches.
6. Use of slide rule, Logarithmic table, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts in permitted.
7. Use of non programmable calculator is allowed.

1. a) Derive from the first principle, $r_{sat} = \left(\frac{G+e}{1+e}\right) r_{ul.}$ **8**

b) Explain with a neat sketch core cutter method for determining field density of soil. **8**

OR

2. a) A natural soil deposit has a bulk unit 1 Weight of $19.5 KN/m^3$ and water content of 8. Calculate the amount of water required to be added to 1 cubic meter of soil to raise the water content to 15% Assume the void ratio to remain constant. What will be the degree of saturation. Take G = 2.67. **10**

b) Write a note on "Formations of soil". **6**

3. a) Define shrinkage limit of soil? How it is determined in the laboratory. **8**

b) What do you mean by "Particle size Distribution came? What is it significance. **8**

OR

4. a) What are the various systems of classifying the soil. Explain any one in detail. **9**

b) What do you understand by "Expansive soil". How it is identified. **7**

5. a) Explain "Quick sand Conditions". Derive the equations for critical hydraulic gradient. **8**

b) Prove that In falling head test the coefficient of permeability is expressed as **8**

$K = 2.303 \frac{aL}{At} \log_{10} h_1 / h_2$.

OR

6. a) Explain "Flow net" and its uses. **8**

b) Discuss the factors affecting permeability. **8**

7. a) Define the following terms. **6**

i) Coefficient of compressibility.

ii) Time factor.

iii) Coefficient of consolidation.

b) Explain any method to find coefficient of consolidation in the laboratory. **10**

OR

8. a) What do you mean by "Zero Air void line"? **5**

b) Write a short note on "Secondary consolidations". **4**

c) An undisturbed sample of clay 24 mm thick, consolidated 50% in 18 minutes, when tested in laboratory with drainage allowed at top and Bottom. The clay layer from which the sample was obtained is 3 m thick in the field. How much time will it take to consolidate 50% with double drainage? If the clay stratary has only single drainage, calculate the time to consolidate 50%. Assume uniform distribution of consolidation pressure. **7**

9. a) Explain Boussinesq's formula alongwith its assumption. **8**

b) Explain "Unconfined compression Test" for soil. **8**

OR

10. a) A soil has $\phi = 22^{o}$ and $C = 50\,KN/m^2$. Draw Mohr's circle of failure if soil is tested in shear box at normal stress of $50\,KN/m^2$. Calculate magnitude and direction of principal stresses. **9**

b) Write a note on "Newmark's influence chart". **7**

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