004 / PCCCE304 - Geotechnical Engineering-I

P. Pages : 2

Time : Three Hours

|||||| *2185* ||||||

GUG/S/25/13710

Max. Marks : 80

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Notes : 1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.

1. a) Define the following terms: **4**
   i)   Void Ratio
   ii) Degree of Saturation
   iii) Porosity
   iv) Specific Gravity

b) Derive from the basic principle that $\gamma d = (Gs/1+e) \times \gamma w$. **6**

c) A soil sample has a porosity of 35%. The specific gravity of soil solids is 2.67. Calculate: **6**
   i)   Void Ratio
   ii) Dry Unit Weight
   iii) Unit weight if the soil is 50% Saturated.

OR

2. a) Enumerate the various method of determining field density of soil. Explain any one in detail. **6**

b) Briefly describe the process of formation of soil and differentiate between Residual and Transported soil. **6**

c) Explain with a neat Sketches Gap graded and well graded soil. **4**

3. a) What do you understand by the term "consistency of soil". Explain the different states of Consistency in detail. **6**

b) for a liquid limit, following were the observations. **10**

No. of Blows	9	21	34	44
Water Content (%)	68%	57%	47%	40%

Determine the liquid limit and flow index of soil. If Plastic limit of the same soil is found To 28%. What will be its plasticity index.

OR

4. a) Explain IS Classification with help of plasticity chart. **6**

b) The Particle size analysis of the soil sample gave the following results. **10**

Particle size (mm)	0.2	0.1	0.05	0.02	0.01	0.005	0.002	0.001
% Finer (N)	100	95	89	40	19	9	4	2

5. a) Differentiate between consolidation and compaction with suitable example. **8**

b) Standard Compaction test was performed on a soil sample and following data was obtained. **8**

Water Content%	12	14	16	18	20
Wt. of wet Soil (gm.)	1680	1850	1910	1870	1850

Volume of mould used is $1000cm^3$ .Assuming Specific Gravity of Soil Solids as 2.7. Obtain maximum dry density and optimum moisture content. Also plot the zero-air void line.

OR

6. a) Discuss the factors affecting compaction. **8**

b) Explain the term: **8**
i) Time factor.   ii) Degree of Consolidation.
iii) Co-efficient of Consolidation.

7. a) Derive the Expression For Failing Head Permeability test. **8**

b) Discuss the Factors Affecting Permeability. **8**

OR

8. a) What is Flow net .Discuss the uses of it. **8**

b) The following data was recorded in a constant head permeability test. **8**
Diameter of sample = 75mm.
Head loss in a length of 180mm = 247mm
Quantity of water collected in 60sec.626ml.
Void ratio-0.785
Calculate coefficient of permeability of soil. Also determine discharge and seepage velocity.

9. a) Explain Plate Load Test with its limitations. **8**

b) Design a strip footing to carry a load of 750KN/m at a depth of 1.6m in a C-ø soil having **8**
a unit weight of $18KN/m^3$ and shear strength parameters as $C = 20KN/m^2$ and ø=25°
Determine the width of footing, using a factor of safety of 3 against shear failure
Use Terzaghi equation consider Nc = 25.1, Nq = 12.7, Nr = 9.7.

OR

10. a) State the assumptions made by Rankin's Earth Pressure Theory. **4**

b) Explain the factors improving stability of slopes. **4**

c) Derive the expression for critical height for an infinite slope of c-ø soil. **8**

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