

The Assam Royal Global University, Guwahati

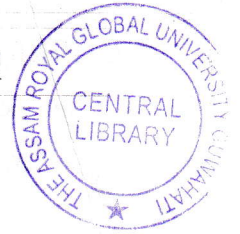
Royal School of Engineering and Technology

B.Tech. 5th Semester

Special Supplementary Examination, September 2023

Course Title: Geotechnical Engineering

Course Code: CEE022C504



Time: 3 Hours

Maximum Marks: 70

Note: Attempt all questions as per instructions given.

The figures in the right-hand margin indicate marks.

Section – A

Q.1. Attempt all questions

2x8

- What is meant by residual soils?
- What is 'saturated unit weight' and 'submerged unit weight'?
- What is plasticity index? Under what condition plasticity index is reported as non-plastic (NP)?
- What is permeability of soil? What is its unit?
- Mention few points to differentiate the concept of compaction & consolidation.
- What is pore water pressure? Which condition marks the end of consolidation process?
- Define shear strength of soil.
- Write a brief note on auger boring.

Section – B

Q.2. Attempt any two of the following

6 x 2 = 12

- Define bulk unit weight. Express bulk unit weight in terms of specific gravity, void ratio, water content and unit weight of water.
- A partially saturated sample from a borrow pit has a natural moisture content of 20% and bulk unit weight of 2.0 g/cc. The specific gravity of solids is 2.80. Determine the degree of saturation and void ratio. What will be the unit weight of the sample on saturation?

- c. Briefly explain the grain size distribution curve with a suitable plot of particle diameter and percentage finer by weight. From the plot explain well graded soil, poorly graded soil & gap graded soil.

Q.3. Attempt **any two** of the following

7 x 2 = 14

- Explain the various factors affecting permeability of soil.
- Deduce the expression for average horizontal & vertical coefficient of permeability in case of stratified soil deposit.
- Discuss the Constant Head Test for measurement of co-efficient of permeability with the help of suitable diagram.

Q.4. Attempt **any two** of the following

7x 2= 14

- With the help of a suitable plot of logarithm of effective stress and void ratio, explain the compressibility behavior of clayey soil.
- Consolidation test was carried out on layer of clayey soil 4.5 m height. The initial void ratio is 0.80 and pre-consolidation stress 122 kN/m^2 . The recompression index and compression index were found to be 0.02 and 0.30 respectively. Evaluate the consolidation settlement if the present average overburden stress of the layer is 70 kN/m^2 and increase in average stress in the layer is 85 kN/m^2 .
- Explain in detail the factors affecting soil compaction.

Q.5. Attempt **any two** of the following

(7x2= 14)

- Explain elaborately Coulomb's Equation and Mohr Coulomb Criterion.
- Evaluate the shear strength in terms of effective stress on a plane with a saturated soil mass at a point where the normal stress is 220 kN/m^2 and the pore water pressure is 85 kN/m^2 . The effective shear strength parameters for the soil are $c' = 17 \text{ kN/m}^2$ and $\phi' = 30^\circ$
- Explain in detail the Standard Penetration Test (SPT) with a neat sketch.