

3/4 B.Tech. FIFTH SEMESTER

CE5L1

GEOTECHNICAL ENGINEERING LAB

Credits: 2

Lecture: --

Internal assessment: 25 marks

Lab : 3 periods/week

Semester end examination: 50 marks

Pre-requisites: Geo technology

Learning objectives:

- To calculate the physical and mechanical properties of soils and to identify their suitability for construction.
- To conduct various field tests on soils for getting the accurate results and avoid approximately.

Course outcomes:

After performing the experiments listed in the syllabus, the students will have skills:

1. To determine basic soil properties and classify the soil for Engineering application
2. To investigate the engineering properties of the soil such as Strength, Compressibility and permeability and apply the same to the engineering problems

LIST OF EXPERIMENTS:

Any 12 of the following experiments are to be completed.

1. Determination of water content by oven drying method.
2. Determination of specific gravity by
 - (a) Density bottle method
 - (b) Pycnometer method.
3. Gradation analysis
 - a) Mechanical Sieve analysis
 - b) Hydrometer analysis.
4. Determination of Atterberg limits
5. Determination of free swell index
6. Determination of field unit weight by
 - a) Core cutter method.
 - b) Sand replacement method.
7. Determination of permeability by
 - a) Constant head permeameter.
 - b) Variable head permeameter.
8. Direct shear test.
9. Vane shear test.
10. Unconfined compression test
11. IS - Light compaction test
12. IS - Heavy compaction test
13. Triaxial shear test.
14. Consolidation test.

LIST OF EQUIPMENTS:

1. Determination of specific gravity by
 - (a) Density bottle method
 - (b) Pycnometer method.
2. Casagrande's liquid limit apparatus.
3. Apparatus for plastic and Shrinkage limits
4. Sieve analysis
 - a) Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm.
 - b) Hydrometer
5. Field Density apparatus for
 - a) Core cutter method
 - b) Sand Replacement method
6. Permeability Apparatus for
 - a) Constant Head test
 - b) Variable Head test
7. Box shear test apparatus
8. Laboratory vane shear apparatus.
9. Apparatus for CBR test
10. Sampling tubes and sample extractors.
11. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
12. One dimensional consolidation test apparatus with all accessories.
13. Tri-axial cell with provision for accommodating 38 mm dia specimens.
14. Universal Auto compactor for I.S light and heavy compaction tests.
15. Hot Air ovens (Range of Temperature 50-1500C
16. Electronic balances of 500 g capacity with 0.01g least count and 5 kg capacity with least count of 1gm

Learning Resources:**Text books:**

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao, New Age International Publishers
2. Soil Mechanics and Foundation Engg (7th edition) by Dr. Arora, K.R., Standard Publisher and Distributors, Delhi, 2010.