

SOIL MECHANICS LAB

Course Objectives:

- To impart knowledge of determination of index properties required for classification of soils.
- To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests; to determine permeability of soils.
- To teach how to determine shear parameters of soil through different laboratory tests.

Course Outcomes: upon successful completion, student can

- Determine Specific Gravity, Atterberg's limits and Differential free swell for clayey soils
- Determine relative density, dry density & moisture contents in the field and laboratory
- Determine permeability and analyze coarse and fine grain sizes
- Determine shear strength and shear strength parameters by vane shear, tri-axial, direct shear & unconfined compression tests
- Determine CBR value and consolidation settlement & swell pressure in laboratory

SYLLABUS

LIST OF EXPERIMENTS

1. Specific gravity, G
2. Atterberg's Limits.
3. Field density-Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Hydrometer Analysis Test
6. Permeability of soil - Constant and Variable head tests
7. Compaction test
8. Consolidation test (to be demonstrated)
9. Direct Shear test
10. Triaxial Compression test (UU Test)
11. Unconfined Compression test
12. Differential free swell (DFS)
13. CBR Test

At least **Ten** experiments shall be conducted.

LIST OF EQUIPMENT:

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and shrinkage limits
3. Field density apparatus for
 - a) Core cutter method
 - b) Sand replacement method
4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm.
5. Hydrometer
6. Permeability apparatus for
 - a) Constant head test
 - b) Variable head test

7. Universal auto compactor for I.S light and heavy compaction tests.
8. Shaking table, funnel for sand raining technique.
9. Apparatus for CBR test
10. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. One dimensional consolidation test apparatus with all accessories.
12. Triaxial cell with provision for accommodating 38 mm dia specimens.
13. Box shear test apparatus
14. Hot air ovens (range of temperature 500 - 1500C)

Reference:

1. Determination of Soil Properties, J. E. Bowles.
2. IS Code 2720 – relevant parts.

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 3 | 2 | - | 3 | 1 | - | - | - | 1 | 1 | - | 2 | - | 2 | 3 |
| CO2 | 3 | 2 | - | 3 | 1 | - | - | - | 1 | 1 | - | 2 | - | 2 | 3 |
| CO3 | 3 | 2 | - | 3 | 1 | - | - | - | 1 | 1 | - | 2 | - | 2 | 3 |
| CO4 | 3 | 2 | - | 3 | 1 | - | - | - | 1 | 1 | - | 2 | - | 2 | 3 |
| CO5 | 3 | 2 | - | 3 | 1 | - | - | - | 1 | 1 | - | 2 | - | 2 | 3 |