

Name of the Faculty: Chinmaya Maharana (Guest Faculty)

UGMIT, Rayagada
LESSON PLAN: 2026-27

Subject: GEOTECHNICAL ENGINEERING LAB (PR:3)

Course Code: CEPC 215 | Program: Diploma in Civil Engineering | Semester: 3rd

Total Contact Hours: 60 Hrs (Practical) | Total Marks: 50

Assessment: Progressive – 35, End Term – 15 | Credits: 2

COURSE OUTCOMES:

CO1: Determine physical and index properties of soil.

CO2: Estimate the permeability and shear strength of soil.

CO3: Demonstrate the procedure for performing C.B.R test.

CO4: Demonstrate various compaction methods for soil stabilization.

1. Basic Soil Properties (20 Hrs / 10 Classes)

Class (2 Hrs)	Topic	Sub-topics	Teaching Aids / Activities	Course Outcomes
1	Water Content (Part 1)	Exp 1: Setup for water content by oven drying method as per IS: 2720 (Part-II).	Lab Practice & Equipment Demo	CO1
2	Water Content (Part 2)	Exp 1: Weighing, calculation, and reporting of water content.	Lab Practice & Equipment Demo	CO1
3	Specific Gravity (Part 1)	Exp 2: Setup for specific gravity of soil by pycnometer method (IS 2720 Part-III).	Lab Practice & Equipment Demo	CO1
4	Specific Gravity (Part 2)	Exp 2: Execution, observations, and calculations of specific gravity.	Lab Practice & Equipment Demo	CO1
5	Core Cutter Method (Part 1)	Exp 3: Field setup for dry unit weight by core cutter method (IS 2720 Part-XXIX).	Lab Practice & Equipment Demo	CO1
6	Core Cutter Method (Part 2)	Exp 3: Extraction, weighing, and calculation of dry unit weight.	Lab Practice & Equipment Demo	CO1
7	Sand Replacement Method (Part 1)	Exp 4: Field calibration for sand replacement method (IS 2720 Part-XXVIII).	Lab Practice & Equipment Demo	CO1
8	Sand Replacement Method (Part 2)	Exp 4: Excavation, testing, and determination of dry unit weight.	Lab Practice & Equipment Demo	CO1
9	Liquid & Plastic Limits (Part 1)	Exp 5: Casagrande apparatus setup for Liquid & Plastic limits (IS 2720 Part-V).	Lab Practice & Equipment Demo	CO1
10	Liquid & Plastic Limits (Part 2)	Exp 5: Testing, plotting flow curve, and calculating Plasticity Index.	Lab Practice & Equipment Demo	CO1

2. Index Properties & Permeability (20 Hrs / 10 Classes)

Class (2 Hrs)	Topic	Sub-topics	Teaching Aids / Activities	Course Outcomes
11	Shrinkage Limit (Part 1)	Exp 6: Setup for Shrinkage limit of given soil sample as per IS 2720 (Part-V).	Lab Practice & Equipment Demo	CO1, CO2
12	Shrinkage Limit (Part 2)	Exp 6: Execution, measurement of volume change, and calculation.	Lab Practice & Equipment Demo	CO1, CO2
13	Grain Size Distribution (Part 1)	Exp 7: Mechanical sieve analysis setup (IS 2720 Part-IV).	Lab Practice & Equipment Demo	CO1, CO2
14	Grain Size Distribution (Part 2)	Exp 7: Sieving, weighing, plotting particle size distribution curve.	Lab Practice & Equipment Demo	CO1, CO2
15	Field Identification (Part 1)	Exp 8: Visual inspection and dry strength test of different soil types.	Lab Practice & Equipment Demo	CO1, CO2
16	Field Identification (Part 2)	Exp 8: Dilatancy test and toughness test for soil classification.	Lab Practice & Equipment Demo	CO1, CO2
17	Constant Head Test (Part 1)	Exp 9: Setup for coefficient of permeability by constant head test (IS 2720 Part-XVII).	Lab Practice & Equipment Demo	CO1, CO2
18	Constant Head Test (Part 2)	Exp 9: Execution, measuring discharge, and calculating permeability.	Lab Practice & Equipment Demo	CO1, CO2
19	Falling Head Test (Part 1)	Exp 10: Setup for coefficient of permeability by falling head test.	Lab Practice & Equipment Demo	CO1, CO2
20	Falling Head Test (Part 2)	Exp 10: Recording time/head drops and calculating coefficient of permeability.	Lab Practice & Equipment Demo	CO1, CO2

3. Shear Strength & Compaction (20 Hrs / 10 Classes)

Class (2 Hrs)	Topic	Sub-topics	Teaching Aids / Activities	Course Outcomes
21	Direct Shear Test (Part 1)	Exp 11: Setup for shear strength of soil by direct shear test (IS 2720 Part-XIII).	Lab Practice & Equipment Demo	CO2, CO3, CO4
22	Direct Shear Test (Part 2)	Exp 11: Applying normal/shear stress, plotting failure envelope.	Lab Practice & Equipment Demo	CO2, CO3, CO4
23	Vane & Triaxial Shear (Part 1)	Exp 12: Setup for vane shear and triaxial shear test (IS 2720 Part-XXX).	Lab Practice & Equipment Demo	CO2, CO3, CO4

24	Vane & Triaxial Shear (Part 2)	Exp 12: Execution and determination of shear strength parameters.	Lab Practice & Equipment Demo	CO2, CO3, CO4
25	Standard Proctor Test (Part 1)	Exp 13: Setup for MDD and OMC by standard proctor test (IS 2720 Part-VII).	Lab Practice & Equipment Demo	CO2, CO3, CO4
26	Standard Proctor Test (Part 2)	Exp 13: Compaction, water content determination, plotting compaction curve.	Lab Practice & Equipment Demo	CO2, CO3, CO4
27	Modified Proctor Test (Part 1)	Exp 13: Setup for modified proctor test with heavier rammer/higher drop.	Lab Practice & Equipment Demo	CO2, CO3, CO4
28	Modified Proctor Test (Part 2)	Exp 13: Compaction, observations, and comparing with standard proctor results.	Lab Practice & Equipment Demo	CO2, CO3, CO4
29	CBR Test (Part 1)	Exp 14: Field setup for California Bearing Ratio (CBR) test (IS 2720 Part-XVI).	Lab Practice & Equipment Demo	CO2, CO3, CO4
30	CBR Test (Part 2)	Exp 14: Loading, taking dial gauge readings, plotting CBR curve, and final review.	Lab Practice & Equipment Demo	CO2, CO3, CO4

Chinnmaya Maharana
Signature of the Faculty D-20/7/26

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Signature of the HOD