



UTKALMANI GOPABANDHU INSTITUTE OF ENGINEERING, ROURKELA
DEPARTMENT OF CIVIL ENGINEERING

LESSON PLAN TH2 GEOTECHNICAL ENGG. 3RD SEM (2023-24)

(Prepared by Mrs. Kananika Nayak, Sr. Lecturer)

PERIOD NO.	CONTENTS	CHAPTER
1	Soil and soil engineering	1. Introduction
	Scope of soil mechanics	
2	Origin and formation of soil	
3	Soil as a 3 phase system	2. Preliminary definitions & relationships
4 - 6	Water Content, Density, Specific gravity, Voids ratio, Porosity, Percentage of air voids, air content, degree of saturation, density Index, Bulk/Saturated/dry/submerged density,	
7	Interrelationship of various soil parameters	
8	Quiz/ Class Test 1 and discussion	3. Index properties of soil
9	Water Content and Specific Gravity	
10 - 11	Particle size distribution: Sieve analysis, wet mechanical analysis, particle size distribution curve and its uses	
12	Consistency of Soils, Atterberg's Limits, Plasticity Index, Consistency Index, Liquidity Index	
13	Quiz/ Class Test 2 and discussion	4. Classification of soil
14 - 15	General – Particle size, Textural, Unified soil classification systems (concept only)	
16 - 17	IS Classification (detailed)	
18	Plasticity chart	
19	Quiz/ Class Test 3 and discussion	5. Permeability & Seepage
20	Concept of Permeability, Darcy's Law, Co-efficient of Permeability	
21	Factors affecting Permeability.	
22 - 23	Constant head permeability and falling head permeability Test.	
24 - 25	Seepage pressure, effective stress, phenomenon of quick sand	6. Compaction & Consolidation
26	IA - I	
27	Discussion and doubt clearing class for 1 ST IA	
28	Introduction to soil compaction, Factors affecting compaction	
29 - 31	Light and Heavy compaction test, OMC, MDD, zero air void line	
32	Field compaction methods & their suitability	
33	Consolidation, distinction between compaction and consolidation.	
34	Terzaghi's model analogy of compression/ springs showing the process of consolidation – field implications	

35	Quiz/ Class Test 3 and discussion	
36	Concept of shear strength,	7. Shear Strength
37	Mohr- Coulomb failure theory	
38	Cohesion, Angle of internal friction, strength envelope for different type of soil	
39-40	Direct shear test, triaxial shear test, unconfined compression test and vane-shear test	
41	Quiz/ Class Test 4 and discussion	
42-43	Active earth pressure, Passive earth pressure, Earth pressure at rest	8. Earth Pressure on Retaining structures
44-46	Use of Rankine's formula for the following cases (cohesion-less soil only) (i) Backfill with no surcharge, (ii) backfill with uniform surcharge	
47	Quiz/ Class Test 5 and discussion	
48	Introduction and Functions of foundations	9. Foundation Engineering
49	Shallow and deep foundation, Different type of shallow and deep foundations with sketches.	
50	Types of failure (General shear, Local shear & punching shear)	
51	Bearing capacity of soil,	
52-54	Bearing capacity of soils using Terzaghi's formulae & IS Code formulae for strip, Circular and square footings	
55	Effect water table on bearing capacity of soil	
56-57	Plate load test and standard penetration test	
58	Quiz/ Class Test 6 and discussion	
59-60	Doubt clearing/ Extra classes	

Total contact hours = 60, (4 hrs/week)