

## LESSON PLAN

Discipline: Civil Engg. , UGMIT Rayagada  
Semester: 3<sup>rd</sup>  
Name of the Teaching Faculty: DEBABRATA CHHURIA  
Lecturer Stage 1  
Subject: GEOTECHNICAL ENGINEERING  
(CEPC207)  
No of Days/week class allotted: 3  
Session: 2025-26

Week	Class Day	Theory/Practical Topics	Remarks
1	1-3	<b>Overview of Geology and Geotechnical Engineering</b> <ul style="list-style-type: none"><li>•Introduction of Geology, Branches of Geology, Importance of Geology for civil engineering structure and composition of earth,</li><li>• Definition of a rock: Classification based on their genesis (mode of origin), formation. Classification and engineering uses of igneous, sedimentary and metamorphic rocks. (Concepts only)</li><li>•Importance of soil as construction material in Civil engineering structures and as foundation bed for structures. (Concepts only)</li></ul>	
2	4-6	<ul style="list-style-type: none"><li>•Field application of geotechnical engineering for foundation design, pavement design, design of earth retaining structures, design of earthen dam. (Concepts only)</li></ul> <b>Physical and Index Properties of Soil</b> Soil as a three phase system,	
3	7-9	<ul style="list-style-type: none"><li>• water content, determination of water content by oven</li></ul>	

		<p>drying method as per BIS code, void ratio, porosity and degree of saturation, density index.,air Content,Percentage of air voids,Relation between the parameters.</p> <ul style="list-style-type: none"> <li>• Unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight.</li> </ul>	
4	10-12	<ul style="list-style-type: none"> <li>• Determination of bulk unit weight and dry unit weight by core cutter and sand replacement method, Determination of specific gravity by pycnometer.</li> <li>• Consistency of soil, Atterberg limits of consistency: Liquid limit, plastic limit and shrinkage limit. Plasticity index.</li> </ul>	
5	13-15	<p>Particle size distribution test and plotting of curve, Determination of effective diameter of soil, well graded and uniformly graded soils, BIS classification of soil.</p> <p><b>Permeability and Seepage</b></p> <ul style="list-style-type: none"> <li>• Definition of permeability, Darcy's law of permeability, coefficient of permeability, factors affecting permeability</li> </ul>	
6	16-18	<ul style="list-style-type: none"> <li>• determination of coefficient of permeability by constant head and falling head tests, simple problems to determine coefficient of permeability.</li> </ul>	
7	19-21	<ul style="list-style-type: none"> <li>• Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines, application of flow net, (Concepts only No numerical problems).Effective stress,quick Sand</li> </ul>	
8	21-23	<ul style="list-style-type: none"> <li>• <b>Compaction,Consolidation and stabilization of soil</b> Concept of compaction, Standard and Modified proctor test as per IS code, Plotting of Compaction curve for determining: Optimum moisture content (OMC), maximum dry density (MDD), Zero air voids line. Factors affecting compaction, field methods of compaction – rolling, ramming and vibration.</li> <li>• Consoildation,Difference between compaction and consolidation.</li> </ul>	
9	24-26	<ul style="list-style-type: none"> <li>• Terzaghi's Model analogy of compression/springs showing the process of consolidation,Field implications</li> <li>• Concept of soil stabilization, necessity of soil stabilization, different methods of soil stabiliza tion. California bearing ratio (CBR) test - Meaning and Utilization in Pavement Construction</li> </ul>	

10	27-29	<ul style="list-style-type: none"> <li>•Necessity of site investigation and soil exploration: Types of exploration , criteria for deciding the location and number of test pits and bores. Field identification of soil – dry strength test, dilatancy test and toughness test.</li> </ul>	
11	30-32	<p><b>Shear Strength of Soil</b></p> <ul style="list-style-type: none"> <li>• Shear failure of soil-General, local and punching shear, concept of shear strength of soil.</li> <li>•Components of shearing resistance of soil – cohesion, internal friction.</li> </ul>	
12	33-35	<ul style="list-style-type: none"> <li>• Mohr-Coulomb failure theory, Strength envelope, strength equation for purely cohesive and cohesion less soils.</li> </ul>	
13	36-38	<ul style="list-style-type: none"> <li>• Direct shear, triaxial and vane shear test laboratory methods. <b>Bearing Capacity of Soil and Foundation</b></li> <li>•Bearing capacity and theory of earth pressure. Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure</li> </ul>	
14	39-41	<ul style="list-style-type: none"> <li>• Introduction to Terzaghi's analysis and assumptions, effect of water table on bearing capacity.</li> <li>• Field methods for determination of bearing capacity – Plate load and Standard Penetration Test. Test procedures as per IS:1888 &amp; IS:2131.</li> </ul>	
15	42-45	<p>Definition of earth pressure, Active and Passive earth pressure for no surcharge condition, coefficient of earth pressure, Rankine's theory and assumptions made for non-cohesive Soils. •Type of foundations-shallow, deep foundation</p>	

Signature of Faculty:

Signature of HOD:

  
14/07/25