

**Government polytechnic, Malkangiri**  
**Lesson plan: Geotechnical Engineering**

<b>Discipline:</b> Civil engineering	<b>Semester</b> : 3 <sup>rd</sup>	<b>Name of Teaching faculty:</b> BINOD JENA(PTGF)
Subject: Geotechnical Engineering	No. of days/ per week class allotted: 4	<b>Semester from Date:</b> 15/ 09/2022 <b>To Date:</b> 21/01/2023
<b>Week</b>	<b>Class Day</b>	<b>Topics</b>
		<b>1. Introduction</b>
1 <sup>ST</sup>	1 <sup>ST</sup>	1.1 Soil and Soil Engineering
	2 <sup>ND</sup>	1.2 Scope of Soil Mechanics 1.3 Origin and formation of soil
	<b>2. Preliminary Definitions and Relationship</b>	
	3 <sup>RD</sup>	2.1 Soil as a three Phase system
	4 <sup>TH</sup>	2.2 Water Content, Density, Specific gravity
2 <sup>ND</sup>	1 <sup>ST</sup>	Voids ratio, Porosity, Percentage of air voids,
	2 <sup>ND</sup>	air content, degree of saturation, density Index,
	3 <sup>RD</sup>	Bulk/Saturated/dry/submerged density,
	4 <sup>TH</sup>	Interrelationship of various soil parameters
		<b>3. Index Properties of Soil</b>
3 <sup>RD</sup>	1 <sup>ST</sup>	3.1 Water Content
	2 <sup>ND</sup>	3.2 Specific Gravity
	3 <sup>RD</sup>	3.3 Particle size distribution: Sieve analysis, wet mechanical analysis, particle size distribution curve and its uses
	4 <sup>TH</sup>	3.4 Consistency of Soils, Atterberg's Limits, Plasticity Index, Consistency Index, Liquidity Index
		<b>4. Classification of Soil</b>
4 <sup>TH</sup>	1 <sup>ST</sup>	4.1 General 4.2 I.S. Classification
	2 <sup>ND</sup>	4.2 I.S. Classification, Plasticity chart
	3 <sup>RD</sup>	4.2 I.S. Classification, Plasticity chart
	4 <sup>TH</sup>	4.2 I.S. Classification, Plasticity chart
5 <sup>TH</sup>	1 <sup>ST</sup>	4.2 I.S. Classification, Plasticity chart
	2 <sup>ND</sup>	1.2 I.S. Classification, Plasticity chart
	<b>2. Permeability and Seepage</b>	
	3 <sup>RD</sup>	5.1 Concept of Permeability, Darcy's Law, Co-efficient of Permeability,
	4 <sup>TH</sup>	5.2 Factors affecting Permeability.
6 <sup>TH</sup>	1 <sup>ST</sup>	5.2 Factors affecting Permeability.

	2 <sup>ND</sup>	5.3 Constant head permeability and falling head permeability Test.
	3 <sup>RD</sup>	5.4 Seepage pressure, effective stress, phenomenon of quick sand
	4 <sup>TH</sup>	5.4 Seepage pressure, effective stress, phenomenon of quick sand
7 <sup>TH</sup>	1 <sup>ST</sup>	phenomenon of quick sand
		<b>3. Compaction and Consolidation</b>
	2 <sup>ND</sup>	6.1 Compaction: Compaction, Light and heavy compaction Test,
	3 <sup>RD</sup>	Optimum Moisture Content of Soil
	4 <sup>TH</sup>	Maximum dry density, Zero air void line,
8 <sup>TH</sup>	1 <sup>ST</sup>	Factors affecting Compaction,
	2 <sup>ND</sup>	Field compaction methods and their suitability
	3 <sup>RD</sup>	6.2 Consolidation: Consolidation, distinction between compaction and consolidation.
	4 <sup>TH</sup>	Terzaghi's model analogy of compression/ springs showing the process of consolidation – field implications
9 <sup>TH</sup>	1 <sup>ST</sup>	Terzaghi's model analogy of compression/ springs showing the process of consolidation – field implications
		<b>4. Shear Strength</b>
	2 <sup>ND</sup>	7.1 Concept of shear strength, Mohr- Coulomb failure theory
	3 <sup>RD</sup>	Cohesion, Angle of internal friction,
	4 <sup>TH</sup>	strength envelope for different type of soil,
10 <sup>TH</sup>	1 <sup>ST</sup>	Measurement of shear strength;- Direct shear test, triaxial shear test, unconfined compression test and vane-shear test
	2 <sup>ND</sup>	Measurement of shear strength;- Direct shear test, triaxial shear test, unconfined compression test and vane-shear test
	3 <sup>RD</sup>	Measurement of shear strength;- Direct shear test, triaxial shear test, unconfined compression test and vane-shear test
		<b>5. Earth Pressure on Retaining Structures</b>
	4 <sup>TH</sup>	Active earth pressure, ,
11 <sup>TH</sup>	1 <sup>ST</sup>	Passive earth pressure
	2 <sup>ND</sup>	Earth pressure at rest.
	3 <sup>RD</sup>	Use of Rankine's formula for the following cases (cohesion-less soil only) (i) Backfill with no surcharge,
	4 <sup>TH</sup>	Use of Rankine's formula for the following cases (cohesion-less soil only) (i) Backfill with no surcharge,
12 <sup>TH</sup>	1 <sup>ST</sup>	Use of Rankine's formula for the following cases (cohesion-less soil only) (ii) backfill with uniform surcharge
	2 <sup>ND</sup>	Use of Rankine's formula for the following cases (cohesion-less soil only) (ii) backfill with uniform surcharge
		<b>6. Foundation Engineering</b>
	3 <sup>RD</sup>	9.1 Functions of foundations, shallow and deep foundation,
	4 <sup>TH</sup>	different type of shallow foundation with sketches.

13 <sup>TH</sup>	1 <sup>ST</sup>	different type deep foundations with sketches.
	2 <sup>ND</sup>	Types of failure (General shear, Local shear & punching shear)
	3 <sup>RD</sup>	Types of failure (General shear, Local shear & punching shear)
	4 <sup>TH</sup>	9.2 Bearing capacity of soil,
14 <sup>TH</sup>	1 <sup>ST</sup>	9.2 Bearing capacity of soil,
	2 <sup>ND</sup>	bearing capacity of soils using Terzaghi's formulae
	3 <sup>RD</sup>	bearing capacity of soils using Terzaghi's formulae
	4 <sup>TH</sup>	IS Code formulae for strip, Circular and square footings
15 <sup>TH</sup>	1 <sup>ST</sup>	IS Code formulae for strip, Circular and square footings
	2 <sup>ND</sup>	water table on bearing capacity of soil
	3 <sup>RD</sup>	9.3 Plate load test
	4 <sup>TH</sup>	standard penetration test

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