



SYNERGY SCHOOL OF ENGINEERING, DHENKANAL
LESSON PLAN
SESSION 2026-27
DEPARTMENT OF CIVIL ENGINEERING

Discipline: Civil Engineering	Semester: 3 rd /W 2026	Name of the Faculty: KIRANBALA BEHERA (Lecturer) Email: kiranabalabchera5@gmail.com
Subject: GEOTECHNICAL ENGINEERING	No. of Days/week: 03	Start Date: 01/07/2026 End Date: 05/11/2026

Week	Class Day	Theory Topics
1st	1st	Introduction of Geology, Branches of Geology, Importance of Geology for civil engineering structure and composition of earth,
	2nd	Definition of a rock: Classification based on their genesis (mode of origin), formation.
	3rd	Classification and engineering uses of igneous, sedimentary and metamorphic rocks. (Concepts only)
2nd	1st	Importance of soil as construction material in Civil engineering structures and as foundation bed for structures. (Concepts only)
	2nd	Field application of geotechnical engineering for foundation design, pavement design, design of earth retaining structures, design of earthen dam. (Concepts only)
	3rd	Soil as a three phase system, water content, determination of water content by oven drying method as per BIS code
3rd	1st	Void ratio, porosity and degree of saturation, density index, air Content, Percentage of air voids, Relation between the parameters.
	2nd	Unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight.
	3rd	Determination of bulk unit weight and dry unit weight by core cutter and sand replacement method,
4th	1st	Determination of specific gravity by pycnometer. Consistency of soil,
	2nd	Atterberg limits of consistency: Liquid limit, Plastic limit and shrinkage limit. Plasticity index.
	3rd	Particle size distribution test and plotting of curve
5th	1st	Determination of effective diameter of soil, well graded and uniformly graded soils, BIS classification of soil.
	2nd	Definition of permeability, Darcy's law of permeability
	3rd	Coefficient of permeability, factors affecting permeability
6th	1st	Determination of coefficient of permeability by constant head method
	2nd	Determination of coefficient of permeability by falling head tests
	3rd	Simple problems to determine coefficient of permeability.
7th	1st	Seepage through earthen structures, seepage velocity
	2nd	Seepage pressure, phreatic line, flow lines, application of flow net
	3rd	Effective stress, Quick Sand
8th	1st	Concept of compaction, Standard and Modified proctor test as per IS code
	2nd	Plotting of Compaction curve for determining: Optimum moisture content (OMC), maximum dry density (MDD)
	3rd	Zero air voids line. Factors affecting compaction, field methods of compaction – rolling, ramming and vibration.
9th	1st	Consolidation, Difference between compaction and consolidation. Terzaghi's Model analogy of compression/springs showing the process of consolidation, Field

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		implications
	2nd	Concept of soil stabilization, necessity of soil stabilization, different methods of soil stabilization. California bearing ratio (CBR) test
	3rd	Meaning and Utilization in Pavement Construction. Necessity of site investigation and soil exploration
10 th	1st	Types of exploration, criteria for deciding the location and number of test pits and bores. Field identification of soil – dry
	2nd	strength test, dilatancy test and toughness test.
	3rd	Shear Strength of Soil
11 th	1st	Shear failure of soil-General
	2nd	Local and punching shear
	3rd	Concept of shear strength of soil.
12 th	1st	Components of shearing resistance of soil – cohesion, internal friction.
	2nd	Mohr-Coulomb failure theory, Strength envelope
	3rd	Strength equation for purely cohesive and cohesion less soils. Direct shear
13 th	1st	Vane shear test laboratory methods.
	2nd	Bearing capacity and theory of earth pressure. Concept of bearing capacity
	3rd	Ultimate bearing capacity, safe bearing capacity and allowable bearing pressure
14 th	1st	Introduction to Terzaghi's analysis and assumptions
	2nd	Effect of water table on bearing capacity.
	3rd	Field methods for determination of bearing capacity – Plate load and Standard Penetration Test.
15 th	1st	Test procedures as per IS:1888 & IS:2131. Definition of earth pressure
	2nd	Active and Passive earth pressure for no surcharge condition, coefficient of earth pressure, Rankine's theory and assumptions made for non- cohesive Soils.
	3rd	Type of foundations-shallow, deep foundation

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