

Lesson Plan: Geotechnical Engineering

Name of Faculty – Amrit Gajendra, Lecturer Stage II, Civil Engineering

Number of Periods – 45

Number of Credits – 03

Sl. No.	Week	Day	Topic Name
1	Week 1	Day 1	Introduction to Geology, Branches and Importance for Civil Engineering
2		Day 2	Composition of Earth and Rock Definition
3		Day 3	Classification of Rocks based on Genesis
4	Week 2	Day 4	Engineering Uses of Igneous, Sedimentary, and Metamorphic Rocks
5		Day 5	Importance of Soil as Construction Material and Foundation Bed
6		Day 6	Applications of Geotechnical Engineering (Foundation, Pavement, Dams)
7	Week 3	Day 7	Soil as a Three Phase System, Water Content Concepts
8		Day 8	Determination of Water Content by Oven Drying Method (BIS)
9		Day 9	Void Ratio, Porosity, Degree of Saturation, Air Content and Relationships
10	Week 4	Day 10	Unit Weights – Bulk, Dry, Saturated, Submerged
11		Day 11	Determination of Bulk & Dry Unit Weight by Core Cutter Method
12		Day 12	Determination by Sand Replacement Method
13	Week 5	Day 13	Specific Gravity Determination using Pycnometer
14		Day 14	Consistency of Soil, Atterberg Limits
15		Day 15	Plasticity Index and Its Significance
16	Week 6	Day 16	Particle Size Distribution Test and Curve Plotting
17		Day 17	Effective Diameter, Well-Graded and Uniformly Graded Soil
18		Day 18	BIS Classification of Soil
19	Week 7	Day 19	Definition and Importance of Permeability
20		Day 20	Darcy's Law and Coefficient of Permeability
21		Day 21	Factors Affecting Permeability
22	Week 8	Day 22	Constant Head Test for Permeability
23		Day 23	Falling Head Test and Simple Problems
24		Day 24	Seepage through Earthen Structures and Seepage Velocity
25	Week 9	Day 25	Seepage Pressure, Phreatic Line, Flow Lines, Flow Net
26		Day 26	Concept of Effective Stress and Quick Sand Condition
27		Day 27	Concept of Compaction, Standard and Modified Proctor Test
28	Week 10	Day 28	Plotting Compaction Curve, OMC, MDD, Zero Air Voids Line
29		Day 29	Factors Affecting Compaction, Field Methods (Rolling, Ramming, Vibration)
30		Day 30	Concept and Difference between Compaction and Consolidation
31	Week 11	Day 31	Terzaghi's Model and Field Implications of Consolidation
32		Day 32	Concept and Necessity of Soil Stabilization
33		Day 33	Methods of Soil Stabilization
34	Week 12	Day 34	CBR Test – Meaning and Utilization in Pavement Design
35		Day 35	Site Investigation and Soil Exploration – Necessity and Types
36		Day 36	Criteria for Location and Number of Test Pits and Bores
37	Week 13	Day 37	Field Identification of Soils – Dry Strength, Dilatancy, Toughness Tests
38		Day 38	Types of Shear Failure – General, Local, Punching
39		Day 39	Concept of Shear Strength of Soil

40	Week 14	Day 40	Components of Shearing Resistance – Cohesion and Internal Friction
41		Day 41	Mohr-Coulomb Failure Theory and Strength Envelope
42		Day 42	Strength Equation for Cohesive and Cohesionless Soils
43	Week 15	Day 43	Direct Shear Test – Procedure and Significance
44		Day 44	Triaxial Test – Procedure and Applications
45		Day 45	Vane Shear Test – Procedure and Field Application

Lesson Plan: Mechanics of Material

Name of Faculty – Amrit Gajendra, Lecturer Stage II, Civil Engineering

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Sl. No.	Week	Day	Topic Name
1	Week 1	Day 1	Definition and Importance of Centre of Gravity
2		Day 2	Centre of Gravity of Symmetrical Shapes (Solid/Hollow Square, Rectangle)
3		Day 3	Centre of Gravity of Circular and I Sections
4	Week 2	Day 4	Definition and Concept of Moment of Inertia (M.I.)
5		Day 5	M.I. of Plane Lamina and Radius of Gyration
6		Day 6	Parallel and Perpendicular Axes Theorems (Concept only)
7	Week 3	Day 7	M.I. of Rectangle, Square, Circle, Semi-circle, Quarter Circle and Triangle
8		Day 8	M.I. of Symmetrical and Unsymmetrical Sections (I, T, Channel, Angle, Hollow)
9		Day 9	Polar Moment of Inertia of Solid Circular Section
10	Week 4	Day 10	Definition of Rigid, Elastic and Plastic Bodies
11		Day 11	Concept of Deformation, Stress, Strain, Hook's Law, and Elastic Limit
12		Day 12	Types of Stresses – Normal, Direct, Bending and Shear; Tensile and Compressive
13	Week 5	Day 13	Stress-Strain Curve for Steel; Yield Stress, Proof Stress, Ultimate Stress
14		Day 14	Percentage Elongation, Factor of Safety
15		Day 15	Deformation under Axial Load and Intermediate Forces
16	Week 6	Day 16	Composite Section under Axial Loading
17		Day 17	Temperature Stresses and Strains in Simple Bars
18		Day 18	Longitudinal and Lateral Strain; Modulus of Rigidity and Poisson's Ratio
19	Week 7	Day 19	Biaxial and Triaxial Stresses; Volumetric Strain and Bulk Modulus
20		Day 20	Relation among Elastic Constants (E, G, K)
21		Day 21	Concept of Principal Stresses and Principal Planes
22	Week 8	Day 22	Types of Supports, Beams, and Loads
23		Day 23	Definition and Concept of Shear Force and Bending Moment
24		Day 24	Relation among Load, Shear Force, and Bending Moment
25	Week 9	Day 25	SFD and BMD for Cantilever Beams under Point Load
26		Day 26	SFD and BMD for Simply Supported Beams under Point Load
27		Day 27	SFD and BMD for Uniformly Distributed Load
28	Week 10	Day 28	SFD and BMD for Combined Loads and Couple
29		Day 29	Concept of Point of Contraflexure
30		Day 30	Numerical Problems on SFD and BMD
31	Week 11	Day 31	Practical Applications of SFD and BMD
32		Day 32	Concept and Theory of Pure Bending; Assumptions
33		Day 33	Derivation and Application of Flexural Equation (Without Derivation)
34	Week 12	Day 34	Bending Stress Distribution Diagram
35		Day 35	Concept of Moment of Resistance; Simple Problems
36		Day 36	Shear Stress Equation and Relation between Max and Avg Shear Stress
37	Week 13	Day 37	Shear Stress Distribution for Rectangular and Circular Sections
38		Day 38	Shear Stress Distribution for Hollow, Angle, Channel, I and T Sections

39		Day 39	Simple Numerical Problems on Shear Stress
40	Week 14	Day 40	Practical Relevance of Bending and Shear Stresses
41		Day 41	Concept of Compression Members; Short and Long Columns
42		Day 42	Effective Length, Radius of Gyration, Slenderness Ratio
43	Week 15	Day 43	Types of End Conditions and Buckling of Columns
44		Day 44	Euler's Theory – Assumptions, Limitations, and Applications
45		Day 45	Rankine's Formula – Concept and Applications