

Lesson Planning (Theory)

Branch : Civil Engineering

Semester: 3RD

Subject: Geotechnical Engineering

Session : August-December 2025

Teacher: Er. Harish Kumar

Class Room : A-202

S.No.	No. of WEEKS	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1	3 WEEKS	Unit – I Overview of Geology and Geotechnical Engineering	<ul style="list-style-type: none"> • Introduction of Geology, Branches of Geology, Importance of Geology for civil engineering structure and composition of earth, Definition of a rock: Classification based on their genesis (mode of origin), formation, Classification, and engineering uses of igneous, sedimentary, and metamorphic rocks. • Importance of soil as construction material in Civil engineering structures and as foundation bed for structures. • Field application of geotechnical engineering for foundation design, pavement design, design of earth retaining structures, design of earthen dam 	R1,R2,R3	
2	3 WEEKS	Unit– II Physical and Index Properties of Soil	<ul style="list-style-type: none"> • Soil as a three-phase system, water content, determination of water content by oven drying method as per BIS code, void ratio, porosity and degree of saturation, density index. Unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight. Determination of bulk unit weight and dry unit weight by core cutter and sand replacement method, • Consistency of soil, Atterberg limits of consistency: Liquid limit, plastic limit and shrinkage limit. Plasticity index. • Particle size distribution test and plotting of curve, Determination of effective diameter of soil, well graded and uniformly graded soils, BIS classification of soil 	R1,R2,R3	
3	3 WEEKS	Unit– III Permeability and Shear Strength of Soil	<ul style="list-style-type: none"> • Definition of permeability, Darcy's law of permeability, coefficient of permeability, factors affecting permeability, determination of coefficient of permeability by constant head and falling head tests, simple problems to determine coefficient of permeability. Seepage through earthen structures, seepage velocity, 	R1,R2,R3	

			<p>seepage pressure, phreatic line, flow lines, application of flow net, (No numerical problems).</p> <ul style="list-style-type: none"> • Shear failure of soil, concept of shear strength of soil. Components of shearing resistance of soil – cohesion, internal friction. Mohr-Coulomb failure theory, Strength envelope, strength equation for purely cohesive and cohesion less soils. Direct shear and vane shear test – laboratory methods 		
4	3 WEEKS	<p>Unit- IV Bearing Capacity of Soil</p>	<ul style="list-style-type: none"> • Bearing capacity and theory of earth pressure. Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure. Introduction to Terzaghi's analysis and assumptions, effect of water table on bearing capacity. 18 • Field methods for determination of bearing capacity – Plate load and Standard Penetration Test. Test procedures as per IS:1888 & IS:2131. • Definition of earth pressure, Active and Passive earth pressure for no surcharge condition, coefficient of earth pressure 	R1,R2,R3	
5	2 WEEKS	<p>Unit- V Compaction and stabilization of soil</p>	<ul style="list-style-type: none"> • 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. Suitability of various compaction equipment -smooth wheel roller, sheep foot roller, pneumatic tyre roller, Rammer and Vibrator, Difference between compaction and consolidation. • Concept of soil stabilization, necessity of soil stabilization, different methods of soil stabilization. California bearing ratio (CBR) test - Meaning and Utilization in Pavement Construction • 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 	R1,R2,R3	

- R1-Punmia, B.C., Soil Mechanics and Foundation Engineering, Laxmi Publication, Delhi
- R2-Arora K R, Soil Mechanics and Foundation Engineering, Standard Publisher
- R3- Ramamurthy, T.N. & Sitharam, T.G., Geotechnical Engineering(Soil Mechanics), S Chand and Company LTD., New Delhi



Signature of Teacher



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Lesson Planning (Theory)

Branch : Civil Engineering

Semester : 3RD

Subject : Construction Materials

Session : August-December 2025

Teacher: Er. Anuj Rana

Class Room : A-202

S.No.	No. of WEEKS	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1	3 WEEKS	Unit – I: Overview of Construction Materials	<ul style="list-style-type: none"> • Scope of construction materials in Building Construction, Transportation Engineering, Environmental Engineering, Irrigation Engineering (applications only). • Selection of materials for different civil engineering structures based on strength, durability, Eco friendly and economy. • Broad classification of materials – Natural, Artificial, special, finishing and recycled 	R1,R2	
2	3 WEEKS	Unit – II: Natural Construction Materials	<ul style="list-style-type: none"> • Requirements of good building stone; general characteristics of stone; quarrying and dressing methods and tools for stone. • Structure of timber, general properties and uses of good timber, different methods of seasoning for preservation of timber, defects in timber, use of bamboo in construction. • Asphalt, bitumen, and tar used in construction, properties and uses. • Properties of lime, its types and uses. • Types of soil and its suitability in construction. • Properties of sand and uses • Classification of coarse aggregate according to size 	R1,R2	
3	3 WEEKS	Unit- III: Artificial Construction Materials	<ul style="list-style-type: none"> • Constituents of brick earth, Conventional / Traditional bricks, Modular and Standard bricks, Special bricks –fly ash bricks, Characteristics of good brick, Field tests on Bricks, Classification of burnt clay bricks and their suitability, Manufacturing process of burnt clay brick, fly ash bricks, Aerated concrete blocks. • Flooring tiles – Types, uses • Manufacturing process of Cement - dry and wet (only flow chart), types of cement and its uses. Field tests on cement. • Pre-cast concrete blocks- hollow, solid, pavement blocks, and their uses. • Plywood, particle board, Veneers, 	R1,R2	

			laminated board and their uses. • Types of glass: soda lime glass, lead glass and borosilicate glass and their uses. • Ferrous and non-ferrous metals and their uses.		
4	3 WEEKS	Unit- IV: Special Constructio n Materials	• Types of material and suitability in construction works of following materials: Water proofing, Termite proofing; Thermal and sound insulating materials. • Fibers – Types –Jute, Glass, Plastic Asbestos Fibers, (only uses). • Geo polymer cement: Geo-cement: properties, uses	R1,R2	
5	2 WEEKS	Unit- V: Processed Constructio n Materials	• Constituents and uses of POP (Plaster of Paris), POP finishing boards, sizes, and uses. • Paints- whitewash, cement paint, Distempers, Oil Paints and Varnishes with their uses. (Situations where used). • Industrial waste materials- Fly ash, Blast furnace slag, Granite and marble polishing waste and their uses. • Agro waste materials - Rice husk, Bagasse, coir fibers and their uses. • Special processed construction materials; Geo synthetic, Ferro Crete, Artificial timber, Artificial sand, and their uses	R1,R2	

REFERENCE RESOURCES

- R1-Duggal, S. K, Building Materials, New International, New Delhi.
- R2-Rangwala, S.C., Engineering Materials, Charator publisher, Ahmedabad

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Lesson Planning (Theory)

Branch : Civil Engineering

Semester : 3RD

Subject : Basic Surveying

Session : August-December 2025

Teacher: Er. Tanmay Kapoor

Class Room: A-202

S.No.	WEEKS	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1	3 WEEKS	Unit –1 Overview and Classificatio n of Survey	<ul style="list-style-type: none"> • Survey- Purpose and Use. • Types of surveying- Primary and Secondary, Classification: Plane, Geodetic, Cadastral, Hydrographic, Photogrammetry and Aerial. • Principles of Surveying. • Scales: Engineer's scale, Representative Fraction (RF) and diagonal scale 	R1,R2	
2	3 WEEKS	Unit– 2 Chain Surveying	<ul style="list-style-type: none"> • Instruments used in chain survey: Metric Chain, Tapes, Arrow, ranging rod, Line ranger, Offset rod, Open cross staff, Optical square. • Chain survey Station, Base line, Check line, Tie line, Offset, Tie station. Ranging: Direct and Indirect Ranging. • Methods of Chaining, obstacles in chaining. • Errors in length: Instrumental error, personal error, error due to natural cause, random error. • Principles of triangulation. • Types of offsets: Perpendicular and Oblique. • Conventional Signs, Recording of measurements in a field book 	R1,R2	
3	3 WEEKS	Unit– 3 Compass Traverse Survey	<ul style="list-style-type: none"> • Compass Traversing- open, closed. • Technical Terms: Geographic/ True Magnetic Meridians and Bearings, Whole Circle Bearing system and Reduced Bearing system and examples on conversion of given bearing to another bearing (from one form to another), Fore Bearing and Back Bearing, Calculation of internal and external angles from bearings at a station, Dip of Magnetic needle, Magnetic Declination. • Components of Prismatic Compass and their Functions, Methods of using Prismatic Compass-Temporary adjustments and observing bearings. • Local attraction, Methods of correction of observed bearings - Correction at station and correction to included angles 	R1,R2	
4	3 WEEKS	Unit– 4	<ul style="list-style-type: none"> • Basic terminologies: Level surfaces, 	R1,R2	

		Leveling and Contouring	<p>Horizontal and vertical surfaces, Datum, Benchmarks- GTS, 9</p> <p>Permanent, Arbitrary and Temporary, Reduced Level, Rise, Fall, Line of collimation, Station, Back sight, Fore sight, Intermediate sight, Change point, Height of instruments.</p> <ul style="list-style-type: none"> • Types of levels: Dumpy, Tilting, Auto level, Digital level, Components of Dumpy Level and its fundamental axes, Temporary adjustments of Level. • Types of Levelling Staff: Self-reading staff and Target staff. Reduction of level by Line of collimation and Rise and Fall Method. • Levelling Types: Simple, Differential, Fly, Profile and Reciprocal Levelling. Contour, contour intervals, horizontal equivalent. • Uses of contour maps, Characteristics of contours, Methods of Contouring: Direct and indirect 		
5	2 WEEKS	Unit- 5 Measurement of Area and Volume	<ul style="list-style-type: none"> • Components and use of Digital planimeter. • Measurement of area using digital planimeter. • Measurement of volume of reservoir from contour map 	R1,R2	

REFERENCE RESOURCES

- R1- Punmia, B.C, Jain, Ashok Kumar; Jain, Arun Kumar, Surveying I, Laxmi Publications, New Delhi
- R2 - Duggal, S. K., Survey I, McGraw Hill Education, New Delhi

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Lesson Plan (Theory)

Branch : CIVIL ENGG

Semester : 3RD

Subject : CONCRETE TECHNOLOGY

Session : Aug-Dec 2025

Teacher: RANA KUNAL

Class Room: A-202

S.N o.	Weeks	Chapter / Unit Description	Detail of Contents	Reference Resources	Remarks
1	4 Weeks	Cement, Aggregates and Water	<ul style="list-style-type: none"> Physical properties of OPC and PPC: fineness, standard consistency, setting time, soundness, compressive strength. Different grades of OPC and relevant BIS codes Storage of cement and effect of storage on properties of cement. BIS Specifications and field applications of different types of cements: Rapid hardening, Low heat, Portland pozzolana, Sulphate resisting, Blast furnace slag, High Alumina and White cement. Aggregates: Requirements of good aggregate, Classification according to size and shape. Fine aggregates: Properties, size, specific gravity, bulk density, water absorption and bulking, fineness modulus and grading zone of sand, silt content and their specification as per IS 383. Concept of crushed Sand. Coarse aggregates: Properties, size, shape, surface texture, water absorption, soundness, specific gravity and bulk density, fineness modulus of coarse aggregate, grading of coarse aggregates, crushing value, impact value and abrasion value of coarse aggregates with specifications. Water: Quality of water, impurities in mixing water and permissible limits for solids as per IS: 456 	R1,R2	
2	2 Weeks	Concrete	<ul style="list-style-type: none"> Concrete: Different grades of concrete, provisions of IS 456. Duff Abraham water cement (w/c) ratio law, significance of w/c ratio, selection of w/c ratio for different grades, maximum w/c ratio for different grades of concrete for different exposure conditions as per IS 456. Properties of fresh concrete: Workability: Factors affecting workability of concrete. Determination of workability of concrete by slump cone, compaction factor, Vee-Bee Consistometer. Value of workability requirement for different types of concrete works. Segregation, bleeding, and preventive measures. Properties of Hardened concrete: Strength, Durability, Impermeability 	R1,R2	
3	2 Weeks	Concrete	<ul style="list-style-type: none"> Concrete mix design: Objectives, methods of mix 	R1,R2	

		Mix Design and Testing of Concrete	<p>design, study of mix design as per IS 10262 (only procedural steps).</p> <ul style="list-style-type: none"> • Testing of concrete, determination of compressive strength of concrete cubes at different ages, interpretation, and co-relation of test results. • Non- destructive testing of concrete: Rebound hammer test, working principle of rebound hammer and factor affecting the rebound index, Ultrasonic pulse velocity test as per IS 13311 (part 1 and 2), Importance of NDT tests 		
4	3 Weeks	Quality Control of Concrete	<ul style="list-style-type: none"> • Concreting Operations: Batching, Mixing, Transportation, Placing, Compaction, Curing and Finishing of concrete. • Forms for concreting: Different types of form works for beams, slabs, columns, materials used for formwork, requirement of good form work. Stripping time for removal of form works per IS 456. • Waterproofing: Importance and need of waterproofing, methods of waterproofing and materials used for waterproofing. • Joints in concrete construction: Types of joints, methods for joining old and new concrete, materials used for filling joints 	R1,R2	
5	3 Weeks	Chemical Admixture, Special Concrete and Extreme Weather concreting	<ul style="list-style-type: none"> • Admixtures in concrete: Purpose, properties and application for different types of admixtures such as accelerating admixtures, retarding admixtures, water reducing admixtures, air entraining admixtures and super plasticizers. • Special Concrete: Properties, advantages and limitation of following types of Special concrete: Ready mix Concrete, Fibre Reinforced Concrete, High performance Concrete Self-compacting concrete and light weight concrete. • Cold weather concreting: effect of cold weather on concrete, precautions to be taken while concreting in cold weather condition. • Hot weather concreting: effect of hot weather on concrete, precautions to be taken while concreting in hot weather condition 	R1,R2	

REFERENCE RESOURCES

- R1- Shetty, M.S., Concrete Technology, S. Chand and Co. Pvt. Ltd., Ram Nagar, Delhi
- R-2 – Gambhir, M.L., Concrete Technology, Tata McGraw Hill Publishing Co. Ltd., Delhi

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Lesson Planning (Theory)

Branch : Civil Engineering

Semester : 3RD

Subject : Building Construction

Session : August-December 2025

Teacher: Er. Saibal Bharti

Class Room : A-202

S.No.	No. of WEEKS	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1	3 WEEKS	Unit – I: Overview of Building Components	<ul style="list-style-type: none"> • Classification of Buildings as per National Building Code Group A to I, as per Types of Constructions Load Bearing Structure, Framed Structure, Composite Structure. • Building Components - Functions of Building Components, Substructure – Foundation, Plinth. • Superstructure – Walls, Partition wall, Cavity wall, Sill, Lintel, Doors and Windows, Floor, Roof, Columns, Beams, Parapet 	R1,R2	
2	3 WEEKS	Unit – II: Construction of Substructure	<ul style="list-style-type: none"> • Job Layout: Site Clearance, Layout for Load Bearing Structure and Framed Structure by Center Line and Face Line Method, Precautions. • Earthwork: Excavation for Foundation, Timbering and Strutting, Earthwork for embankment, Material for plinth Filling, Tools and plants used for earthwork. • Foundation: Functions of foundation, Types of foundation – Shallow Foundation, Stepped Footing, Wall Footing, Column Footing, Isolated and Combined Column Footing, Raft Foundation, Grillage Foundation. Deep Foundation - Pile Foundation, Well foundation 	R1,R2	
3	3 WEEKS	Unit- III: Construction of Superstructure	<ul style="list-style-type: none"> • Stone Masonry: Terms used in stone masonry- facing, backing, hearting, through stone, corner stone, cornice. Types of stone masonry: Rubble masonry, Ashlar Masonry, and their types. Joints in stone masonry and their purpose. Selection of Stone Masonry, Precautions to be taken in Stone Masonry Construction. • Brick masonry: Terms used in brick masonry- header, stretcher, closer, quoins, course, face, back, hearting, bat bond, joints, lap, frog line, level and plumb. Bonds in brick masonry- header bond, stretcher bond, English bond and Flemish bond. 	R1,R2	

			<p>Requirements of good brick masonry. Junctions in brick masonry and their purpose and procedure. Precautions to be observed in Brick Masonry Construction. Comparison between stone and Brick Masonry. Tools and plants required for construction of stone and brick masonry. Hollow concrete block masonry and composite masonry.</p> <ul style="list-style-type: none"> • Scaffolding and Shoring: Purpose, Types of Scaffolding, Process of Erection and Dismantling. Purpose and Types of Shoring, Underpinning. <p>Formwork: Definition of Formwork, Requirements of Formwork, Materials used in Formwork, Types of Formworks, Removal of formwork</p>		
4	3 WEEKS	Unit- IV: Building Communication and Ventilation	<ul style="list-style-type: none"> • Horizontal Communication: Doors – Horizontal Communication: Doors – Components of Doors, Full Panelled Doors, Partly Panelled and Glazed Doors, Flush Doors, Collapsible Doors, Rolling Shutters, 13 <p>Revolving Doors, Glazed Doors. Sizes of Door recommended by BIS.</p> <ul style="list-style-type: none"> • Windows: Component of windows, Types of Windows - Full Panelled, Partly Panelled and Glazed, wooden, Steel, Aluminium windows, Sliding Windows, Louvered Window, Bay window, Corner window, clear-storey window, Gable and Dormer window, Skylight. Sizes of Windows recommended by BIS. <p>Ventilators.</p> <ul style="list-style-type: none"> • Vertical Communication: Means of Vertical Communication- Stair Case, Terms used in staircase-steps, tread, riser, nosing, soffit, waist slab, baluster, balustrade, scotia, handrails, newel post, landing, headroom, winder. Types of staircases (On the basis of shape): Straight, dog-legged, open well, Spiral, quarter turn, bifurcated, three quarter turn and Half turn, (On the basis of Material): Stone, Brick, R.C.C., wooden and Metal 	R1,R2	
5	2 WEEKS	Unit- V: Building Finishes	<ul style="list-style-type: none"> • Floors and Roofs: Types of Floor Finishes and its suitability- Kota, Marble, Granite, Ceramic Tiles, Vitrified, Concrete Floors, wooden Flooring, Skirting and Dado. Process of 	R1,R2	

		<p>Laying and Construction, Finishing and Polishing of Floors, Roofing Materials- RCC, Mangalore Tiles, AC Sheets, G.I. sheets, Corrugated G.I. Sheets, Plastic and Fibre Sheets. Types of Roofs: Flat roof, Pitched Roof-King Post truss, Queen Post Truss, terms used in roofs.</p> <p>• Wall Finishes: Plastering – Necessity of Plastering, Procedure of Plastering, Single Coat Plaster, Double Coat Plaster, Rough finish, Neeru Finishing and Plaster of Paris (POP). Special Plasters- Stucco plaster, sponge finish, pebble finish. Plaster. Precautions to be taken in plastering, defects in plastering. Pointing – Necessity, Types of pointing and procedure of Pointing. Painting – Necessity, Surface Preparation for painting, Methods of Application</p>		
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REFERENCE RESOURCES

- R1- Rangawala, S. C., Building Construction, Charotar Publication, Anand.
- R2 -Punmia B. C., and Jain A. K., Building Construction, Firewall Media

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Lesson Planning (Theory)

Branch : Civil Engineering

Semester : 3RD

Subject : Mechanics Of Materials

Session : August-December 2025

Teacher: Er. Saibal Bharti

Class Room: A-202

S.No.	WEEKS	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1	3 WEEKS	Unit – 1 Moment of Inertia	Moment of inertia (M.I.): Definition, M.I. of plane lamina, Radius of gyration, section modulus, Parallel and Perpendicular axes theorems (without derivations), M.I. of rectangle, square, circle, semi-circle, quarter circle and triangle section (without derivations). M.I. of symmetrical and unsymmetrical I-section, Channel section, T-section, Angle section, Hollow sections about centroidal axes. Polar Moment of Inertia of solid circular sections.	R1,R2	
2	3 WEEKS	Unit– 2 Simple Stresses and Strains	Definition of rigid, elastic and plastic bodies, Definition of stress, strain, elasticity, Hook's law, Elastic limit, Modulus of elasticity. Type of Stresses-Normal, Direct, Bending and Shear and nature of stresses i.e., Tensile and Compressive stresses. Standard stress strain curve for tor steel bar under tension, Yield stress, Proof stress, Ultimate stress, Strain at various critical points, Percentage elongation and Factor of safety. Deformation of body due to axial force, forces applied at intermediate sections, Maximum and minimum stress induced, Composite section under axial loading. Concept of temperature stresses and strain, Stress and strain developed due to temperature variation in homogeneous simple bar (no composite section) Longitudinal and lateral strain, Modulus of Rigidity, Poisson's ratio, volumetric strain, change in volume, Bulk modulus (Introduction only). Relation between modulus of elasticity, modulus of rigidity and bulk modulus (without derivation)	R1,R2	
3	3 WEEKS	Unit– 3 Shear Force and Bending Moment	Types of supports, beams, and loads. Concept and definition of shear force and bending moment, Relation between load, shear force and bending moment (without derivation). Shear force and bending moment diagram for cantilever and simply supported beams subjected to point loads, uniformly distributed loads (combination of any two types of loading), point of contra flexure	R1,R2	
4	3 WEEKS	Unit– 4 Bending and	Concept and theory of pure bending, assumptions, flexural equation (without	R1,R2	

		Shear Stresses in beams	derivation), bending stresses and their nature, bending stress distribution diagram. Concept of moment of resistance and simple numerical problems using flexural equation. Shear stress equation (without derivation), relation between maximum and average shear stress for rectangular and circular section, shear stress distribution diagram. Shear stress distribution for square, rectangular, circle, hollow, angle sections, channel section, I-section, T section. Simple numerical problems based on shear equation		
5	2 WEEKS	Unit- 5 Columns	Concept of compression member, short and long column, Effective length, Radius of gyration, Slenderness ratio, Types of end condition for columns, Buckling of axially loaded columns. Euler's theory, assumptions made in Euler's theory and its limitations, Application of Euler's equation to calculate buckling load. Rankine's formula and its application to calculate crippling load. Concept of working load/safe load, design load and factor of safety	R1,R2	

REFERENCE RESOURCES

- R1- Bansal R K, Strength of Materials, Laxmi Publications.
- R2 -Khurmi, R.S., Strength of Materials, S Chand and Co. Ltd. New Delhi

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