

LESSON PLAN: BUILDING CONSTRUCTION (TH-1)

GOVT. POLYTECHNIC, BERHAMPUR

Discipline: Civil Engineering	Semester: 3RD	Name of the Teaching Faculty: <i>Sibani Sahu, Bishree, Samita Sahoo</i>
Subject: BUILDING CONSTRUCTION	No. of days/ per week class allotted: 3	Semester From Date : 01/07/2026 to Date: 05/11/2026 No. of Weeks: 15
Week	Class Day	Theory/ Practical Topics
1st	1st	Overview of Building Components Classification of Buildings as per National Building Code Group A to I, as per Types of Constructions.
	2nd	Load Bearing Structure, Framed Structure, Composite Structure. Building Components – Functions of Building Components.
	3rd	Foundation, Plinth. Superstructure – Walls, Partition wall, Cavity wall.
2nd	1st	Sill, Lintel, Doors and Windows, Floor. Mezzanine floor, Roof, Columns, Beams, Parapet.
	2nd	Construction of Substructure Job Layout: Site Clearance, Layout for Load Bearing Structure.
	3rd	Framed Structure by Center Line and Face Line Method, Precautions. Earthwork, Excavation for Foundation, Timbering and Strutting.
3rd	1st	Earthwork for embankment, Material for plinth Filling, Tools and plants used for earthwork.
	2nd	Foundation, Functions of foundation. Types of foundation – Shallow Foundation, Stepped Footing, Wall Footing.
	3rd	Column Footing, Isolated and Combined Column Footing, Raft Foundation, Grillage Foundation
4th	1st	Deep Foundation – Pile Foundation, Well foundation and Caissions.
	2nd	Pumping Methods of Dewatering, Deep wells, Well points, Cofferdams.
	3rd	Construction of Superstructure Stone Masonry: Terms used in stone masonry- facing, backing, hearting, through stone, corner stone, cornice.
5th	1st	Types of stone masonry and their types . Joints in stone masonry and their purpose.
	2nd	Selection of Stone Masonry. Precautions to be taken in Stone Masonry Construction.
	3rd	Terms used in brick masonry- header, stretcher, closer, quoins, course, face, back, hearting, bat bond, joints, lap, frog line, level and plumb.
6th	1st	Bonds in brick masonry- header bond, stretcher bond, English bond and Flemish bond. Requirements of good brick masonry.
	2nd	Junctions in brick masonry and their purpose and procedure. Precautions to be observed in Brick Masonry Construction.
	3rd	Comparison between stone and Brick Masonry. Tools and plants required for construction of stone and brick masonry.
	1st	Hollow concrete block masonry and composite masonry. Purpose of Scaffolding and shoring.

7th	2nd	Types of Scaffolding, Process of Erection and Dismantling. Purpose and Types of Shoring, Underpinning.
	3rd	Definition of Formwork, Requirements of Formwork. Materials used in Formwork, Types of Formwork, Removal of formwork.
8th	1st	Building Communication and Ventilation Components of Doors, Types of Doors. Sizes of Door recommended by BIS.
	2nd	Component of windows, Types of Windows. Sizes of Windows recommended by BIS. Ventilators.
	3rd	Fixtures and fastenings for doors and windows. Material used and functions of Window Sill and Lintels, Shed / Chajja.
9th	1st	Means of Vertical Communication- Stair Case, Ramps, Lift, Elevators and Escalators.
	2nd	Terms used in staircase. Types of staircase.
	3rd	Three quarter turn and Half turn, Stone, Brick, R.C.C., wooden and Metal.
10th	1st	Building Finishes Types of Floor Finishes .
	2nd	Suitability of Floor Finishes.
	3rd	Kota, Marble, Granite, Ceramic Tiles, Vitrified, Chequered Tiles.
11th	1st	Paver Blocks, Concrete Floors, wooden Flooring, Skirting and Dado.
	2nd	Process of Laying and Construction.
	3rd	Finishing and Polishing of Floors, Roofing Materials.
12th	1st	RCC, Mangalore Tiles, AC Sheets, G.I. sheets, Corrugated G.I. Sheets, Plastic and Fibre Sheets.
	2nd	Types of Roof: Flat roof, Pitched Roof King Post truss.
	3rd	Queen Post Truss, terms used in roofs.
13th	1st	Necessity of Plastering, Procedure of Plastering.
	2nd	Single Coat Plaster, Double Coat Plaster, Rough finish, Neeru Finishing and Plaster of Paris .
	3rd	Special Plasters- Stucco plaster, sponge finish, pebble finish.
14th	1st	Plaster Board and Wall Claddings.
	2nd	Precautions to be taken in plastering, defects in plastering.
	3rd	Necessity of painting.
15th	1st	Types of painting.
	2nd	Procedure of Painting.
	3rd	Surface Preparation for painting, Methods of Application.

Sibani Sahu

H.O.D. (V/C), UPR

LESSON PLAN : TRANSPORTATION ENGINEERING (TH-2)**GOVT. POLYTECHNIC, BERHAMPUR**

Discipline :- CIVIL ENGINEERING		Semester :- THIRD(W) 2026-27	Name of the teaching Faculty : <i>Sibani Sahu</i>
SUBJECT:- TRANSPORTATION ENGINEERING	NO. OF CLASSES ALLOTTED FOR WEEK	SEMESTER FROM :- FROM 07/07/2026 TO 05/11/2026	
WEEK	DAY	THEORY	
1ST	1st	1.1 Role of transportation in the development of nation. 1.2 Scope and Importance of roads in India.	
	2nd	1.3 Characteristics of Transportation. 1.4 Different modes of transportation.	
	3rd	1.5 Merits and demerits of roadway.	
2ND	1st	1.6 Merits and demerits of railway. 1.7 General classification of roads.	
	2nd	1.8 Details of classification of roads.	
	3rd	1.9 Selection and factors affecting road alignment.	
3RD	1st	2.0 Definition and purpose of Camber. 2.1 Types as per IRC – recommendations.	
	2nd	2.2 Kerbs: Road margin.	
	3rd	2.3 Road formation, right of way.	
4TH	1st	2.4 Design speed . 2.5 Various factors affecting design speed as per IRC – recommendations.	
	2nd	2.6 Definition of Gradient. 2.7 Gradient types as per IRC – Recommendations.	
	3rd	2.8 Definition of Sight distance (SSD).	
5TH	1st	2.9 SSD types as per IRC – recommendations.	
	2nd	3.0 Simple numerical.	
	3rd	3.1 Necessity of Curves.	
6TH	1st	3.2 Types of Curves.	
	2nd	3.3 Extra widening of roads.	
	3rd	3.4 Numerical examples.	
7TH	1st	3.5 Definition of Super elevation. 3.6 Formula for calculating minimum and maximum Super elevation.	
	2nd	3.7 Method of providing super-elevation.	
	3rd	3.8 Standards cross-sections of national highway in	
8TH	1st	3.9 Types of road materials and their Tests. 4.0 -Flakiness and Elongation Index tests.	
	2nd	4.1 Angularity Number test, test on Bitumen. 4.2 Penetration, Ductility, Flash and Fire point test.	
	3rd	4.3 Softening point test. 4.4 Definition, Types of Pavement.	
9TH	1st	4.5 Structural Components of pavement and their functions.	
	2nd	4.6 Construction of WBM road. 4.7 Merits and demerits of WBM & WMM road.	
	3rd	4.8 Construction of Flexible pavement . 4.9 Types of Bitumen and its proper ties.	
10th	1st	5.0 Ties, Emulsion, Cutback, Tar, used in BR-prime coat. 5.1 Merits and Demerits of BR.	
	2nd	5.2 Methods of construction of cement concrete road 5.3 Alternate and Continuous Bay Method.	
	3rd	5.4 Merits and demerits of concrete roads. Types of joints. 5.5 Classification of Indian Railways.	
11th	1st	5.6 Zones of Indian Railways.	
		5.7 Permanent way , Ideal requirement, Components .	

	2nd	5.8 Rail Gauge, types, factors affecting selection of a gauge.
	3rd	5.9 Requirements, types of Rail Joints. 6.0 Creep of rail, causes and prevention.
12th	1st	6.1 Sleepers - functions and Requirement, types. 6.2 Ballast - function and types.
	2nd	6.3 Rail fixtures and fastenings. 6.4 Alignment- Factors governing rail alignment. 6.5 Track Cross sections.
	3rd	6.6 Permanent land, formation width, side drains. 6.7 Railway Track Geometrics.
13th	1st	6.8 Cant deficiency, negative cant, coning of wheel, tilting of rail.
	2nd	6.9 Branching of Tracks, Points and crossings.
	3rd	7.1 Track junctions, cross overs, diamond crossing. 7.2 Requirement of railway station.
14th	1st	7.3 Types of rail. 7.4 Factors affecting site selection for railway station.
	2nd	7.5 Definitions of Station yard
	3rd	7.6 Function & drawbacks of marshalling yards. 7.7 Classification- Passenger, goods, locomotive.
15th	1st	7.8 Track Maintenance- Necessity, Classification.
	2nd	7.9 Tools required for track maintenance with their functions.
	3rd	8.0 Duties of permanent way inspector, gangmate and key man.

Sibani Sahu


H.O.D. (T), erwl

LESSON PLAN: MECHANICS OF MATERIAL (TH-3)
GOVT. POLYTECHNIC, BERHAMPUR

Discipline: Civil Engineering	Semester: 3RD	Name of the Teaching Faculty: <i>Narasimha Mahanty</i>
Subject: MECHANICS OF MATERIAL	No. of days/ per week class allotted: 3	Semester From Date : 11 07/2026 to Date: 05/11/2026 No. of Weeks: 15
Week	Class Day	Theory/ Practical Topics
1st	1st	UNIT-I Centre of Gravity and Moment of Inertia Definition of centre of gravity -Centre of gravity of of Symmetrical shapes (solid / hollow square
	2nd	rectangular, circular, I Sections)
	3rd	Moment of inertia (M.I.): Definition, M.I. of plane lamina, Radius of gyration, section modulus, Parallel and Perpendicular axes theorems (without derivations),
2nd	1st	M.I. of rectangle, square, circle, semicircle, quarter circle and triangle section (without derivations).
	2nd	M.I. of symmetrical and unsymmetrical I-section, Channel section,
	3rd	T-section, Angle section,
3rd	1st	Hollow sections
	2nd	built up sections about centroidal axes and any other reference axis.
	3rd	Polar Moment of Inertia of solid circular sections.
4th	1st	UNIT-II Simple Stresses and Strains Definition of rigid, elastic and plastic bodies,
	2nd	deformation of elastic body under various forces,
	3rd	Definition of stress, strain, elasticity,
5th	1st	Hook's law, Elastic limit, Modulus of elasticity.
	2nd	Type of Stresses-Normal, Direct, Bending and Shear and nature of stresses i.e. Tensile and Compressive stresses.
	3rd	Standard stress strain curve for mild steel bar under tension, Yield stress, Proof stress,
6th	1st	Ultimate stress, Strain at various critical points, Percentage elongation and Factor of safety.
	2nd	Deformation of body due to axial force, forces applied at intermediate sections, Maximum and minimum stress induced,
	3rd	Composite section under axial loading.
7th	1st	Concept of temperature stresses and strain, Stress and strain developed due to temperature variation in homogeneous simple bar (no composite section)
	2nd	Longitudinal and lateral strain, Modulus of Rigidity, Poisson's ratio, Biaxial and tri-axial stresses, volumetric strain, change in volume,
	3rd	Bulk modulus (Introduction only). Relation between modulus of elasticity, modulus of rigidity and bulk modulus (without derivation).

8th	1st	COMPLEX STRESSES AND STRAINS Principal stresses and strains: Occurrence of normal and tangential stresses - Concept of Principal stress and Principal Planes – major and minor principal stresses and their orientations
	2nd	Mohr's circle and its use in solving problems on complex stresses - Numerical problems
	3rd	UNIT-III Shear Force and Bending Moment Types of supports, beams and loads.
9th	1st	Concept and definition of shear force and bending moment, Relation between load, shear force and bending moment (without derivation).
	2nd	Shear force and bending moment diagram for cantilever beams subjected to point loads,
	3rd	Shear force and bending moment diagram for simply supported beams subjected to point loads,
10th	1st	uniformly distributed loads and couple (combination of any two types of loading),
	2nd	point of contra flexure.
	3rd	UNIT-IV Bending and Shear Stresses in beams Concept and theory of pure bending, assumptions, flexural equation (without derivation),
11th	1st	bending stresses and their nature, bending stress distribution diagram.
	2nd	Concept of moment of resistance and simple numerical problems using flexural equation.
	3rd	Shear stress equation (without derivation), relation between maximum and average shear stress for rectangular and circular section, shear stress distribution diagram.
12th	1st	Shear stress distribution for square, rectangular, circle, hollow, square, rectangular, circular,
	2nd	angle sections, channel section, I-section, T section.
	3rd	Simple numerical problems based on shear equation.
13th	1st	UNIT-V Columns Concept of compression member, short and long column, Effective length, Radius of gy- ration,
	2nd	Slenderness ratio, Types of end condition for columns, Buckling of axially loaded columns.
	3rd	Euler's theory, assumptions made in Euler's theory and its limitations
14th	1st	Application of Euler's equation to calculate buckling load.
	2nd	Rankine's formula and its application to calculate crippling load.
	3rd	Concept of working load/safe load,
15th	1st	design load and factor of safety.
	2nd	Revision and Previous Year Question Discussion
	3rd	Revision and Previous Year Question Discussion

Narasimh Mahanty


H.O.D (P/C), ENR

Discipline :- CIVIL ENGINEERING		Semester :- THIRD(W) 2025- 26	Name of the teaching Faculty : Deepanjali Sethi
SUBJECT:- GEOTECHNICAL ENGINEERING	NO. Of CLASSES ALLOTTED FOR WEEK	SEMESTER FROM :- FROM 01/07/2026 TO 05/11/2026	
WEEK	DAY	THEORY	
1ST	1st	1.1 - Introduction of Geology, Branches of Geology. 1.2 - Importance of Geology for civil engineering structure and composition of earth.	
	2nd	1.3 - Difference between Geology and Geotechnical engineering.	
	3rd	1.4 - Definition of a rock: Classification based on their genesis and formation.	
2ND	1st	1.5 - Classification and engineering uses of igneous, sedimentary and metamorphic rocks.	
	2nd	1.6 - Difference between three types of rock. 1.7 - Importance of soil as construction material in Civil engineering structures.	
	3rd	1.8 - design of earthen dam.	
3RD	1st	1.9 - Field application of geotechnical engineering . 2.0 - design of earth retaining structures.	
	2nd	2.1 - CLASS TEST (01)	
	3rd	2.2 - Soil as a three phase system, water content, void ratio, porosity and degree of saturation.	
4TH	1st	2.3 - density index., air Content, Percentage of air voids, Relation between the parameters.	
	2nd	2.4 -determination of water content by oven drying method as per BIS code.	
	3rd	2.5 - bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight. 2.6 - Related problems based on the formula. ASSIGNMENT 01	
5TH	1st	2.7 - Determination of bulk unit weight by core cutter. Determination of unit weight sand replacement method.	
	2nd	2.8 - Determination of specific gravity by pycnometer.	
	3rd	2.9 -Consistency of soil, Atterberg limits of consistency.	
6TH	1st	3.0- BIS classification of soil. Particle size distribution test. 3.1- determination of coefficient of permeability by constant head and falling head tests.	
	2nd	3.2 - plotting of curve, Determination of effective diameter of soil, well graded and uniformly graded soils.	
	3rd	3.3 - Definition of permeability, Darcy's law of permeability, coefficient of permeability, factors affecting permeability.	
7TH	1st	3.4 - simple problems to determine coefficient of permeability. 3.5 - Effective stress, quick Sand.	
	2nd	3.6 - Seepage through earthen structures, seepage velocity,	
	3rd	3.7 -seepage pressure, phreaticline, flow lines, application of flow net.	

8TH	1st	3.8 – CLASS TEST (02) Concept of compaction. Standard and Modified proctor test.
	2nd	3.9 - Optimum moisture content , maximum dry density , Zero air voids line. Consoildation, Difference between compaction and consolidation.
	3rd	4.0 - factors affecting compaction, field methods of compaction.
9TH	1st	4.1- Terzaghi's Model analogy of compression/springs Showing the process of consolidation.
	2nd	4.2 Concept of soil stabilization, necessity of soil stabilization. Necessity of site investigation and soil exploration.
	3rd	4.3 - different methods of soil stabilization. 4.4 - California bearing ratio test . ASSIGNMENT 02
10TH	1st	4.5 – Types of exploration, criteria for deciding the location. General, local and punching shear, shear strength of soil.
	2nd	4.6 – number of test pits and bores. Field identification of soil.
	3rd	4.7 – CLASS TEST (03) Shear failure of soil.
11TH	1st	4.8 - Components of shearing resistance of soil. Direct shear, triaxial and vane shear test.
	2nd	4.9 - cohesion, internal friction. Mohr-Coulomb failure theory.
	3rd	5.0 - strength equation for purely cohesive and cohesion less soils.
12TH	1st	5.1 - Bearing capacity and theory of earth pressure. Related problems.
	2nd	5.2 - Concept of bearing capacity, ultimate bearing capacity.
	3rd	5.3 - safe bearing capacity and allowable bearing pressure.
13TH	1st	5.4 - Introduction to Terzaghi's analysis and assumptions.
	2nd	5.5 - effect of water table on bearing capacity. Related numerical.
	3rd	5.6- Field methods for determination of bearing capacity. 5.7 – Plate load and Standard Penetration Test.
14TH	1st	5.8 - Definition of earth pressure. coefficient of earth pressure.
	2nd	5.9 - Active and Passive earth pressure for no surcharge condition.
	3rd	6.0 - Rankine's theory and assumptions made for non-cohesive Soils.
15TH	1st	6.1 - Type of foundations-shallow, deep foundation.
	2nd	6.2 – numerical.
	3rd	6.3 – CLASS TEST (04)

Deepanjali Sathu
(9F CIVIL)


HOD (1/2), CIVIL

LESSON PLAN -: BUILDING MATERIAL & CONCRETE TECHNOLOGY (TH-5) GOVT. POLYTECHNIC, BERHAMPUR

Discipline: Civil Engineering	Semester: 3rd	Name of the Teaching Faculty: Gushree Basmita Sahoo
Subject: BUILDING MATERIAL & CONCRETE TECHNOLOGY	No. of days/ per week class allotted: 3	Semester From Date : 01/07/2026 to Date: 05/11/2026
Week	Class Day	No. of Weeks: 15
		Theory/ Practical Topics
1st	1st	Overview of Construction Materials • Scope of construction materials in Building Construction, Transportation Engineering, Environmental Engineering, and Irrigation Engineering (applications only).
	2nd	• Selection of materials for different civil engineering structures on the basis of strength, durability, Eco friendly and economy. Broad classification of materials – , Natural, Artificial, special, finishing and recycled
	3rd	Natural Construction Materials -Requirements of good building stone; general characteristics of stone; quarrying addressing methods and tools for stone.
2nd	1st	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.
	2nd	Asphalt, bitumen and tar used in construction, properties and uses.
	3rd	Properties of lime, its types and uses. Types of soil and its suitability in construction
3rd	1st	Properties of sand and uses Classification of coarse aggregate according to size
	2nd	Artificial Construction Materials: Constituents of brick earth, Conventional / Traditional bricks, Modular and Standard bricks, Special bricks –fly ash bricks, Characteristics of good brick, Field tests on Bricks
	3rd	Flooring tiles – Types, uses Pre-cast concrete blocks- hollow, solid, pavement blocks, and their uses.
4th	1st	Plywood, particle board, Veneers, laminated board and their uses.
	2nd	Types of glass: soda lime glass, lead glass and borosilicate glass and their uses.
	3rd	Ferrous and non-ferrous metals and their uses.
5th	1st	Cement, Aggregates, Water and Admixture : Composition of Cement Manufacturing process of Cement – dry and wet (only flow chart), types of cement and its uses. Field tests on cement.
	2nd	Physical properties of OPC and PPC: fineness, standard consistency, setting time, soundness, compressive strength. Different grades of OPC and relevant BIS codes.
	3rd	Testing of cement: Laboratory tests-fineness, standard consistency, setting time, soundness, compressive strength.
6th	1st	Storage of cement and effect of storage on properties of cement.
	2nd	BIS Specifications and field applications of different types of cements: Rapid hardening, Lowheat, Portland pozzolana,
	3rd	Sulphate resisting, Blast furnace slag, High Alumina and White cement .
7th	1st	Aggregates: Requirements of good aggregate, Classification according to size and shape.
	2nd	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.
	3rd	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

8th	1st	Water: Quality of water, impurities in mixing water and permissible limits for solids as per IS: 456.
	2nd	Admixtures in concrete: Purpose, properties
	3rd	application for different types of admixtures such as accelerating admixtures, retarding admixtures, water reducing admixtures, air entraining admixtures and super plasticizers. (concepts only)
9th	1st	Concrete Concrete: Different grades of concrete, provisions of IS 456 (Latest).
	2nd	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.
	3rd	Properties of fresh concrete: Workability: Factors affecting workability of concrete.
10th	1st	Determination of workability of concrete by slump cone, compaction factor, Vee-Bee Consistometer.
	2nd	Value of workability requirement for different types of concrete works. Segregation, bleeding and preventive measures.
	3rd	Value of workability requirement for different types of concrete works. Segregation, bleeding and preventive measures.
11th	1st	Properties of Hardened concrete: Strength, Durability, Impermeability.
	2nd	Concrete Mix Design and Testing of Concrete Concrete mix design: Objectives, methods of mix design
	3rd	Concrete Mix Design and Testing of Concrete Concrete mix design: Objectives, methods of mix design
12th	1st	study of mix design as per IS 10262 (only procedural steps).
	2nd	study of mix design as per IS 10262 (only procedural steps).
	3rd	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 IS13311 (part 1 and 2), Importance of NDT tests.
13th	1st	Quality Control of Concrete Concreting Operations: Batching, Mixing, Transportation, Placing, Compaction, Curing and Finishing of concrete.
	2nd	Forms for concreting: Different types of form works for beams, slabs, columns, materials used for form work, requirement of good form work.
	3rd	Stripping time for removal of form works per IS 456.
14th	1st	Waterproofing: Importance and need of waterproofing, methods of waterproofing and materials used for waterproofing.
	2nd	Joints in concrete construction: Types of joints, methods for joining old and new concrete, materials used for filling joints
	3rd	Special Concrete and Extreme Weather concreting Special Concrete: Properties
15th	1st	advantages and limitation of following types of Special concrete: Ready mix Concrete, Fiber Reinforced Concrete, High performance Concrete, Selfcompacting concrete and light weight concrete.
	2nd	Cold weather concreting: effect of cold weather on concrete, precautions to be taken while concreting in cold weather condition
	3rd	Hot weather concreting: effect of hot weather on concrete, precautions to be taken while concreting in hot weather condition.


H.O.D.(P/C), CIVIL,