

LESSON PLAN

Advanced Construction Technology (CEPE 305A)

DISCIPLINE	SEMESTER	NAME OF THE TEACHING FACULTY
Civil Engineering	5th	Mrs. Pranati Panda
SUBJECT	Advanced Construction Technology (CEPE 305A)	
NO. OF DAYS/WEEK	3	
NO. OF WEEKS	15	
COMMENCEMENT DATE	01-07-2026	

Weekly Theory LESSON PLAN

WEEK	CLASS DAY	THEORY TOPICS
1st Week	1st	Introduction to advanced construction materials - overview and scope
	2nd	Fibres: Use and properties of steel and polypropylene fibres
	3rd	Fibres: Use and properties of carbon and glass fibres
2nd Week	1st	Plastics: Use and properties of PVC and RPVC
	2nd	Plastics: Use and properties of HDPE, FRP and GRP
	3rd	Miscellaneous materials: acoustic materials, wall claddings, plaster boards, micro-silica, waterproofing materials, adhesives
3rd Week	1st	Use of waste products and industrial by-products in bricks, blocks, concrete and mortar
	2nd	Ready mix concrete: necessity and use
	3rd	Products and equipment for ready mix concrete plant
4th Week	1st	Conveying of ready mix concrete; transit mixers
	2nd	Vibrators for concrete consolidation: internal and needle vibrators
	3rd	Vibrators for concrete consolidation: surface, platform and form vibrators
5th Week	1st	Underwater concreting: Tremie method - procedure and equipment
	2nd	Underwater concreting: Drop bucket method; properties, workability and water-cement ratio
	3rd	Special concrete: Roller compacted concrete and Self-compacting concrete (SCC)
6th Week	1st	Special concrete: Steel fibre reinforced concrete and Foam concrete
	2nd	Special concrete: Shotcreting - procedure and uses
	3rd	Construction of bridges and flyovers: equipment and machinery for foundation
7th Week	1st	Construction of bridges and flyovers: equipment and machinery for superstructure

	2nd	Construction of multi-storeyed buildings: use of lifts
	3rd	Construction of multi-storeyed buildings: belt conveyors and pumping of concrete
8th Week	1st	Prefabricated construction: methods of prefabrication
	2nd	Plant fabrication and site fabrication
	3rd	Prefabricated building elements: wall panels and slab panels
9th Week	1st	Prefabricated building elements: beams, columns, door and window frames
	2nd	Equipment and machinery for placing and jointing of prefabricated elements
	3rd	Strengthening of embankments by soil reinforcing techniques using geo-synthetics
10th Week	1st	Hoisting equipment: Derrick-Pole, Gin Pole and Crane
	2nd	Hoisting equipment: Power driven scotch derrick crane and hand operated crane
	3rd	Hoisting equipment: Locomotive crane, tower crane and lattice girder
11th Week	1st	Hoisting equipment: Winches, elevators and ladders
	2nd	Hoisting equipment: Crawler cranes and truck mounted cranes
	3rd	Hoisting equipment: Gantry cranes and mast cranes
12th Week	1st	Conveying equipment: belt conveyors - types of belts and conveying mechanism
	2nd	Capacity and use of dumpers, tractors and trucks
	3rd	Excavation equipment: bull dozers, scrapers and graders
13th Week	1st	Excavation equipment: clam shell and trenching equipment
	2nd	Tunnel boring machine and wheel mounted belt loaders
	3rd	Power shovels, JCB and drag lines
14th Week	1st	Compacting equipment: plain rollers and sheep footed rollers
	2nd	Compacting equipment: vibratory and pneumatic rollers, rammers
	3rd	Pile driving equipment and pile hammers
15th Week	1st	Hot mix bitumen plant and bitumen paver
	2nd	Grouting equipment, guniting equipment, floor polishing and cutting machine
	3rd	Selection of drilling pattern for blasting; bentonite/mud slurry in drilling; explosives, dynamite and process of using explosives

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LESSON PLAN

Building Material & Concrete Technology (CEPC 209)

DISCIPLINE	SEMESTER	NAME OF THE TEACHING FACULTY
Civil Engineering	3rd	Mrs. Pranati Panda
SUBJECT	Building Material & Concrete Technology (CEPC 209)	
NO. OF DAYS/WEEK	3	
NO. OF WEEKS	15	
COMMENCEMENT DATE	01-07-2026	

Weekly Theory LESSON PLAN

WEEK	CLASS DAY	THEORY TOPICS
1st Week	1st	Scope of construction materials in Building, Transportation, Environmental and Irrigation Engineering; selection criteria - strength, durability, eco-friendliness and economy
	2nd	Broad classification of materials: natural, artificial, special, finishing and recycled
	3rd	Requirements of good building stone; general characteristics; quarrying and dressing methods and tools for stone
2nd Week	1st	Structure of timber, general properties and uses; methods of seasoning; 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 Week	1st	Properties of sand and its uses; classification of coarse aggregate according to size
	2nd	Bricks: constituents of brick earth, conventional/traditional bricks, modular and standard bricks, special bricks - fly ash bricks
	3rd	Characteristics of good brick, field tests on bricks, classification of burnt clay bricks and their suitability, manufacturing process of burnt clay and fly ash bricks; aerated concrete blocks
4th Week	1st	Flooring tiles - types and uses; pre-cast concrete blocks - hollow, solid, pavement blocks and their uses
	2nd	Plywood, particle board, veneers, laminated board and their uses; types of glass - soda lime, lead and borosilicate glass
	3rd	Ferrous and non-ferrous metals and their uses
5th Week	1st	Composition of cement; manufacturing process of cement - dry and wet (flow chart)
	2nd	Types of cement and its uses; field tests on cement

	3rd	Physical properties of OPC and PPC: fineness, standard consistency, setting time, soundness, compressive strength
6th Week	1st	Different grades of OPC and relevant BIS codes
	2nd	Laboratory testing of cement: fineness, standard consistency, setting time, soundness, compressive strength
	3rd	Storage of cement and effect of storage on properties of cement
7th Week	1st	BIS specifications and field applications of Rapid hardening, Low heat, Portland pozzolana, Sulphate resisting, Blast furnace slag, High Alumina and White cement
	2nd	Aggregates: requirements of good aggregate, classification by size and shape; fine aggregate properties - specific gravity, bulk density, water absorption, bulking, fineness modulus, grading zone, silt content (IS 383), crushed sand
	3rd	Coarse aggregates: properties, size, shape, surface texture, water absorption, soundness, specific gravity, bulk density, fineness modulus, grading, crushing value, impact value and abrasion value
8th Week	1st	Water: quality and permissible limits for solids as per IS: 456; admixtures - accelerating, retarding, water reducing, air entraining admixtures and super plasticizers
	2nd	Different grades of concrete; provisions of IS 456 (Latest)
	3rd	Duff Abraham water-cement (w/c) ratio law and its significance
9th Week	1st	Selection of w/c ratio for different grades and maximum w/c ratio for different exposure conditions as per IS 456
	2nd	Properties of fresh concrete: workability and factors affecting workability of concrete
	3rd	Determination of workability by slump cone test and compaction factor test
10th Week	1st	Determination of workability by Vee-Bee Consistometer; workability requirement for different types of concrete works
	2nd	Segregation and bleeding of concrete and preventive measures
	3rd	Properties of hardened concrete: strength, durability and impermeability
11th Week	1st	Concrete mix design: objectives and methods of mix design
	2nd	Study of mix design procedure as per IS 10262 (procedural steps)
	3rd	Non-destructive testing of concrete: Rebound hammer test - working principle
12th Week	1st	Factors affecting rebound index
	2nd	Ultrasonic pulse velocity test as per IS 13311 (Part 1 and 2); importance of NDT tests
	3rd	Concreting operations: Batching, Mixing and Transportation of concrete
13th Week	1st	Concreting operations: Placing, Compaction, Curing and Finishing of concrete
	2nd	Forms for concreting: types of form work for beams, slabs and columns; materials used; requirement of good form work; stripping time as per IS 456

	3rd	Waterproofing: importance and need of waterproofing; methods and materials used for waterproofing
14th Week	1st	Joints in concrete construction: types of joints; methods for joining old and new concrete; materials used for filling joints
	2nd	Special concrete: Ready mix concrete and Fibre Reinforced Concrete - properties, advantages and limitations
	3rd	Special concrete: High Performance Concrete and Self-compacting concrete - properties, advantages and limitations
15th Week	1st	Special concrete: Light weight concrete - properties, advantages and limitations
	2nd	Cold weather concreting: effect of cold weather on concrete and precautions to be taken
	3rd	Hot weather concreting: effect of hot weather on concrete and precautions to be taken

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LESSON PLAN

Building Materials & Concrete Technology Lab (CEPC 217)

DISCIPLINE	SEMESTER	NAME OF THE TEACHING FACULTY
Civil Engineering	3rd	Mrs. Pranati Panda
SUBJECT	Building Materials & Concrete Technology Lab (CEPC 217)	
NO. OF DAYS/WEEK	2	
NO. OF WEEKS	15	
COMMENCEMENT DATE	01-07-2026	

Weekly Practical LESSON PLAN

WEEK	CLASS DAY	PRACTICAL TOPICS
1st Week	1st	Identify various sizes of available coarse aggregates from a 10 kg sample and prepare report (60, 40, 20, 10 mm)
	2nd	Field visit: identify soil layers and types in a foundation pit (visit 1 of 3 sites) - report with photographs and samples
2nd Week	1st	Field visit: soil layers and types in foundation pit (visits 2 & 3) - report compilation
	2nd	Select first, second and third class bricks from a stack and prepare report based on their properties
3rd Week	1st	Measure dimensions and weight of 10 bricks; perform field tests - dropping, striking and scratching by nail
	2nd	Identify different types of flooring tiles (vitrified, ceramic, glazed, mosaic, anti-skid, chequered, paving blocks) and prepare specification report
4th Week	1st	Apply paint on a 1m x 1m wall surface - surface preparation and first coat
	2nd	Apply paint on a 1m x 1m wall surface - second coat, finishing and safe practices
5th Week	1st	Prepare cement mortar of proportion 1:3 or 1:6 using cement and sand
	2nd	Determine fineness of cement by Blaine's air permeability apparatus or by sieving
6th Week	1st	Determine specific gravity of cement
	2nd	Determine standard consistency and initial/final setting times of cement
7th Week	1st	Determine compressive strength of cement - specimen preparation
	2nd	Determine compressive strength of cement - testing and record
8th Week	1st	Determine bulking of sand
	2nd	Determine bulk density of fine and coarse aggregates
9th Week	1st	Determine water absorption of fine aggregates
	2nd	Determine water absorption of coarse aggregates

10th Week	1st	Determine fineness modulus of fine aggregate by sieve analysis
	2nd	Determine workability of concrete by slump cone test
11th Week	1st	Determine workability of concrete by compaction factor test
	2nd	Concrete mix design of a particular grade as per IS 10262:2019 – calculation
12th Week	1st	Preparation of concrete mix and casting of specimens as per the mix design
	2nd	Curing of specimens; compressive strength testing at 7 days
13th Week	1st	Compressive strength testing at 28 days; result analysis
	2nd	Demonstration of NDT equipment - Rebound Hammer test
14th Week	1st	Demonstration of NDT equipment - Ultrasonic Pulse Velocity test
	2nd	Record checking and viva
15th Week	1st	Revision of experiments, specifications and relevant IS codes
	2nd	Final record file submission and viva-voce



LESSON PLAN

Geotechnical Engineering (CEPC 207)

DISCIPLINE	SEMESTER	NAME OF THE TEACHING FACULTY
Civil Engineering	3rd	Mrs. Pranati Panda
SUBJECT	Geotechnical Engineering (CEPC 207)	
NO. OF DAYS/WEEK	3	
NO. OF WEEKS	15	
COMMENCEMENT DATE	01-07-2026	

Weekly Theory LESSON PLAN

WEEK	CLASS DAY	THEORY TOPICS
1st Week	1st	Introduction to geology, branches of geology, importance of geology for civil engineering structures and composition of earth
	2nd	Rocks: definition and classification based on genesis - igneous, sedimentary and metamorphic rocks
	3rd	Engineering uses of igneous, sedimentary and metamorphic rocks
2nd Week	1st	Importance of soil as a construction material and as a foundation bed for structures
	2nd	Field application of geotechnical engineering: foundation design, pavement design, earth retaining structures, earthen dam design
	3rd	Soil as a three-phase system; determination of water content by oven drying method as per BIS code
3rd Week	1st	Void ratio, porosity, degree of saturation, density index, air content, percentage of air voids and relations between 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 and dry unit weight by core cutter method and sand replacement method
4th Week	1st	Determination of specific gravity of soil by pycnometer method
	2nd	Consistency of soil: Atterberg limits - liquid limit, plastic limit and shrinkage limit; plasticity index
	3rd	Particle size distribution test and plotting of curve; determination of effective diameter of soil
5th Week	1st	Well graded and uniformly graded soils; BIS classification of soil
	2nd	Definition of permeability; Darcy's law of permeability

	3rd	Coefficient of permeability and factors affecting permeability
6th Week	1st	Determination of coefficient of permeability by constant head test
	2nd	Determination of coefficient of permeability by falling head test
	3rd	Simple numerical problems to determine coefficient of permeability
7th Week	1st	Seepage through earthen structures: seepage velocity and seepage pressure
	2nd	Phreatic line, flow lines and application of flow net
	3rd	Effective stress and quick sand condition
8th Week	1st	Concept of compaction; Standard and Modified Proctor test as per IS code
	2nd	Plotting of compaction curve: Optimum moisture content (OMC), maximum dry density (MDD), zero air voids line
	3rd	Factors affecting compaction; field methods of compaction - rolling, ramming and vibration
9th Week	1st	Consolidation: difference between compaction and consolidation; Terzaghi's model analogy of compression/springs
	2nd	Field implications of the consolidation process
	3rd	Concept and necessity of soil stabilization; different methods of soil stabilization
10th Week	1st	California Bearing Ratio (CBR) test - meaning and utilization in pavement construction
	2nd	Necessity of site investigation and soil exploration: types of exploration, criteria for deciding location and number of test pits and bores
	3rd	Field identification of soil: dry strength test, dilatancy test and toughness test
11th Week	1st	Shear failure of soil: general, local and punching shear; concept of shear strength of soil
	2nd	Components of shearing resistance of soil: cohesion and internal friction
	3rd	Mohr-Coulomb failure theory and strength envelope
12th Week	1st	Strength equation for purely cohesive soils
	2nd	Strength equation for cohesion-less soils
	3rd	Direct shear test and triaxial test - laboratory methods
13th Week	1st	Vane shear test - laboratory method
	2nd	Concept of bearing capacity: ultimate bearing capacity, safe bearing capacity and allowable bearing pressure
	3rd	Introduction to Terzaghi's analysis and assumptions for bearing capacity
14th Week	1st	Effect of water table on bearing capacity
	2nd	Field methods for determination of bearing capacity: Plate load test
	3rd	Standard Penetration Test (SPT) - test procedure as per IS:1888 & IS:2131
15th Week	1st	Definition of earth pressure; active and passive earth pressure for no surcharge condition

	2nd	Coefficient of earth pressure; Rankine's theory and assumptions for non-cohesive soils
	3rd	Types of foundations: shallow foundation and deep foundation



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LESSON PLAN

Geotechnical Engineering Lab (CEPC 215)

DISCIPLINE	SEMESTER	NAME OF THE TEACHING FACULTY
Civil Engineering	3rd	Mrs. Pranati Panda
SUBJECT	Geotechnical Engineering Lab (CEPC 215)	
NO. OF DAYS/WEEK	2	
NO. OF WEEKS	15	
COMMENCEMENT DATE	01-07-2026	

Weekly Practical LESSON PLAN

WEEK	CLASS DAY	PRACTICAL TOPICS
1st Week	1st	Determination of water content by oven drying method (IS 2720 Part II)
	2nd	Water content test - record checking and viva
2nd Week	1st	Determination of specific gravity of soil by pycnometer method (IS 2720 Part III)
	2nd	Specific gravity test - record checking and viva
3rd Week	1st	Determination of dry unit weight of soil by core cutter method (IS 2720 Part XXIX)
	2nd	Core cutter method - record checking and viva
4th Week	1st	Determination of dry unit weight of soil by sand replacement method (IS 2720 Part XXVIII)
	2nd	Sand replacement method - record checking and viva
5th Week	1st	Determination of Plastic and Liquid Limit; Plasticity Index (IS 2720 Part V)
	2nd	Liquid and Plastic limit test - record checking and viva
6th Week	1st	Determination of Shrinkage limit of soil (IS 2720 Part V)
	2nd	Shrinkage limit test - record checking and viva
7th Week	1st	Determination of grain size distribution by mechanical sieve analysis (IS 2720 Part IV)
	2nd	Sieve analysis - record checking and viva
8th Week	1st	Field identification of soil: visual inspection, dry strength test, dilatancy test and toughness test
	2nd	Field identification of soil - record checking and viva
9th Week	1st	Determination of coefficient of permeability by constant head test (IS 2720 Part XVII)
	2nd	Constant head test - record checking and viva

10th Week	1st	Determination of coefficient of permeability by falling head test (IS 2720 Part XVII)
	2nd	Falling head test - record checking and viva
11th Week	1st	Determination of shear strength of soil by direct shear test (IS 2720 Part XIII)
	2nd	Direct shear test - record checking and viva
12th Week	1st	Determination of shear strength by vane shear and triaxial shear test (IS 2720 Part XXX)
	2nd	Vane shear and triaxial shear test - record checking and viva
13th Week	1st	Determination of MDD and OMC by standard and modified Proctor test (IS 2720 Part VII)
	2nd	Proctor compaction test - record checking and viva
14th Week	1st	Determination of CBR value on the field (IS 2720 Part XVI)
	2nd	CBR field test - record checking and viva
15th Week	1st	Revision of laboratory procedures and relevant IS codes
	2nd	Final record file submission and viva-voce

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LESSON PLAN

Transportation Engineering Lab (CEPC 211)

DISCIPLINE	SEMESTER	NAME OF THE TEACHING FACULTY
Civil Engineering	3rd	Mrs. Pranati Panda
SUBJECT	Transportation Engineering Lab (CEPC 211)	
NO. OF DAYS/WEEK	2	
NO. OF WEEKS	15	
COMMENCEMENT DATE	01-07-2026	

Weekly Practical LESSON PLAN

WEEK	CLASS DAY	PRACTICAL TOPICS
1st Week	1st	Flakiness and Elongation Index of aggregates - test
	2nd	Flakiness and Elongation Index of aggregates - record checking and viva
2nd Week	1st	Determination of Crushing strength of aggregates - test
	2nd	Crushing strength of aggregates - record checking and viva
3rd Week	1st	Determination of Impact value of aggregates - test
	2nd	Impact value of aggregates - record checking and viva
4th Week	1st	Determination of Abrasion value of aggregates - test
	2nd	Abrasion value of aggregates - record checking and viva
5th Week	1st	Angularity Number of aggregates - test
	2nd	Angularity Number of aggregates - record checking and viva
6th Week	1st	Softening point test of bitumen
	2nd	Softening point test of bitumen - record checking and viva
7th Week	1st	Penetration test of bitumen
	2nd	Penetration test of bitumen - record checking and viva
8th Week	1st	Flash and Fire Point test of bitumen
	2nd	Flash and Fire Point test of bitumen - record checking and viva
9th Week	1st	Ductility test of bitumen
	2nd	Ductility test of bitumen - record checking and viva
10th Week	1st	Determination of Viscosity of bitumen
	2nd	Viscosity of bitumen - record checking and viva
11th Week	1st	Determination of bitumen content using centrifuging extractor

	2nd	Bitumen content - record checking and viva
12th Week	1st	Determination of stability and flow of bitumen using Marshall stability apparatus
	2nd	Marshall stability and flow - record checking and viva
13th Week	1st	Field visit: constructed road - visual inspection to identify defects and suggest remedial measures
	2nd	Field visit report preparation and discussion
14th Week	1st	Field visit: road of any one type (flexible/rigid) to study drainage condition
	2nd	Field visit report preparation and discussion
15th Week	1st	CBR Test of aggregates
	2nd	CBR Test - record checking, viva and revision

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