

Govt. Polytechnic Hamirpur (H.P.)

Lesson Planning (Theory)

Branch : Civil Engineering

Semester: 3rd

Subject : Mechanics of Materials

Session: Aug – Dec 2026

Teacher: Er. Vikas Thakur

Sr. No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1	10	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	12	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	12	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	12	Unit– 4 Bending and Shear Stresses in beams	• Concept and theory of pure bending, assumptions, flexural equation (without 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.	R1& R2	

5	5	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	
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REFERENCE RESOURCES

- ☐ Khurmi, R.S., Strength of Materials, S Chand and Co. Ltd. New Delhi.
- ☐ Ramamurtham, S, Strength of Materials, Dhanpat Rai and sons, New Delhi.
- ☐ Punmia B C, Strength of Materials, Laxmi Publications (p) Ltd. New Delhi.


 Signature of Teacher with Date


 Signature of H.O.D.



Government Polytechnic Hamirpur
DEPARTMENT OF CIVIL ENGINEERING
LESSON PLAN

Name of Faculty	Tanuj Gupta	Academic Session	August – November 2026
Course Name	Mechanics of Materials Lab	Scheme	N-2022
Course Code	CEPC217	Semester	3 rd Civil
Course Type	Program Core Course (PCC)	Semester Start Date	01-08-2026
L-T-P	0-0-2 (L:0, T:0, P:2, BS:0)	Semester End Date	28-11-2026

STUDY AND EVALUATION SCHEME

Teaching Hours/Week		Internal Assessment		External Assessment				Total		Credit
Theory	Practical	Theory	Practical	Theory	Hrs.	Practical	Hrs.	Theory	Practical	
NA	02 Hrs.	NA	40	NA	NA	60	03 Hrs.	NA	100	01

COURSE OUTCOMES (COs)

On successful completion of this course, students will be able to:-

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|-----|--|
| CO1 | Test different Civil engineering materials on Universal Testing Machine. |
| CO2 | Analyse structural behavior of materials under various loading conditions. |
| CO3 | Interpret shear force and bending moment diagrams for various types of beam sections and different loading conditions. |
| CO4 | Determine bending and shear stresses in beams under different loading conditions. |
| CO5 | Calculate flexural strength of different types of floor tiles. |

Recommended Books

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| 1 | Strength of Materials – D.S. Bedi, Khanna Publishing House, New Delhi (Edition 2018) |
| 2 | Strength of Materials, Vol. I – S. Timoshenko, CBS, New Delhi |
| 3 | Strength of Materials – R.S. Khurmi, S Chand and Co. Ltd., New Delhi |
| 4 | Strength of Materials – S. Ramamurtham, Dhanpat Rai and Sons, New Delhi |
| 5 | Strength of Materials – B.C. Punmia, Laxmi Publications (P) Ltd., New Delhi |
| 6 | Strength of Materials – S.S. Rattan, McGraw Hill Education, New Delhi |
| 7 | Strength of Materials – R.K. Bansal, Laxmi Publications |
| 8 | Strength of Materials – R. Subramaniam, Oxford University Press |

Practical Performing Plan

No. of Lab. Classes Planned	Practical to be perform/conduct	Proposed date (as per time table)		Actual Date		Remarks
		Group-1 (Sat)	Group-2 (Wed)	Group-1 (Sat)	Group-2 (Wed)	
1	Study and understand the use and components of Universal Testing Machine (UTM)	22.08.2026	05.08.2026			
2	Perform Tension test on mild steel as per IS:432(1)	29.08.2026	12.08.2026			
3	Perform Tension test on Tor steel as per IS:1608, IS:1139	05.09.2026	19.08.2026			
4	Determine Water Absorption on bricks as per IS:3495 (Part II), IS:1077 or tile IS:1237	19.09.2026	26.08.2026			
5	Determine Compressive strength of dry and wet bricks as per IS:3495 (Part I), IS:1077	26.09.2026	02.09.2026			
6	Conduct Abrasion Test on flooring tiles (any one) e.g. Mosaic tiles, Ceramic Tiles as per IS:13630 (Part 7), Cement Tile as per IS:1237	03.10.2026	09.09.2026			
7	Perform Single Shear and Double Shear test on any two metals e.g. Mild steel/brass/aluminium/copper/cast iron as per IS:5242	17.10.2026	16.09.2026			
8	Plot Shear Force and Bending Moment diagrams for simply supported beams	24.10.2026	23.09.2026			
9	Conduct Flexural test on timber beam of rectangular section in both orientations as per IS:1708, IS:2408	31.10.2026	30.09.2026			
10	Conduct Flexure test on floor tiles as per IS:1237, IS:13630 or roofing tiles as per IS:654, IS:2690	07.11.2026	07.10.2026			

Signature of Course Teacher with Name
(TANUJ GUPTA)
(LECT. MECH.)

Approved by
OIC/H&D/Principal

Govt. Polytechnic Hamirpur (H.P.)

Lesson Planning (Theory)

Branch : Civil Engineering

Semester: 3rd

Subject : Concrete Technology

Session: Aug – Dec 2026

Teacher: Er. Shivani

Class Room: L-7

Sr. No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1	06	Unit – I Cement, Aggregates and Water	- 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	11	Unit– II Concrete	- 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	10	Unit– III Concrete Mix Design and Testing of Concrete	- Concrete mix design: Objectives, methods of mix design, study of mix design as per IS 10262 (only procedural steps). - 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 14 factor affecting the rebound index, Ultrasonic pulse velocity test as per IS 13311 (part 1 and 2), Importance of NDT tests.	R1& R2	
4	10	Unit– IV Quality Control of	Concreting Operations: Batching, Mixing, Transportation, Placing, Compaction, Curing and Finishing of concrete.	R1& R2	

		Concrete Contouring	- Forms for concreting: Different types of form works for beams, slabs, columns, materials used for form work, 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.		
5	5	Unit- V Chemical Admixture, Special Concrete and Extreme Weather concreting	- 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. Gambhir, M.L., Concrete Technology, Tata McGraw Hill Publishing Co. Ltd., Delhi.
R2. Shetty, M.S., Concrete Technology, S. Chand and Co. Pvt. Ltd., Ram Nagar, Delhi.

Signature of Teacher with Date

Signature of H.O.D.

Govt. Polytechnic Hamirpur (H.P.)

Practical Planning & Coverage

Branch : Civil Engineering

Semester : 3RD

Subject : Concrete Technology

Session : Aug-Dec 2026

Teacher: Er. Shivani

Laboratory: Concrete Technology Lab

Experiment. No.	Description of Practical	Reference for Procedure/ Write up	Likely Dates Group 1 Group 2		Actual Dates	Signature
<u>1</u>	Determine fineness of cement by Blaine's air permeability apparatus or by sieving	<u>R1</u>	8/8/26	22/8/26		
2	Determine specific gravity, standard consistency, initial and final setting times of cement	<u>R1</u>	12/8	29/8		
3	Determine compressive strength of cement. aggregate by sieve analysis	<u>R1</u>	19/8	5/9		
4	Determine silt content in sand.	<u>R1</u>	26/8	19/9		
5	Determine bulking of sand.	<u>R1</u>	2/9	26/9		
6	Determine bulk density of fine and coarse aggregates.	<u>R1</u>	9/9	8/10		
7	Determine water absorption of fine and coarse aggregates.	<u>R1</u>	16/9	17/10		
8	Determine Fineness modulus of fine	<u>R1</u>	23/9	24/10		
9	Determine elongation and flakiness index of coarse aggregates	<u>R1</u>	30/9	31/10		
10	Determine workability of concrete by slump cone test.	<u>R1</u>	7/10	7/11		
11	Determine workability of concrete by compaction factor test	<u>R1</u>	14/10	14/11		
12	To prepare concrete mix of a particular grade and determine compressive strength of	<u>R1</u>	21/10	21/11		

13	Demonstration of NDT equipment	R1				
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R1. Gambhir, M.L., Concrete Technology, Tata McGraw Hill Publishing Co. Ltd., Delhi.


Signature of Teacher with Date

Signature of H.O.D.

Govt. polytechnic Hamirpur
Branch: Civil engineering
Subject: Geotechnical Engg.
Teacher: Er. Sujaya Sharma

Semester: 3rd
Session- August- Dec 2026

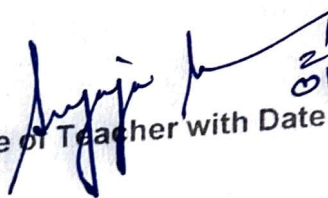
Sr. No.	No. of Lectures	Chapter/ Unit Description	Detail of Contents	Reference Resources	Remarks
1	08	Overview of Geology and Geotechnical Engineering	Introduction of Geology, Branches of Geology, Importance of Geology for civil engineering structure and composition of earth, Definition of a rock: Classification 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	
2	13	Physical and Index Properties of Soil	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's 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	

3	16	Permeability and Shear Strength of Soil	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, seepage pressure, phreatic line, flow lines, application of flow net, (No numerical problems). 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	R1, R2
4	10	Bearing Capacity of Soil	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. 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
5	9	Compaction and stabilization of soil	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

REFERENCE RESOURCES

1. Punmia, B.C., Soil Mechanics and Foundation Engineering, Laxmi Publication, Delhi.
2. Murthy, V.N.S., A textbook of soil mechanics and foundation Engineering, CBS Publishers & Distributors Pvt. Ltd., New Delhi.
3. Ramamurthy, T.N. & Sitharam, T.G., Geotechnical Engineering (Soil Mechanics), S Chand and Company LTD., New Delhi.
4. Raj, P. Purushothama, Soil Mechanics and Foundation Engineering, Pearson India, New Delhi.
5. Kasamalkar, B. J., Geotechnical Engineering, Pune Vidyarthi Griha Prakashan, Pune.
6. Arora K R, Soil Mechanics and Foundation Engineering, Standard Publisher

Signature of Teacher with Date

 21/08/20

Signature of H.O.D.

Practical Planning & Coverage

Branch: Civil Engineering

Semester : 3rd sem

Subject: Geotechnical engg.Lab

Session: July-Dec 2026

Teacher: Er. Sujaya Sharma

Laboratory: GTE Lab(G1)

Experiment. No.	Description of Practical	Reference for Procedure/ Write up	Likely Dates	Actual Dates	Signature
		R1	6/1/26		
<u>1</u>	Identification of rocks from the given specimen	R1	4/8/26 7/8/26		
<u>2</u>	Determine water content of given soil sample by oven drying method as per IS: 2720 (Part II).	R1	11/8/26 14/8/26		
<u>3</u>	Determine specific gravity of soil by pycnometer method as per IS 2720 (Part- III).	R1	18/8/26 21/8/26		
<u>4</u>	Determine dry unit weight of soil in field by core cutter method as per IS 2720 (Part- XXIX)	R1	25/8/26 11/9/26		
<u>5</u>	Determine dry unit weight of soil in field by sand replacement method as per IS 2720 (Part XXVIII).	R1	1/9/26 18/9/26		
<u>6</u>	Determine Plastic and Liquid Limit along with Plasticity Index of given soil sample as per IS 2720 (Part V).	R1	8/9/26 25/9/26		
<u>7</u>	Determine Shrinkage limit of given soil sample as per IS 2720 (Part- V).	R1	15/9/26 9/10/26		
<u>8</u>	Determine grain size distribution of given soil sample by mechanical sieve analysis as per IS 2720 (Part IV).	R1	29/9/26 16/10/26		
<u>9</u>	Use different types of soil to identify and classify soil by conducting field tests-through Visual inspection, Dry strength test, Dilatancy test and Toughness test.	R1	6/10/26 30/10/26		

10	Determine coefficient of permeability by falling head test as per IS 2720 (Part- XVII).	R1	27/10/26 6/11/26		
11	Determine MDD and OMC by standard proctor test of given soil sample as per IS 2720 (Part VII).	R1	3/11/26 13/11/26		

Reference Books:

1. B.C.Punmia, Soil Mechanics and Foundation Engineering, Laxmi Publication
2. Murthy, V.N.S., A text book of soil mechanics and foundation Engineering, CBS Publishers & Distributors Pvt. Ltd., New Delhi.
3. Ramamurthy, T.N. & Sitharam, T.G., Geotechnical Engineering (Soil Mechanics), S Chand and Company LTD., New Delhi.

Signature of Teacher with Date
01/08/26

Signature of H.O.D. 01/08/26