

**Haryana Engineering College, Jagadhri**  
Lesson Plan of Civil Engineering Deptt. 4th Semester

**Subject :** Civil Engineering – Societal & Global Impact (HM-252A)

**Objective of Course :**

Students will acquire the knowledge about importance of Civil Engineering in shaping and impacting the world.

<b>Day</b>	<b>Topic / Chapter Covered</b>	<b>Academic Activity</b>	<b>Test/Assignment</b>
Day 1	Pre-industrial revolution days and second industrial revolutions	Lecture	
Day 2	Agricultural revolution and IT revolution	Lecture	
Day 3	Recent major Civil Engineering breakthroughs and innovations	Lecture	
Day 4	Present day world and future projections, Ecosystems in Society and in Nature	Lecture	
Day 5	Global warming, its impact and possible causes	Lecture	
Day 6	Evaluating future requirements for various resources	Lecture	
Day 7	GIS and applications for monitoring systems	Lecture	
Day 8	Human Development Index	Lecture	Assignment 1
Day 9	Ecological Footprint of India Vs other countries and analysis	Lecture	
Day10	The ancient and modern Marvels and Wonders in the field of Civil Engineering	Lecture	
Day11	Future Vision for Civil Engineering	Lecture	
Day12	Habitats, Megacities, Smart Cities, futuristic visions	Lecture	
Day13	Transportation (Roads, Railways & Metros, Airports, Seaports, River ways, Sea canals	Lecture	
Day14	Tunnels (below ground, under water); Futuristic systems (ex, Hyper Loop)	Lecture	
Day15	Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney)	Lecture	
Day16	Wind, Wave, Tidal, Geothermal, Thermal energy	Lecture	
Day17	Water provisioning; Telecommunication needs (towers, above-ground and underground cabling	Lecture	
Day18	Awareness of various Codes & Standards governing Infrastructure development	Lecture	Assignment 2
Day19	Innovations and methodologies for	Lecture	

	ensuring Sustainability		
Day20	Solid waste management, Water purification	Lecture	
Day21	Wastewater treatment & Recycling, Hazardous waste treatment	Lecture	
Day22	Flood control (Dams, Canals, River interlinking), Multi-purpose water projects	Lecture	
Day23	Atmospheric pollution; Global warming phenomena and Pollution Mitigation measures	Lecture	
Day24	Stationarity and nonstationarity; Environmental Metrics & Monitoring	Lecture	
Day25	Facilities management and Climate control	Lecture	
Day26	Energy efficient built environments and LEED ratings	Lecture	
Day27	Recycling, Temperature/ Sound control in built environment	Lecture	Assignment 3
Day28	Security systems; Intelligent/ Smart Buildings	Lecture	
Day29	Role of Urban Arts Commissions; Conservation, Repairs & Rehabilitation of Structures & Heritage structures	Lecture	
Day30	Environmental Impact Analysis procedures;	Lecture	
Day31	Waste (materials, manpower, equipment) avoidance/ Efficiency increase	Lecture	
Day32	Advanced construction techniques for better sustainability;	Lecture	
Day33	Techniques for reduction of Green House Gas emissions in various aspects of Civil Engineering Projects	Lecture	
Day34	New Project Management paradigms & Systems (Ex. Lean Construction)	Lecture	
Day35	Contribution of Civil Engineering to GDP	Lecture	Assignment 4
Day36	Contribution to employment (projects, facilities management)	Lecture	
Day37	Quality of products, Health & Safety aspects for stakeholders	Lecture	
Day38	Innovations and methodologies for ensuring Sustainability during Project development	Lecture	

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**Haryana Engineering College, Jagadhri**  
Lesson Plan of Civil Engineering Deptt. 4th Semester

**Subject :** Engineering Mechanics (ES-205A)

**Objective of Course :**

Students will acquire the knowledge about the analysis of Engineering Mechanics like friction, virtual works and energy method and about the Kinetics of Rigid Bodies.

Day	Topic / Chapter Covered	Academic Activity	Test/Assignment
Day 1	Introduction to Engineering Mechanics Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D	Lecture	
Day 2	Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces,	Lecture	
Day 3	Components in Space – Resultant-Moment of Forces and its Application;	Lecture	
Day 4	Couples and Resultant of Force System, Equilibrium of System of Forces,	Lecture	
Day 5	Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.	Lecture	
Day 6	Friction:- Types of friction, Limiting friction, Laws of Friction,	Lecture	
Day 7	Static and Dynamic Friction; Motion of Bodies, wedge friction,	Lecture	
Day 8	screw jack & differential screw jack.	Lecture	Assignment 1
Day 9	Basic Structural Analysis:- Equilibrium in three dimensions; Simple Trusses; Zero force members	Lecture	
Day10	Beams & types of beams; Frames & Machines;	Lecture	
Day11	Centroid and Centre of Gravity:- Centroid of simple figures from first principle, centroid of composite sections	Lecture	
Day12	Centre of Gravity and its implications; Area moment of inertia- Definition,	Lecture	
Day13	Moment of inertia of plane sections from first principles,	Lecture	
Day14	Theorems of moment of inertia	Lecture	
Day15	Moment of inertia of standard sections and composite sections	Lecture	
Day16	Mass moment inertia of circular plate,	Lecture	

Day17	Cylinder, Cone, Sphere, Hook	Lecture	
Day18	Virtual Work and Energy Method- Virtual displacements	Lecture	Assignment 2
Day19	Principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom	Lecture	
Day20	Active force diagram, systems with friction, mechanical efficiency..	Lecture	
Day21	Conservative forces and potential energy (elastic and gravitational),	Lecture	
Day22	energy equation for equilibrium.Applications of energy method for equilibrium. Stability of equilibrium	Lecture	
Day23	Review of particle dynamics- Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates).	Lecture	
Day24	3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates).	Lecture	
Day25	Work-kinetic energy, power	Lecture	
Day26	Impact (Direct and oblique).	Lecture	
Day27	Introduction to Kinetics of Rigid Bodies:- Basic terms,	Lecture	Assignment 3
Day28	General principles in dynamics; Types of motion,	Lecture	
Day29	Numerical problem	Lecture	
Day30	sample problems	Lecture	
Day31	D'Alembert's principle and its applications in plane motion and connected bodies;	Lecture	
Day32	Work energy principle and its application in plane motion of connected bodies;	Lecture	
Day33	Kinetics of rigid body rotation.	Lecture	
Day34	Numerical problem	Lecture	
Day35	Instantaneous centre of rotation in plane motion	Lecture	Assignment 4
Day36	Numerical problem	Lecture	

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**Haryana Engineering College, Jagadhri**  
Lesson Plan of Civil Engineering Deptt. 4th Semester

**Subject :** Structural Analysis - I (CE-202A)

**Objective of Course :**

Students will acquire the knowledge about the analysis of beams and frame structure.

Day	Topic / Chapter Covered	Academic Activity	Test/Assignment
Day 1	Introduction to Static and Kinematic Indeterminacies	Lecture	
Day 2	Castigliano's theorems (1 <sup>st</sup> & 2 <sup>nd</sup> )	Lecture	
Day 3	Strain energy method	Lecture	
Day 4	Numerical Problems	Lecture	
Day 5	Analysis of frames with one redundant members using Castigliano's 2nd theorem.	Lecture	
Day 6	Numerical Problems	Lecture	
Day 7	Introduction of Slope Deflection Method	Lecture	
Day 8	Analysis of continuous beams with both ends fixed by Slope Deflection Method.	Lecture	Assignment 1
Day 9	Numerical Problems	Lecture	
Day10	Analysis of continuous beams with both ends hinged by Slope Deflection Method	Lecture	
Day11	Numerical Problems	Lecture	
Day12	Analysis of continuous beams with one end fixed and other end hinged by Slope Deflection Method	Lecture	
Day13	Numerical Problems	Lecture	
Day14	Analysis of continuous beams with both ends hinged (sinking of supports) by Slope Deflection Method	Lecture	
Day15	Numerical Problems	Lecture	
Day16	Analysis of symmetrical Portal frames by Slope Deflection Method	Lecture	
Day17	Numerical Problems	Lecture	
Day18	Analysis of unsymmetrical Portal frames by Slope Deflection Method	Lecture	Assignment 2
Day19	Numerical Problems	Lecture	
Day20	Analysis the continuous beams by Moment Distribution Method	Lecture	
Day21	Numerical Problems	Lecture	
Day22	Analysis the portal frame by Moment Distribution Method	Lecture	
Day23	Numerical Problems	Lecture	
Day24	Elastic centre and properties of analogous column	Lecture	
Day25	Numerical Problems	Lecture	

Day26	Applications to beam and frames.	Lecture	
Day27	Analysis of two hinged arch.(Derivations)	Lecture	Assignment 3
Day28	Bending Moment Diagram for various loadings	Lecture	
Day29	Temperature effects, Rib shortening, Axial thrust and Radial Shear force diagrams.	Lecture	
Day30	Numerical problems	Lecture	
Day31	Introduction of centroidal principal axes of sections	Lecture	
Day32	Bending stresses in beam subjected to unsymmetrical bending	Lecture	
Day33	shear centre, shear centre for channel, Angles and Z sections (Numerical problems)	Lecture	
Day34	Introduction of Cable and suspension Bridges	Lecture	
Day35	Uniformly loaded cables, Temperature stresses.	Lecture	Assignment 4
Day36	Numerical Problems	Lecture	
Day37	Three hinged stiffening Girder	Lecture	
Day38	Numerical Problems	Lecture	
Day39	Two hinged stiffening Girder	Lecture	
Day40	Numerical Problems	Lecture	

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**Haryana Engineering College, Jagadhri**  
Lesson Plan of Civil Engineering Deptt. 4th Semester

**Subject :** Design of Steel Structure - I (CE-204A)

**Objective of Course :**

Students will acquire the knowledge about specifications, structural elements, design specifications of Steel Structures.

Day	Topic / Chapter Covered	Academic Activity	Test/Assignment
Day 1	Loads , Introduction to IS code,	Lecture	
Day 2	Steel Structures, I S rolled steel Section	Lecture	
Day 3	Concrete v/s steel, design approach	Lecture	
Day 4	Design Specification	Lecture	
Day 5	Introduction of riveted joint and types,	Lecture	
Day 6	Failure of rivet and Bolt- Bolting	Lecture	
Day 7	Types of Bolting and Efficiency	Lecture	
Day 8	Advantages and Disadvantages of bolting, Design of Rivet	Lecture	Assignment 1
Day 9	Welding and its types	Lecture	
Day10	Numerical problem of eccentric connections	Lecture	
Day11	Introduction of tension member	Lecture	
Day12	Failure of tension member	Lecture	
Day13	Failure criteria for tension member	Lecture	
Day14	Design of tension member as per IS specification	Lecture	
Day15	Numerical problem of tension member	Lecture	
Day16	Numerical problem of tension member	Lecture	
Day17	Numerical problem of tension member	Lecture	
Day18	Introduction of of compression member	Lecture	Assignment 2
Day19	Types of compression member	Lecture	
Day20	Design methodology of compression member	Lecture	
Day21	Design of built up column	Lecture	
Day22	Introduction of laced and battened columns	Lecture	
Day23	Design of Lacing and battens	Lecture	
Day24	Indian standard specification for the design of compression member	Lecture	
Day25	Design problems regarding compression member Numerical problem of compression members	Lecture	
Day26	Introduction of flexural member	Lecture	
Day27	Introduction of laterally restrained built up section	Lecture	Assignment 3

Day28	Design of laterally restrained built up sections	Lecture	
Day29	Introduction of un-restrained section.	Lecture	
Day30	Design of encased beams as per I S specifications	Lecture	
Day31	Introduction of Slab base, Design of Slab base	Lecture	
Day32	Introduction of gusseted base and grillage foundation	Lecture	
Day33	Design of gusseted base and grillage foundation	Lecture	
Day34	Design of gusseted base and grillage foundation	Lecture	
Day35	Design loads, combination of loads	Lecture	Assignment 4
Day36	Design of members (including Purlins) and joints	Lecture	
Day37	Design of members (including Purlins) and joints	Lecture	
Day38	Detail working drawing	Lecture	

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**Haryana Engineering College, Jagadhri**  
Lesson Plan of Civil Engineering Deptt. 4th Semester

**Subject :** Soil Mechanics (CE-206A)

**Objective of Course :**

Students will acquire the knowledge about soil, its classification, Physical and engineering properties.

Day	Topic / Chapter Covered	Academic Activity	Test/Assignment
Day 1	Introduction, soil and rock	Lecture	
Day 2	Soil Mechanics and Foundation Engineering, origin of soils, weathering, soil formation, major soil deposits of India	Lecture	
Day 3	Particle size, particle shape, interparticle forces, soil structure, principal clay minerals	Lecture	
Day 4	three phase system, weight-volume relationships, soil grain properties	Lecture	
Day 5	sieve analysis, sedimentation analysis, grain size distribution curves, consistency of soils, consistency limits and their determination, activity of clays, relative density of sands.	Lecture	
Day 6	Numerical Problems	Lecture	
Day 7	Purpose of classification, classification on the basis of grain size	Lecture	
Day 8	Darcy's law and its validity, discharge velocity and seepage velocity, factors affecting permeability,	Lecture	Assignment 1
Day 9	laboratory determination of coefficient of permeability	Lecture	
Day10	Numerical Problems	Lecture	
Day11	Determination of field permeability, permeability of stratified deposits	Lecture	
Day12	Principle of effective stress, effective stress under hydrostatic conditions	Lecture	
Day13	Capillary rise in soils, effective stress in the zone of capillary rise, effective stress under steady state hydro-dynamic conditions	Lecture	
Day14	Seepage force, quick condition, critical hydraulic gradient, two dimensional flow, Laplace's equation	Lecture	
Day15	Numerical Problems	Lecture	
Day16	Properties and utilities of flownet, graphical method of construction of	Lecture	

	flownets		
Day17	Piping, protective filter. Numerical Problems	Lecture	
Day18	Introduction, role of moisture and compactive effect in compaction	Lecture	Assignment 2
Day19	Laboratory determination of optimum moisture content, moisture density relationship	Lecture	
Day20	Numerical Problems	Lecture	
Day21	compaction in field, compaction of cohesionless soils	Lecture	
Day22	moderately cohesive soils and clays, field control of compaction	Lecture	
Day23	Numerical Problems	Lecture	
Day24	Boussinesq's equation, vertical stress distribution diagrams	Lecture	
Day25	vertical stress beneath loaded areas, Newmark's influence chart	Lecture	
Day26	approximate stress distribution methods for loaded areas, contact pressure	Lecture	
Day27	Numerical problems	Lecture	Assignment 3
Day28	Introduction to Compressibility and Consolidation, components of total settlement	Lecture	
Day29	Temperature effects, Rib shortening, Axial thrust and Radial Shear force diagrams.	Lecture	
Day30	consolidation process, one- dimensional consolidation test	Lecture	
Day31	typical void ratio-pressure relationships for sands and clays, normally consolidated and over consolidated clays	Lecture	
Day32	Casagrande's graphical method of estimating pre-consolidation pressure,	Lecture	
Day33	Terzaghi's theory of one- dimensional primary consolidation, determination of coefficients of consolidation, consolidation settlement, Construction period settlement, secondary consolidation.	Lecture	
Day34	Numerical Problems	Lecture	
Day35	Mohr stress circle, Mohr-Coulomb failure-criterion, relationship between principal stresses at failure, shear tests	Lecture	Assignment 4
Day36	Direct shear test, unconfined compression test, triaxial compression tests, drainage conditions and strength parameters, Vane shear test, shear strength	Lecture	

	characteristics of sands, normally consolidated clays		
Day37	Earth pressure at rest, Rankine's active & passive states of plastic equilibrium	Lecture	
Day38	Rankine's earth pressure theory, Coulomb's earth pressure theory	Lecture	
Day39	Numerical Problems	Lecture	
Day40	Numerical Problems	Lecture	

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**Haryana Engineering College, Jagadhri**  
Lesson Plan of Civil Engineering Deptt. 4th Semester

**Subject :** Hydraulic Engineering (CE-208A)

**Objective of Course :**

Students will acquire the knowledge about the flow of fluid, functioning of pumps and turbines.

Day	Topic / Chapter Covered	Academic Activity	Test/Assignment
Day 1	Laminar Flow: Navier Stoke's equation,	Lecture	
Day 2	Laminar flow between parallel plates	Lecture	
Day 3	Couette flow	Lecture	
Day 4	laminar flow	Lecture	
Day 5	through pipes-Hagen Poiseuille law	Lecture	
Day 6	laminar flow around a sphere- Stokes'law	Lecture	
Day 7	Flow through pipes: Types of flows-Reynold's experiment,	Lecture	
Day 8	shear stress on turbulent flow & numericals	Lecture	Assignment 1
Day 9	boundary layer in pipes- Establishment of flow,	Lecture	
Day10	velocity distribution for turbulent flow in smooth and rough pipes	Lecture	
Day11	resistance to flow of fluid in smooth and rough pipes	Lecture	
Day12	Stanton and Moody's diagram. Darcy's weisbach equation, other energy losses in pipes, loss due to sudden expansion,	Lecture	
Day13	hydraulic gradient and total energy lines, pipes in series and in parallel	Lecture	
Day14	equivalent pipe, branched pipe	Lecture	
Day15	pipe networks, Hardy Cross method, water hammer.	Lecture	
Day16	Drag and Lift: Types of drag, drag on a sphere, flat plate	Lecture	
Day17	cylinder and airfoil	Lecture	
Day18	Development of lift on immersed bodies like circular cylinder and airfoil.	Lecture	Assignment 2
Day19	Open Channel Flow: Type of flow, geometric parameters of channel section	Lecture	
Day20	uniform flow, most economical section (rectangular and trapezoidal)	Lecture	

Day21	specific energy and critical depth, momentum in open channel, specific force, critical flow in rectangular channel	Lecture	
Day22	applications of specific energy and discharge diagrams to channel transition, metering flumes, hydraulic jump in rectangular channel	Lecture	
Day23	surges in open channels, positive and negative surges	Lecture	
Day24	gradually varied flow equation and its integration, surface profiles.	Lecture	
Day25	Compressible flow: Basic relationship of thermodynamics continuity	Lecture	
Day26	momentum and energy equations,	Lecture	
Day27	propagation of elastic waves due to compression of fluid	Lecture	Assignment 3
Day28	Mach number and its significance	Lecture	
Day29	subsonic and supersonic flows	Lecture	
Day30	propagation of elastic wave due to disturbance in fluid mach cone	Lecture	
Day31	stagnation pressure.	Lecture	
Day32	Pumps and Turbines :Reciprocating pumps, their types,	Lecture	
Day33	work done by single acting pumps	Lecture	
Day34	work done by double acting pumps	Lecture	
Day35	numericals problems	Lecture	Assignment 4
Day36	Centrifugal pumps, components and parts and working	Lecture	
Day37	types, heads of a pump-statics and manometric heads,.	Lecture	
Day38	Force executed by fluid jet on stationary and moving flat vanes	Lecture	
Day39	Turbines-classifications of turbines based on head and specific speed	Lecture	
Day40	component and working of Pelton wheel and Francis turbines, cavitation and setting of turbines.	Lecture	
Day41	Numerical problems	Lecture	
Day42	Numerical problems	Lecture	

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