

Jharkhand University of Technology

Ranchi, 834010



SYLLABUS

**For Diploma Program in
Civil Engineering**

(Effective from 2024-25)

DEPARTMENT OF CIVIL ENGINEERING

(3rd – SEMESTER)

Engineering Mechanics and Strength of Materials

Subject code – CIV301

1 Rationale: The study of strength of materials often refers to various methods of calculating the stresses and strains in structural members such as beams, columns and shafts. The methods employed to predict the response of a structure under loading and its susceptibility to various failure modes takes into account the properties of the materials such as its yield strength, ultimate strength, Young's modulus, and Poisson's ratio. In addition, the mechanical elements, geometric properties such as its length, width, thickness, boundary constraints and abrupt changes in geometry such as holes are considered.

2 Course Outcomes/Skill Sets: At the end of this course students will be able to:

CO-01	Explain the potential impact of forces / stresses on structural elements / materials in a given condition.
CO-02	Calculate the moment of Inertia for a given symmetrical or asymmetrical geometric sections.
CO-03	Calculate shear force and bending moments for different loading conditions and support conditions, draw the SFD & BMD and validate the analysis using Ansys software.
CO-04	Calculate bending and shear stresses in beams under different load conditions and validate the analysis using any FEM analysis software.
CO-OS	Calculate and validate the safety of a column for various given loads and end conditions.

3. Course Content

Week	CO	PO	Lecture (Knowledge Criteria)	Tutorial (Activity Criteria)	Practice (Performance Criteria)
			3 hours/week	1 hour/week	4 hours/week (2 hours/batch twice in a week)
1	1	1, 2	1. Force and characteristics of a force. Force system: Classification of force system according to plane		1 & 2. Verification of Lami's Theorem.

			<p>and line of action- Principle of transmissibility of forces, moment of a force, Resolution & composition of forces.</p>	<p>1.Determine Forces in members of a truss at the given joint.</p>	
			<p>2. Resultant force, Law of moments, Resultant of Concurrent and non-concurrent force system. Equilibrium conditions.</p>	<p>2.Determination of resultant of forces acting on retaining wall and trapezoidal dam section.</p>	
			<p>3.Simple Problems on determination of resultant of concurrent & non concurrent force systems.</p>		
2	1	1, 2	<p>1.Rigid body, plastic body Mechanical properties of metal- Rigidity, Elasticity, Plasticity.</p>	<p>1. Compare the properties of Hard, soft, brittle and Ductile material.</p>	<p>1. Hardness test to evaluate a hardness of given material Example: Mild Steel, Stainless steel, Wood, Copper, Bronze, Brass, Aluminium, Glass.</p>
			<p>2.Compressibility, Hardness, Toughness, Stiffness, Brittleness, Ductility</p>		<p>2. Impact test to evaluate toughness of a given material Example: Mild Steel, Stainless steel, Wood, Copper, Bronze, Brass, Aluminium, Glass.</p>
			<p>3. Malleability, Creep, Fatigue, tenacity, durability. Testing procedures and importance of each property of materials.</p>		
3	1	1, 2	<p>1. Stress, strain, Hooke's law</p> <p>Types of stresses - Normal stress and Shear stress</p> <p>Types of normal stress - Tensile stress and Compressive stress</p>	<p>1. Plot Stress/strain graph for various structural steel</p>	<p>1.Conduct tensile test on following materials and plot Stress-strain curve a) Mild steel b) HYSD bar</p> <p>Determine yield stress/ proof stress, Ultimate stress, breaking stress and percentage of elongation, Young's Modulus</p>
			<p>2.Types of strains- Normal strain and Shear strain</p> <p>Types of normal strain - Longitudinal strain, Lateral strain and volumetric strain</p> <p>Types of Lateral strain - Tensile strain and Compressive strain</p>		<p>2.Conduct tensile test on following materials and plot Stress-strain curve a) Plastic b) Bamboo c) Fibres</p> <p>Determine yield stress/ proof stress, Ultimate stress, breaking stress and percentage of elongation, Young's Modulus</p>
			<p>3.Problems</p>		

4	1	1, 2	1. Elongation and Contraction - Poisson's Ratio and Modulus of Elasticity.	1. Determine Stresses and Modulus of Elasticity in Civil Engineering Building materials	<p>1. Conduct tensile test and Measure strain using electric strain gauge on following materials and plot Stress-strain curve.</p> <p>a) Mild steel b) HYSD bar</p> <p>2. Determine yield stress/ proof stress, Ultimate stress, breaking stress and percentage of elongation, Young's Modulus and compare the methods of finding yield stress.</p>
			2. Problems		
			3. Problems		
5	1	1, 2	1. Stresses in bars of composite section (Modular ratio).	1. Analyse the thermal stresses in different materials using Open-source Software.	1. Problems on axially loaded composite sections.
			2. Principles of superposition, Deformation of uniform bars and bars of varying cross section subjected to constant load & varying loads.		2. Analysis of Composite Section - Interpretation of Results.
			3. Volumetric strain & change in volume, Relation among elastic constants, Thermal stresses.		(Analysis by any FEM analysis software)
6	2	1, 2, 3	1. Centre of gravity & centroid, Moment of Inertia for Plane lamina: radius of gyration, elastic sectional modulus, parallel and perpendicular axes theorems	1. Study and compare different geometrical shapes of structural elements like beams, columns, members of truss, shafts etc.	1. Calculation of Centroid and Moment of Inertia of different sections using CADD software.
			2. Moment of Inertia for rectangle, square, circle, semi-circle, and quarter circle and triangle section.		2. Finding the centroid and moment of inertia of irregular sections by manual method (Open ended Experiment) Comparison of MI with manual calculation and CADD software.
			3. MI of symmetrical and unsymmetrical I section, Channel section.		
7	2	1, 2, 3	1. MI of T section, L section, hollow sections, built-up sections about centroidal axes and any other reference axis	1. Calculation of Moment of Inertia for other built-up sections.	1 & 2. Calculation of centroid and Moment of Inertia by Open-Source application/Ansys for a given section and Influence of MI on a strength of section
			2. Problems.		

			3. Polar moment of inertia of solid circular sections. - problems.		
8	3	1, 2, 3	<p>1. Types of beams - simply supported, cantilever, fixed continuous and overhanging beams.</p> <p>Types of supports: Roller support, Hinged support, Fixed support and Pinned support.</p> <p>2. Determinate structures: Types of loading- Axial load, Transverse load, point load, uniformly distributed load, uniform varying load, moment, support reactions for determinate structures.</p> <p>3. Concept of shear force and bending moment, sign convention. Relation between bending moment, shear force and rate of loading.</p> <p>1. Calculation of Bending Moment and shear force for cantilever beams with UDL and point load and Draw Shear force and bending moment diagrams for cantilever beams with UDL and point load.</p> <p>2. Problems.</p>	<p>1. Differentiate between line, Surface and solid structural elements on the basis of their behaviour under loads.</p> <p>1. Calculation of Bending Moment and shear force for fixed beams with UDL and point load.</p> <p>2. Draw Shear force and bending moment diagrams for fixed beam beams. (UDL and point load).</p>	<p>1. Calculation of Bending Moment and shear force for simply supported beams with UDL and point load.</p> <p>2. Draw Shear force and bending moment diagrams for simply supported beams. (UDL and point load).</p> <p>1. Analyse simply supported beams, subjected to different types of loads, for SFD and BMD using any FEM analysis software.</p>
9	3	1, 2, 3	<p>3. Problems.</p> <p>1. Calculation of Bending Moment and shear force for overhanging beams with UDL and point load Draw Shear force and bending moment diagrams for overhanging beams with UDL and point load and Locate points of contra-flexure.</p> <p>2. Problems.</p>	<p>1. Calculation of bending moment and shear force for overhanging and point beam of bicycle stand.</p>	<p>2. Analyse cantilever beams, subjected to different types of loads, for SFD and BMD using any FEM analysis software.</p> <p>1 & 2. Analyse overhanging beams, subjected to different types of loads, for SFD and BMD using any FEM analysis software.</p>
10	3	1, 2, 3	<p>moment diagrams for overhanging beams with UDL and point load and Locate points of contra-flexure.</p> <p>2. Problems.</p>	<p>shear force for overhanging and point beam of bicycle stand.</p>	
					7

			3. Problems		
11	4	1, 2,3	1. Bending stress in beam, Assumptions in simple bending theory, bending equations.	1. Determine bending stress and shear stress across a section of structural elements like RCC beam, Steel beam and purlins.	1. Problems on Bending stress and preparation of bending stress distribution diagram- variation of bending. 2. Flexure Test on materials like steel, concrete specimens -Two Point Load system.
			2. Neutral axis, Modulus of rupture, section modulus, flexural rigidity, moment of resistance.		
			3. Bending and Shear Stresses across the cross section of the beams- rectangular and T section.		
12	5	1, 2,3	1. Slope and deflection using Moment area method for simply supported and cantilever beams subjected to symmetrical point loads and UDL.	1. Calculation of deflection for Overhanging beams 2. Limitation of deflection for various structural Elements	1. Calculation and analysis of beams for slope and deflection by Open-Source application / any FEM analysis software 2. Animations of deflection
			2. Problems		
			3. Problems		
13	5	1, 2,3	1. Introduction - Short and long columns - Euler's theory	1. Study and prepare a report on the failure modes of Column and Influence of L/D ratio on the Strength of column.	1. Problems 2. Calculation and analysis of crippling load by Open-Source application/any FEM analysis software for Axial load, eccentric load and column with different materials
			2. Effective length, slenderness ratio - radius of gyration, buckling load, crippling load		
			3. Assumptions, Euler's Buckling load for different end conditions, Limitations of Euler's theory		
Total in hours			39	13	52

NOTE 1: The course content shall be delivered through lectures, PowerPoint presentations, video demonstrations and field visits.

NOTE 2: The TUTORIAL (Activity criteria) shall be conducted / executed by the student (Minimum ONE suggested activity from each week) and to be submitted in portfolio evaluation of activities through rubrics

to the faculty.

NOTE 3: The PRACTICE (Performance criteria) shall be conducted by the student and observations and report to be submitted at the end of each session to the faculty.

4. Reference:

Sl. No.	Description
1	Ramamurtham. S., “<i>Strength of Materials</i>”, 14th Edition, DhanpatRai Publications
2	SS Bhavikatti, Strength of Materials
3	Fundamentals of strength of materials by P N Chandramouli ” PHI New delhi
4	Relevant IS Codes

Modern Surveying

Subject code – CIV302

Week	CO	PO	Lecture (Knowledge Criteria)	Tutorial (Activity Criteria)	Practice (Performance Criteria)
			Hours/week	Hour/week	Hours/week
1.			<p>1. Contours, Importance of contour maps. Characteristics of contours.</p> <p>2. Methods of plotting contours. Factors affecting contour interval.</p> <p>3. Method of preparing contour map from the given RLs of grid points with examples.</p>	<p>1. Study the contour maps of different topography.</p> <p>2 Study the Uses of Contours in civil engineering field</p> <p>3 Measure the volume of Reservoir from contour maps.</p>	<p>1. Conduct block contouring for a minimum area of 40 m x 40 m to draw its contour plan at a suitable contour interval.</p> <p>2. Find out the area enclosed by the contours using AutoCAD.</p>
2	1	1,2,4,7	<p>1. Component parts of transit theodolite and their functions.</p> <p>2. Reading the vernier, Salient features and relationship between the fundamental axes of transit theodolite.</p> <p>3. Technical terms used. Temporary adjustments.</p>	<p>1. List the Applications of different types of theodolites.</p>	<p>1. Measure horizontal angle between the given points.</p> <p>2. Measure vertical angle between the given points.</p>
3	1	1,2,4,7	<p>1. Theodolite traversing. Open and Closed Traverse.</p> <p>2. Theodolite traversing by included angle method and deflection angle method.</p> <p>3. Checks for open and closed traverse, Calculation of bearing from angles. Traverse computation-Latitude, Departure.</p>	<p>1. Study the Consecutive coordinates, independent coordinates.</p> <p>2. Balance the traverse using spreadsheet by Bowditch rule or Transit rule.</p> <p>3. Conduct Contouring using Theodolite.</p>	<p>1. Measure horizontal angle by repetition and reiteration method.</p> <p>2. Carry out survey project for closed traverse for minimum 5 sides by locating details using theodolite.</p>

4	2	1,2,4,7	<p>1. Trigonometrical Survey and its applications.</p> <p>2. Elevations and Distances of accessible points whose base is accessible-Single plane method-Simple problems.</p> <p>3. Elevations and Distances of inaccessible points whose base is inaccessible-Single plane method-Simple problems.</p>	<p>1. How do we measure heights of mountains?</p> <p>2. Measure height of inaccessible high-rise towers.</p>	<p>1. Measure height of an object whose base is accessible.</p> <p>2. Measure height of an object whose base is inaccessible.</p>
5	2	1,2,4,7	<p>1. Tachometer: Principle of tachometry and component parts. Analytic lens</p> <p>2. Tachometric formula for horizontal distance with telescope horizontal and staff vertical.</p> <p>3. Method of determining Horizontal and vertical distances with tachometer by fixed hair method and staff held vertical.</p>	<p>1. List the applications of Tachometric survey.</p> <p>2. List the limitations of tachometry.</p>	<p>1. Determine Tachometric constants.</p> <p>2. Calculate the reduced levels and horizontal distances of given points using tachometer.</p>
6	3	1,2,4,7	<p>1. Total Station: Introduction, Integral parts, Applications.</p> <p>2. Working principle, Advantages, Disadvantages.</p> <p>3. Use of function keys. Precautions to be taken while using a Total Station.</p>	<p>1. List the Applications of different types of Total Stations.</p> <p>2. Differentiate between theodolite and Total station.</p>	<p>1. Component parts and General commands used.</p> <p>2. Instrument preparation and setting up.</p>
7	3	1,2,4,7	<p>1. Setting up a back sight. Azimuth mark, control point.</p> <p>Change point - procedure to shift change point and precautions to be taken.</p> <p>General settings.</p> <p>2. Automatic Target Recognition, Field Book recording, Radial Shoot.</p> <p>3. Survey Station Description (codes). Occupied point (Instrument Station) Entries.</p>	<p>1. Calculate Height using Trigonometric survey and compare results with total station.</p>	<p>1. Find out the Horizontal angle, Vertical angle of given points.</p> <p>2. Find out the distance, gradient and difference in height between two inaccessible points using Total Station.</p>
			1. 3D coordinates: By Resection.		

8	3	1,2,4,7	<p>Coordinate calculation. Offset: Single distance offset.</p> <p>2. Date Retrieval, Field Generated Graphics. Data Gathering Components, Data Processing Components of the system.</p> <p>3. Data plotting, Field computers, Modem for data transfer.</p>	1. Compare and prepare report on accuracy of results between Theodolite and Total Station.	<p>1. Stake out using Total Station- Find a specific point and its coordinates in the field.</p> <p>2. Find out the height of a remote point like tip of a transmission tower or chimney using Total Station.</p>
9	3	1,2,4,7	1. Interfacing the Data Collector with a Computer, Digital Data.	1. Compare and prepare a report on time requirements	1 & 2: Prepare a topographic sketch of a given area using Total station and plot the

			<p>2. Digital transfer of data to Application software. Requirements of a data collector.</p> <p>3. Calibrating the Instrument Equipment maintenance, Maintaining battery power.</p>	to complete a particular activity by Total Station with other equipment.	contour plan using AutoCAD / Civil 3D/ Auto plotter.
10	3	1,2,4,7	<p>1. Total station survey system error sources and how to avoid them.</p> <p>2& 3. Controlling errors.</p>	<p>1. How Data is transferred from Total Station to other electronic devices.</p> <p>2. Collect the survey sketch of any place and mark the boundaries and determine the area using total station</p>	<p>1. Conduct a closed traverse for a given area using Total Station. (Including minimum two change points)</p> <p>2. Plot the area map of the closed traverse conducted using AutoCAD and Find the area.</p>
11	4	1,2,4,7	<p>Construction Layout Using Total Station</p> <p>1. How to set control points around the layout site.</p> <p>2. How control points and coordinates are used to set out the position of buildings (how the positions of the actual structures are fixed and site profiles to guide the excavation and pouring concrete into the foundations)</p> <p>3. Setting up site profiles and sight rails for Drainage.</p>	<p>List the points that should be kept in mind while using Total station during the operation of</p> <p>a. Levelling b. Measuring distances c. Measuring angles. d. Contouring</p>	<p>1. Set out control points for centre line marking of a building using the total station.</p> <p>2. Set out control points for laying of pipeline using total station.</p>
12	4	1,2,4,7	<p>1. Aerial Surveying, GPS: Introduction, Applications. Positioning methods, Errors and Limitations in GPS. applications of Google maps in civil Engineering.</p> <p>2. Remote Sensing: Introduction, Basic components of remote sensing, energy interaction with the earth surfaces.</p>	<p>1. How the Remote sensing Interpretation is done?</p> <p>2. Study the classification, applications, advantages & Disadvantages</p>	Virtual Media and Field Visit

			3. Applications of remote sensing in mining, land use/land cover, mapping, disaster management and environment.	of GPS surveying 3. Prepare a Technical Report on Field Visit.	
13	4	1,2, 4,7	1. GIS: Overview, components Applications and Limitations. 2. Drone Surveying: Overview, Applications and Limitations. 3. Lidar: Overview, Applications and Advantages. Hyper spectral Imagery.	1. What is the need of GIS for civil engineers? 2. Prepare a Technical Report on Field Visit.	Virtual Media and Field Visit
Total in hours			39	13	52

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NOTE 3: The PRACTICE (Performance criteria) shall be conducted by the student and observations and report to be submitted at the end of each session to the faculty.

4. Reference:

Sl. No.	Description
1	Duggal, S. K., Surveying Vol. I & II , Tata Mcgraw Hill, New Delhi
2	Subramanian, R., Surveying & Levelling , Oxford University Press, New Delhi
3	Punamia, B.C., Surveying Vol. I, II & III , Laxmi Publications
4	Kanetkar, T.P. and Kulkarni, S.V., Surveying and Levelling Vol. I & II , Pune Vidyarthi Gruh
5	Arora, K.R., Surveying Vol. I, II & III , Standard Book House. New Delhi
6	Basak, N.N., Surveying and Levelling , Tata Mcgraw Hill, New Delhi
7	A. Bannister, S. Raymond, R. Baker, "Surveying" , Pearson, 7th ed., NewDelhi
8	Agor, R., Surveying and Levelling , Khanna Publishers, New Delhi
9	Agor, R. Advanced Surveying , Khanna Publishers, New Delhi

10	Roy, S.K., Fundamentals of Surveying, Prentice Hall India, New Delhi
11	Remote Sensing and GIS by B Bhatia, Oxford University Press, New Delhi.
12	Remote sensing and Image interpretation by T.M Lillesand, R.W Kiefer and J.W Chipman, 5th edition, John Wiley and Sons India
13	Lo, C.P. & Yeung A.K.W., Concepts and Techniques of Geographic Information Systems, Prentice Hall of India, New Delhi, 2002
14	Anji Reddy, M., Remote Sensing and Geographical Information Systems, B.S.Publications, Hyderabad, 2001

Construction Techniques

Subject code – CIV303

Week	CO	PO	Lecture (Knowledge Criteria)	Tutorial (Activity Criteria)	Practice (Performance Criteria)
			Hours/week	Hour/week	Hours/week
1			<p>1. Climate factors: Tropical climate, solar & wind flow pattern, Time lag & decrement factor, Periodic heat flow.</p> <p>2. Classification of soils and their suitability for the construction of different structures. Bearing capacity of soil, Safe bearing capacity of soil.</p> <p>3. Determination of Bearing capacity by Standard penetration test (SPT), Method of improving the safe bearing capacity</p>	<p>1. Study the standard Penetration test and Plate load test.</p> <p>2. Study and prepare a report on local rainfall data and type of soil strata available.</p>	<p>1. Field Identification of type of soil based on visualization and validate the type of soil by conducting sieve analysis test - Particle size distribution using semi-log graph.</p> <p>2. Test on soil: a) Liquid limit b) Plastic limit c) Shrinkage limit.</p>
2	2	2,4,7	<p>1. Site clearance, Process of general & deep excavation, Necessity of shoring, Soil nailing and strutting in foundation, excavation and process of dewatering, purpose of anti-termite treatment, type of chemical used & laying method.</p> <p>2. Foundation: Purpose and classification of foundation. Shallow foundation: Isolated footing, Spread footing, combined footing, Strap footing and Raft foundation.</p> <p>3. Deep foundation: Pile foundation and its types and Caisson foundation. Selection of foundation for different types of structures.</p>	<p>1. List the tools and equipments used for site clearance and excavation work</p> <p>2. Study and prepare a report on advanced techniques in laying foundation.</p>	<p>1. Tests on Moisture content of soil (Oven drying method and Field density of soil by core cutter and rapid moisture meter.</p> <p>2. Conduct Standard Proctor test on soil compaction.</p>

3	2	1,2,4,7	<p>1. Foundation in Black Cotton Soil. Causes for failure of foundation and preventive measures.</p> <p>2. Plinth beam or Plinth slab / grade beams. Superstructure-Column, Beams and their suitability for different structures.</p> <p>3. Load bearing walls, non-load bearing walls & framed structure. Main attributes of masonry work, Technique used in masonry work.</p>	<p>1. Study the construction methodology of basement and Retaining wall.</p> <p>2. Study & prepare a report on Advanced techniques in masonry work.</p>	<p>1. Free swell Index of Black cotton soil.</p> <p>2. Water Absorption test & other field test on brick.</p> <p>3. Compression test on bricks, Dimensionality tolerance test.</p>
4	3	2,4,7	<p>1 & 2. Types of masonry work and their suitability.</p> <p>Stone masonry, Brick masonry, Concrete Block masonry and their types.</p>	<p>1. Study & prepare a report on various Precast concrete partition walls.</p> <p>2. Prepare a report on Autoclave</p>	<p>1. Construction of English bond & Flemish bond, also prepare a masonry checklist for</p>

			3. Partition walls and its types based on materials. Dry wall construction Structural Glazing, Aluminium Panelling, Infill walls and Envelopes.	brick masonry, Stabilized mud block masonry, Poro Thermo Block masonry. Laterite brick masonry.	before & after construction. 2. Construct concrete block masonry wall of height 1metre.
5	3	1,2,3,7	1. Ventilation requirements for health mechanisms, natural ventilation, cross ventilation and artificial ventilation, Airflow patterns in building. Purpose of providing doors, windows and ventilators and its suitability. 2.Lintels, sunshades, sun breakers and canopy, portico and their suitability. 3.Arch-Terms used, Types of arches-Flat, Segmental, and Semi-circular and their suitability.	1. Study & present the Standard size of doors, windows & ventilators for different types of building as per I.S codes.	1.Study and present important types of doors, windows and ventilators in general use. 2. Prepare process manual for installation of doors, windows and ventilators.
6	3	1,2,3,7	1. Stairs: Technical terms, Requirements of a stair, Indian Standards for dimensions of stairs, Construction method of staircase and its headroom. 2.Elevators: Lift pit - Foundation for Lift and concrete or Block work with intermediate column beam structure around the lift and lift headroom 3.Ramps and escalators and their importance as per Indian Standards	1. Study the Suitability of staircases, ramps, elevators and escalators in different typologies of buildings	1. Study & present different types of stairs 2.Prepare process manuals for construction of staircases, ramps and lift pit.
7	3	1,3	1.Introduction to Formwork, shuttering, centring, staging, scaffolding and its applications. 2. Scaffolding: Component parts, types of scaffolding and props, Materials used for scaffoldings. 3. Types of shoring-Raking, Flying & Dead shores. Safety precautions while using scaffolding.	1. Visit the construction site and collect details of the advanced types of scaffoldings and prepare a report.	1.Prepare a checklist (before, during after the work) & process manual for different types of scaffolding. 2. Draw different types of scaffolding using BIM software (3D using

					AutoCAD, Revit, Sketch etc.)
8	3	2,3,7	<p>1. Formwork: Purpose of providing formwork. Types of formworks based on material.</p> <p>2. Requirements and Codal provisions for Standard formwork. Monolithic Construction Formwork.</p> <p>3. Method of shuttering and centring & removal of formwork. Formwork Failures and Remedies.</p>	<p>1. Visit construction site and prepare a photo gallery of different formworks adopted for various construction activities.</p>	<p>1. Study and present the tools and components used for formwork.</p> <p>2. Prepare a checklist & process manual for different types of form work.</p>
9	3	1,2,5,7	<p>1. Roof: Types of roofs, common types of Roofing materials.</p> <p>2. Pitched roof, its basic components and its suitability. Flat roof-advantages and disadvantages</p> <p>3. Weather proof course for flat roofs. False ceiling and its suitability.</p>	<p>1. Study & compare different types of roofs considering typology of building and atmospheric conditions.</p>	<p>1. Prepare a checklist & process manual for construction of different types of roofs & trusses.</p> <p>2. Study and present the technique of laying different types of roofs & trusses.</p>
10	3	1,2,4,7	<p>1. Objectives of plastering and requirements of good plaster. Method of cement plastering,</p> <p>2. Types of plaster and surface finishes- Smooth, sand faced, rough cast, pebble dash, debtor, scrapped, textured finish.</p> <p>3. Pointing- Method of pointing & types. Fixing of doors and windows using different fixtures.</p>	<p>1. Study & present advanced plastering and surface finishing techniques and its suitability.</p>	<p>1. Visit a construction site during Plastering Activity-Prepare check list & process manual for cement plastering.</p>

					2. Prepare checklist & process manual for Gypsum/ POP plastering.
11	3	1,2,5,7	<p>1. Definition and causes of dampness. Effects of dampness and prevention of dampness. Materials used for the damp proof course.</p> <p>2. Method of Terrace waterproofing, Water tank waterproofing Methods & types of expansion joint treatment. Roof slab leakages or dampness and arresting it.</p> <p>3. Waterproofing technique for swimming pools, sump, podium, bathroom sunken slabs, water closets, retaining wall.</p>	<p>1. Study on advanced waterproofing techniques and grouting techniques.</p> <p>2. Study and Collect working procedure for pressure grouting application for roof slab leakage or dampness</p>	<p>1. Prepare checklist & process manual for Waterproofing and laying procedure for different areas of building.</p> <p>2. Types & laying procedure of grouts.</p>
12	3	1,2,5,7	<p>1. Types of floors, Suitability of flooring material, Process of laying Cement concrete floorings.</p> <p>2. Process of laying Oxide flooring. Ceramic tile flooring, Vitrified flooring, granite flooring, Marble flooring.</p> <p>3. Wooden flooring, Vinyl flooring, Vacuum dewatered flooring, IPF flooring, epoxy flooring, False flooring. Cladding Work and its types, Importance and suitability of cladding work</p>	<p>1. Collect samples and prepare a report on the grouting process for flooring works.</p> <p>2. Study on advanced techniques in flooring.</p> <p>3. Collect & present different types of flooring materials.</p>	<p>1. Prepare checklist & process manual for different types of flooring.</p> <p>2. Prepare checklist & process manual for different types of cladding work.</p>
13	4	2,3,5,7	<p>1. Methods of painting, Types of paints distempering & varnishing on different surfaces. VOC paints & its importance.</p> <p>2. Introduction, Cause of deterioration of concrete structures, Diagnostic methods & analysis, preliminary investigations, experimental investigations using NDT.</p> <p>3. Techniques for Repair: (Corrosion) Rust eliminators and polymer coating for rebar during repair, foamed concrete,</p>	<p>1. Study & present advanced technique in painting.</p> <p>2. Prepare a report on method of application of external texture painting works.</p>	<p>1. Visit a construction site during Painting activity, Prepare check list & process manual for painting on different surfaces (Any one method)</p>

			mortar and dry pack, vacuum concrete, Guniting and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning.		2. Site visit, investigate the problem using NDT, analyse, adopt suitable method of repair & prepare check list & process manual for repair work.
Total in hours			39	13	52

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4. Reference:

Sl. No.	Description
1	Koenigsberger, O.H. et al, " Manual of Tropical Housing and Building Part-I Climatic Design ", Orient Longman. 1973
2	Hvorslev MJ, " Subsurface Exploration and Sampling of Soils for Civil Engg. Purposes " Elsevier Pub. Co,
3	Manfred RH, " Engineering Principles of Ground Modification ", McGraw Hill
4	Purushotham Raj, " Ground Improvement Techniques ".
5	Bureau of Indian Standards, " HandBook of Functional Requirements of Buildings, (Sp-41&Sp-32) ", BIS 1987 and 1989.
6	B C Punmia, " Building Construction ", Laxmi Publications
7	www.nptel.ac.in

Subject code – CIV304

Building Drawing using CAD

1	1	1,4,5,7	<p>1. Building Bye Laws: Introduction, objects, Importance and Important terms used in building bye laws</p> <p>2. Function of Local Authority, Responsibility of owner, Applicability and Principles underlying building bye laws, Setbacks or building line, light plane, Floor Space Index</p> <p>3. Building bye laws to be practiced: Off street Parking, Fire Protection, Minimum Plot sizes, Thickness of walls, Plinth, Cellar, Height of floors, Stairs, Lifts, Lobbies and Corridors, Sanitary accommodation</p>	1. Study and compare the building bye laws for different typologies of buildings and location of building	<p>1. Symbols and sign conventions used in building drawings as per IS standards</p> <p>2. Introduction to basic BIM softwares like AutoCAD, ARCHICAD, REVIT ARCHITECTURE, 3DSMAX, SKETCHUP</p>
2	1	1,4,5,7	<p>1. Building bye laws to be practiced: Fenestration, Ventilation, Sills of openings, Staircases, Ramps, Roofs, Parapets and Terraces, Water tank, Refuse area/ Disposal of Solid waste, Discharge of Rainwater, Provision of Letter box.</p> <p>2. Margin and Maximum Built up area, Plinth areas, for different types of buildings, Permissible Built-up area in margins, Projections in margins, Margins from Common plot, Open spaces, floor area ratio, carpet area key plan (layout plan), Site plan, building plan, working plan.</p> <p>3. Building Planning- Factors, Shape, size and topography of site, Climatic conditions of the site, Safety precautions to be followed at site during building construction as per National Building Code (NBC).</p>	<p>1. Practice drawing of Site plan with setbacks and orientations for different dimensions.</p> <p>2. Study the elements of Sustainable Planning as per NBC 2016.</p>	<p>1. Drawing of site plan showing setbacks for residential building using CADD software.</p> <p>2. Mark the site plan on the field giving setbacks.</p>
3	2	1,4,7	<p>Given the floor area or carpet areas of rooms, plan the building and draw a Single line diagram of the building.</p> <p>1. Residential building</p> <p>2. Commercial Buildings</p> <p>3. Industrial Building.</p>	1. Prepare Manual Drawing of Single line diagrams for different typology of buildings. Considering building bye laws	<p>1. Execute the single line diagram using CADD software.</p> <p>2. Mark the single line diagram and foundation layout for load bearing and Framed structures on the field using centre line marking method.</p>
4	2	1,4,7	<p>1. Given the floor area or carpet areas of rooms, plan the building and draw a Single line diagram of the building.</p> <p>1. Residential building</p> <p>2. Commercial Buildings</p> <p>3. Industrial Building</p>	1. Prepare Manual Drawing of Single line diagrams for different typology of buildings	<p>1. Execute the single line diagram using CADD software.</p> <p>2. Mark the single line diagram and footing layout for load bearing and Framed structures</p>

				considering building bye laws.	on the field using centre line marking method.
5	2	1,4,7	<p>Draw the following views for Residential buildings</p> <ol style="list-style-type: none"> 1. Plan 2. Elevation 3. Section 	<p>1.Create 3-D model of residential buildings using software's like ARCHICAD , REVIT ARCHITECTURE, SKETCH UP,3DS MAX</p>	<p>1.Execute the building drawing (Plan, Elevation and section) using CADD software for residential building</p> <p>2.Preparation of Footing layout and Centre line/ grid line marking of residential building on the field</p>
6	2	1,4,7	<p>Draw the following views for Commercial Buildings</p> <ol style="list-style-type: none"> 1. Plan 2. Elevation 3. Section 	<p>1.Create 3-D model of commercial buildings using software's like ARCHICAD , REVIT ARCHITECTURE, SKETCH UP,3DS MAX.</p>	<p>1.Execute the building drawing (Plan, Elevation and section) using CADD software for commercial building.</p> <p>2.Preparation of Footing layout and Centre line/ grid line marking of commercial building on the field.</p>
7	2	1,4,7	<p>Draw the following views for Industrial Building having pitched roof.</p> <ol style="list-style-type: none"> 1. Plan 2. Elevation 3. Section 	<p>1.Create 3-D model of industrial buildings using software's like ARCHICAD , REVIT ARCHITECTURE, SKETCH UP,3DS MAX.</p>	<p>1. Execute the building drawing (Plan, Elevation and section) using CADD software for industrial building</p> <p>2.Preparation of Footing layout and Centre line/ grid line of industrial building on the field</p>
8	3	1,4,7	<p>1. Introduction to plumbing: Pipe Materials used in building construction works for water supply work - Plastic Pipes, High Density Polyethylene Pipes, Densified cast iron pipes, GI pipes, Stoneware pipes, Asbestos Cement pipes, and Concrete pipes, Hot water pipes with insulation.</p> <p>2.Water supply fittings, their description and uses, water main, service pipes, supply pipe,</p>	<p>1.Conduct Market analysis on water supply fittings, fixtures, accessories, tools and equipment</p>	<p>1. Signs, Symbols and conventions of Water supply fittings and fixtures used for building servicedrawing.</p> <p>2. Demonstrate the water supply fittings,</p>

			<p>distribution pipe, domestic storage tank, stop cock, ferrule, gooseneck, water tap, aerators, water meter.</p> <p>3. Merits and Demerits. Connections from water main to buildings. Factors affecting the suitability of plumbing material and accessories for Water supply work, Water pressure test for leakage during installation of pipes.</p>	and prepare report.	fixtures, accessories, tools and equipment.
9	3	1,4,7	<p>1. Importance of Sanitary work for building. Different types of Sanitary pipes and pipe materials used in building construction works for drainage and waste disposal.</p> <p>2. Sanitary Fittings- Water Closets, Flushing Cisterns, Urinals, Inspection Chambers, Traps, Anti-siphonage. Connections from building to sewer main.</p> <p>3. Inspection, Testing and Maintenance of sanitary line in building. Factors affecting the suitability of sanitary material and accessories for Sanitary work.</p>	1. Conduct Market analysis on Sanitary fittings, fixtures, accessories, tools and equipment and present a report.	<p>1. Signs, symbols and conventions of Sanitary fittings and fixtures in building service drawing.</p> <p>2. Demonstrate the Sanitary fittings, fixtures, accessories, tools and equipment.</p>
10	3,4	1,4,7	<p>1. Wiring accessories: SP (single pole switch), DP (double pole switch), ICDP (Iron Clad Double Pole main switch), ICTP (Iron Clad Triple Pole switch), change over switch, modular switches, 2 pin socket, 3 pin socket, 2 pin plug top, 3 pin plug top, ceiling rose, round block, switch boards, switch plates, modular switch enclosures, blank insert gang box, junction box, fan box.</p> <p>2. Safety devices: Types of fuse units and Materials for fuse wire, Glass cartridge fuse, types of HRC fuse, Kit kat fuse. Types of MCB, MCCB, RCCB, ELCB Types of Earthing- Pipe earthing, Plate earthing, Lightning arrestors.</p> <p>3. Types of wiring systems and their applications: Surface conduit, concealed conduit, PVC casing capping. Types of wires, cables used for different current and voltage rating, Connection from Electric source to building based on electricity load.</p>	<p>1. Conduct Market analysis on Electrical wiring, fittings, fixtures, accessories, tools and equipment and present a report.</p> <p>2. Study on energy saving using Solar Panel installations with accessories in buildings.</p>	<p>1. Signs, symbols and conventions of Electrical wiring, fittings and fixtures in building service drawing.</p> <p>2. Conduct field visit to study plumbing and electrical installations in ongoing building constructions.</p>
11	3,4	1,4,7	<p style="text-align: center;">Building Basic Services</p> <p>1. Preparation of water supply Layout for residential building.</p> <p>2. Preparation of Sanitary Layout for residential building.</p>	1. Prepare basic service layouts like Water	1&2. Prepare basic service layouts like Water supply, Sanitary, Electrical layouts for

			3. Preparation of Electrical Layout for residential building.	supply, Sanitary, Electrical layout for your college building using any Application software and demonstrate.	residential building using AUTOCAD with layers.
1 2	3,4	1,4, 7	<p>1 Fire classifications, Importance of providing Fire fighting system and fire safety requirements in Commercial and Industrial Building.</p> <p>2. Components of the fire fighting system and its applications in Commercial and Industrial Building.</p> <p>3. Location of fire fighting system, installations and Code of Practice for fire safety in different typologies of Buildings. Fire ratings.</p>	1. Conduct Field visit and study the firefighting system installations, fire safety measures and demonstrate.	1 & 2 Prepare basic service layouts like Water supply, Sanitary, Electrical and Fire fighting system layouts for Multi-storeyed building using AUTOCAD using layers.
1 3	3,4	1,4, 7	<p>1. Importance of conservation of rain water by Rain water harvesting unit in buildings. Components of the rainwater harvesting system.</p> <p>2. Methods of Rainwater harvesting, Benefits of rainwater harvesting unit in buildings</p> <p>3. Purpose of using Soak pit with Septic tank and Manhole and its sizing based on the requirement for different typologies of building.</p>	1. Prepare Rain water harvesting unit layout for your college building using any Application software and demonstrate.	1. Prepare rainwater harvesting unit layout for residential building drawings in CADD 2. Execute septic tank with soak pit and manhole drawings for building drawings in CADD
Total in hours			39	13	52

NOTE 1: The course content shall be delivered through lectures, PowerPoint presentations, video demonstrations and field visits.

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4. Reference:

Sl. No.	Description
1	Building Planning and Drawing- S.S. Bhavikatti, M.V. Chitawadagi , I. K International Publishing House Pvt.Ltd
2	Civil Engineering Drawing and design – D.N. Ghose (CBS Publishers)
3	A textbook of Draughtsman Civil (Theory and Practical) – R.S. Mallik and G.S. Meo (Asian publishers, New Delhi)
4	CAD in Civil Engineering a Laboratory Referral- Dr M.A. Jayaram, D.S.Rajendra Prasad, Sapna Book House
5	Making a simple floor plan using AUTOCAD https://www.youtube.com/watch?v=hO865EIE0p0&t=384s

5. SOFTWARE/ LEARNIG WEBSITE:-

1. <https://www.autodesk.com/learn/catalog/revit>
2. <https://www.autodesk.com/learn/catalog/autoCAD>
3. <https://www.autodesk.com/education/edu-software/overview?sorting=featured&filters=class-lab#card-acdist>
4. <https://www.machinedesignonline.com>