



JAIDEV EDUCATION SOCIETY'S
J D COLLEGE OF ENGINEERING AND MANAGEMENT
KATOL ROAD, NAGPUR

Website: www.jdcoem.ac.in E-mail: info@jdcoem.ac.in

(An Autonomous Institute, with NAAC "A" Grade)

Affiliated to DBATU, RTMNU & MSBTE Mumbai

3rd Semester Civil Engineering



Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T/A	P	CA	MSE	ESE	Total	
1	PCC	CE3T001	Building Drawing and Drafting	2	0	0	20	20	60	100	2
2	PCC	CE3T002	Mechanics of Rigid bodies	2	1	0	20	20	60	100	3
3	PCC	CE3T003	Engineering Geology & Geotechnical Engineering	3	0	0	20	20	60	100	3
4	Audit	CE3T004	Organizational Behavior	2	0	0	10	15	25	50	Audit
5	MDM	CE3M001	Discrete Mathematics	2	0	0	20	20	60	100	2
6	OE	CE3O001	Open Elective-I	3	0	0	20	20	60	100	3
7	EEMC	CE3H001	Entrepreneurship Development	2	0	0	20	20	60	100	2
8	VEC	CE3V001	Universal Human Values	2	0	0	20	20	60	100	2
9	PCC	CE3L005	Building Drawing and Drafting Lab	0	0	4	60	-	40	100	2
10	PCC	CE3L006	Mechanics of Rigid bodies Lab	0	0	2	60	-	40	100	1
11	PCC	CE3L007	Engineering Geology & Geotechnical Engineering Lab	0	0	2	60	-	40	100	1
12	CEP/FP	CE3F001	Community Project	0	0	0	-	-	-	50	2
				18	1	8	330	155	565	1100	23

4th Semester Civil Engineering

Sr. No.	Category of Subject	Course Code	Course Name	Teaching Scheme			Evaluation Scheme				Credit
				L	T	P	CA	MSE	ESE	Total	
1	PCC	CE4T001	Surveying and Geomatics	2	0	0	20	20	60	100	2
2	PCC	CE4T002	Concrete Technology	3	0	0	20	20	60	100	3
3	PCC	CE4T003	Solid Mechanics	2	0	0	20	20	60	100	2
4	MDM	CE4M002	Geographic Information System(GIS)	2	0	0	20	20	60	100	2
5	OE	CE4O002	Open Elective-II	3	0	0	20	20	60	100	3
6	AEC	CE4A002	Principles of Corporate Success	2	0	0	20	20	60	100	2
7	EEMC	CE4H002	Engineering Economics	2	0	0	20	20	60	100	2
8	VEC	CE4V002	Intellectual Property Right	2	0	0	20	20	60	100	2
9	PCC	CE4L004	Surveying and Geomatics Lab	0	0	4	60	-	40	100	2
10	PCC	CE4L005	Concrete Technology Lab	0	0	2	60	-	40	100	1
11	PCC	CE4L006	Solid Mechanics Lab	0	0	2	60	-	40	100	1
12	VSEC	CE4L007	AI in Civil Engineering	0	0	4	60	-	40	100	2
				18	0	12	400	160	640	1200	24



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Department of Civil Engineering

"Building Better Development"



Program: B. Tech in Civil Engineering

Semester	Course Code	Name of Course	L	T	P	Credits
III	CE3T001	Building Drawing and Drafting	2	0	0	2

Prerequisites for the course

1	Types of Structures
2	Building Elements and their types
3	Types of Masonry and other construction Materials
4	Scale Conversion

Prior Reading Material/useful link

1.	https://archive.nptel.ac.in/courses/105/106/105106197/
2.	https://www.youtube.com/@Civil101
3.	https://www.youtube.com/watch?v=NSamrfRhoKY

Sr. No.	Course Outcome	Course Outcome Statement
1	CO1	State the basic components of building as per IS 962-1967, Building planning, and drawing parameters as per relevant IS codes.
2	CO2	Classify the principles of different types building planning and
3	CO3	Drawing as per relevant IS code and general specifications.
4	CO4	Interpret the information of component of building, planning with
5	CO5	Respect to all parameters prescribed by I.S.
6	CO6	Examine the different types of planning of methods and suggest

Syllabus:

Course Content	
Unit I	Introduction: importance of Building drawing as Engineer's Language in Construction & costing. Selection of scales for various drawings, thickness of lines, dimensioning, abbreviations and conventional representations as per IS: 962, 1967. Free hand dimensioned sketches of various building elements and its importance in Civil Engineering [06 hrs]
Unit II	Symbols and sign conventions: Materials, Architectural, Structural, Electrical and Plumbing symbols. welding symbols; dimensioning standards. Building Planning: Study of building site requirements, requirements of owner, local bye laws and Principles of planning. Planning of residential and public buildings as per recommendation of CBRI, Roorkee. [06hrs]
Unit III	Types of Building Drawing: Introduction to working drawing to scale and submission drawing as per I.S.962, from the given sketch. Design and general specifications for different components of the building including terraced and pitched roofs. Developing submission drawings to scale with location plan, site plan and block plan. Developing submission drawings for single storey residential building load bearing structure with pitch roof to scale with location plan, site plan and block plan.[08hrs]
Unit IV	Graph paper drawing (line plans) based on various requirements for Residential, Public, Educational, Industrial Buildings and Interior aspect as well. [04 hrs]
Unit V	Perspective Drawing: Two point perspective of Residential building neglecting small elements of building such as plinth offset, Chajja [06 hrs]

Text Books:

1	Shah, Kale, Pataki, "Building Drawing", Tata McGraw- Hill
2	Sane Y. S., "Building Design and Drawing", Allied Book Stall, Pune
3	Jain V.K., "Automation Systems in Smart and Green Buildings", Khanna Publishers.
4	Jain V.K., "Handbook of Designing and Installation of Services in High Rise Building Complexes, Khanna Publishers, N. Dehli, ISBN No. 978-81-7409-245-8

Reference Book:

1	Deodhar S.V., "Building Science and Planning", Khanna Publishers, 6. Jain A. K., "The Idea of Green Building" Khanna Publishers, N. Delhi, ISBN No.978-81-7409-256-4
2	SP7-National Building Code Group 1 to 5-B.I.S.New Delhi
3	I.S.962-1989 Code for Practice for Architectural and Building Drawings

Semester	Course Code	Name of Course	L	T	P	Credits
III	CE3T002	Mechanics of Rigid bodies	2	1	0	3

Prerequisites for the course	
1	Basic concepts of physics, including force, motion, work, energy, and momentum.
2	Knowledge of vectors and vector algebra.
3	Understanding of Newton's laws of motion and their applications.
4	Familiarity with trigonometry and geometry.

Prior Reading Material/useful link	
1.	https://byjus.com/physics/work-energy-power/
2	https://www.youtube.com/watch?v=giP5YGe7tjI
3	https://www.youtube.com/watch?v=g550H4e5FCY

Sr. No.	Course Outcome	Course Outcome Statement
1	CO1	State the fundamentals of resultant in coplanar force system, friction, structural analysis, rectilinear motion, Work energy and impulse momentum principle for particle to solve the basic engineering problems.
2	CO2	Explain the concept of force system, equilibrium, Moment of inertia, Basic theorems to solve civil engineering problems.
3	CO3	Use concepts and parameters of mechanics to solve real time problem in engineering.
4	CO4	Examine the force systems and determine the forces in various structural
5	CO5	Select the suitable methods to design various engineering component as per the analysis
6	CO6	Design various structural members, also correlate basic knowledge of engineering mechanics in broader way in field of Structural designing.

Syllabus:

Course Content	
Unit I	Resultant of coplanar force system: Principle of statics, Resolution and composition of forces, Resultant of concurrent forces. Moment of a force, Couple, Varignons theorem, Equivalent force couple system, Resultant of parallel and general force system. Distributed forces, Centroid of plane lamina and wire bends. [10 hrs]
Unit II	Equilibrium of Force system: Free body diagram, Equilibrium of concurrent, parallel and general forces in a plane, Equilibrium of three forces in a plane, Types of beams, simple and compound beams, type of supports and reaction. Resultant and Equilibrium of concurrent and parallel forces in a Space. [08 hrs]
Unit III	Analysis of structure and friction: Two force member, Analysis of plane trusses by method of joint and Method of section, cables subjected to point loads. Multi force member, Plane frames. Friction - Application of friction on inclined plane, ladders [08 hrs]
Unit IV	Rectilinear motion of particles: Kinematics- Basic concepts, Equations of motion for constant acceleration and motion under gravity, Variable acceleration, Motion curves, Relative motion and dependent motion. Kinetics- Newton's second law of motion and its applications. [08 hrs]
Unit V	Impulse momentum principle for particles. Linear Impulse & Momentum, Conservation of momentum, Direct central impact and coefficient of restitution, Impulse momentum principle [08 hrs]

Text Books:	
1	Singh M. Kulkarni P., "Engineering Mechanics", PPH.
2	Bansal R. K., "A Textbook Engineering Mechanics", Laxmi Prakashan
3	Bhavikatti, "Engineering Mechanics", PHI.
Reference Book:	
1	J.L.Meriam and L.G.Kraige, "Engineering Mechanics: Dynamics", Wiley, 2011.
2	M.F.Beatty, "Principles of Engineering Mechanics", Springer Science & Business Media, 1986.

Semester	Course Code	Name of Course	L	T	P	Credits
III	CE3T003	Engineering Geology and Geotechnical Engineering.	3	0	0	3

Prerequisites for the course	
1	A basic understanding of geological concepts, such as rock types, minerals, geological processes, and the geological time scale. You can acquire this knowledge through introductory geology courses or textbooks.
2	A fundamental understanding of physics concepts, especially mechanics, as some topics in rock mechanics and slope stability analysis involve principles from physics.

Sr. No.	Course Outcome	Course Outcome Statement
1	CO1	Recall geological terminology, soil mechanics principles, and engineering geology concepts.
2	CO2	Understand the principles of soil mechanics, including stress distribution, consolidation, and Seismic hazard assessment and site response analysis.
3	CO3	Apply soil mechanics principles to analyse and design foundations, earth retaining structures, and ground improvement techniques.
4	CO4	Analyze soil and rock properties to evaluate their suitability for different engineering applications.
5	CO5	Evaluate the effectiveness of geotechnical investigation techniques in characterizing soil and rock properties.
6	CO6	Design comprehensive geotechnical investigation plans for engineering projects, incorporating a range of field and laboratory techniques to characterize site conditions effectively.

Syllabus:

Course Content	
Unit I	Introduction to Engineering Geology Introduction to Engineering Geology, Importance of Engineering Geology, Role in Civil Engineering, Geological Time Scale and Earth's Structure. Types of Rocks and Minerals, Engineering Significance of Geological Materials.
Unit II	Introduction Geotechnical Engineering– Moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity, etc. Relationship between volume weight, voids ratio- moisture content, unit weight- percent air voids, saturation- moisture content, moisture content- specific gravity etc. Determination of various parameters such as: Moisture content by oven dry method, pycnometer, sand bath method.
Unit III	Plasticity Characteristics of Soil - Introduction to definitions of: plasticity of soil, consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices, definitions of activity and sensitivity. Classification of Soils- Introduction of soil classification: particle size classification, textural classification, unified soil classification system, Indian standard soil classification system.
Unit IV	Geotechnical Earthquake Engineering- Seismic hazard assessment and site response analysis, Liquefaction susceptibility assessment and mitigation measures, Soil dynamics and wave propagation in soils, Case studies of earthquake-induced geotechnical failures.
Unit V	Advancement in Geoenvironmental Engineering-Landfill design and liner systems, Geotechnical aspects of waste disposal and management, Geotechnical considerations in sustainable infrastructure development, Analysis and design projects integrating advanced geotechnical concepts.

Text Books:	
1	Soil Mechanics by Craig R.F., Chapman & Hall
2	Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
3	An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ
Reference Book:	
1	Principles of Foundation Engineering, by Braja M. Das, Cengage Learning
2	Essentials of Soil Mechanics and Foundations: Basic Geotechnics by David F. McCarthy

Semester	Course Code	Name of Course	L	T	P	Credits
III	CE3H001	Entrepreneurship Development	2	0	0	2

Prerequisites for the course	
1	Basic Business Knowledge
2	Economics
3	Communication Skills
4	Critical Thinking

Prior Reading Material/useful link	
1.	https://www.youtube.com/watch?v=aLoRz6hidCM&list=PLsh2FvSr3n7eLqyEo8Xoz5F6FOn5ik6RB
2.	https://www.youtube.com/watch?v=MdNNGfoxrqA
3.	https://www.youtube.com/watch?v=MdNNGfoxrqA

Sr. No.	Course Outcome	Course Outcome Statement
1	CO1	Understand the fundamental concepts and theories of entrepreneurship.
2	CO2	Identify and evaluate opportunities for entrepreneurial ventures.
3	CO3	Develop a comprehensive business plan.
4	CO4	Explore various sources of funding and financial management for startups.
5	CO5	Implement marketing strategies and techniques for a new business.
6	CO6	Apply entrepreneurial principles in real-world situations.

Syllabus:

Course Content	
Unit I	Introduction to Entrepreneurship: Definition and Importance of Entrepreneurship, Historical Development of Entrepreneurship, Characteristics and Qualities of an Entrepreneur, Types of Entrepreneurs, Role of Entrepreneurship in the Economy.
Unit II	Opportunity Identification and Feasibility Analysis: Identifying Business Opportunities, Market Research and Feasibility Studies, SWOT Analysis, Business Models, Opportunity Recognition and Evaluation.
Unit III	Business Planning and Start-up: Business Planning Process, Business Plan Components, Legal and Regulatory Considerations, Intellectual Property Rights, Business Formation and Registration.
Unit IV	Funding and Financial Management: Sources of Funding, Financial Projections and Budgeting, Financial Statements, Risk Management, Funding Pitch and Presentation
Unit V	Marketing and Scaling: Marketing Strategies, Branding and Promotion, Sales and Distribution, Growth Strategies, Challenges of Scaling

Text Books:	
1	Title: "Entrepreneurship and New Venture Management" Author: Deborah S. Schaefer, John V. L. Michael, and Elaine R. Thomas
2	Title: "Essentials of Entrepreneurship and Small Business Management" Author: Thomas W. Zimmerer and Norman M. Scarborough
3	Title: "Entrepreneurship: A Real-World Approach" Author: Rhonda Abrams
4	"Innovation and Entrepreneurship: Practice and Principles" by Peter F. Drucker
Reference Book:	
1	"Entrepreneurship: Theory, Process, and Practice" by Donald F. Kuratko.
2	"New Venture Creation: Entrepreneurship for the 21st Century" by Jeffrey A. Timmons and Stephen Spinelli
3	"The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" by Eric Ries

Semester	Course Code	Name of Course	L	T	P	Credits
III	CE3V001	Universal Human Values	2	0	0	2

Prerequisites for the course	
1.	Basic knowledge of human values.
2.	A fundamental understanding of social responsibilities.
3.	Understanding Global Harmony.

Prior Reading Material/useful link	
1.	http://www.madhyasth-darshan.info
2.	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwiFoc_U8O2BAxUp3jgGHR00BdAQFnoECBoQAQ&url=https%3A%2F%2Fen.wikipedia.org%2Fwiki%2FList_of_life_sciences&usg=AOvVaw31AHqGWMrmSCV8A0oKmesk&opi=89978449
3.	https://www.google.com/search?client=firefox-b-d&q=life+science

Sr. No.	Course Outcome	Course Outcome Statement
1	CO1	To enable students to understand the concept of contemporary ethics at different levels: Individual, local and Global and enable them to cross examine the ethical and social Consequences of the decisions of their life-view and world view.
2	CO2	To develop the ability of students to create a balance between their individual freedom and social responsibilities and enable them to identify the personal, professional and social Values and integrate them in their personality after cross examination.
3	CO3	To enable students to cross examine their earlier decisions taken in life and understand the meaning of ethical dilemma to overcome the ethical dilemmas and engage in critical reflection.
4	CO4	To develop positive habits of thought and conduct and work cohesively with fellow beings who have variety of strengths, experiences, shortcomings and challenges, hence to enable them to handle diverse type of personalities.
5	CO5	To enable students to develop a method for making ethically sound decisions for themselves, within hostels, classrooms, university campus and society.
6	CO6	To understand the meaning and nature of ethics, human values and holistic life for leading a good, successful and happy life through continuous examination of thoughts and conduct in day today life.

Course Content	
Unit I	Human Life, its aim and significance: The concept of a successful life, happy life and a meaningful life. Ethical and decision-making capability and its development: Meaning of Ethical dilemma, sharing real life experiences.
Unit II	(Creative and Leadership ability and their development: Intellectual, Emotional, Creative, Ethic spiritual development, Aesthetic sense, Self-dependency, Activeness. Development of positive attitude.
Unit III	Harmony in Personal and Social Life: Concept of personal and group Ethics; Balance between - rights and duties-welfare of self and welfare of all. Creating a value-based work culture in hostel, classroom and other places in the campus and society. Character, Righteousness and Virtues for a Meaningful Life: Ego lessness, Humility, Righteousness, Purity, Truthfulness, Integrity, Self-restraint, Self-control, Sense of responsibility, Empathy, Love, Compassion, Maitri / Comradeship, Cooperation, Tolerance.
Unit IV	Dilemma Between materialistic development and human welfare: Science, Technology, Consumerism, Relation with Nature and Environment.
Unit V	New dimension of Global Harmony: Democracy, Equality, Social Justice.

Text books:	
1	“Foundational Course in Human Values & Professional Ethics” by R Sangal, RR Gaur and G P Bagaria.
Reference Book:	
1	Foundational Course in Human Values & Professional Ethics” by R Sangal, RR Gaur and G P Bagaria
Useful Link:	
1	http://www.madhyasth-darshan.info

Semester	Course Code	Name of Course	L	T	P	Credits
III	CE3L005	Building Drawing and Drafting	0	0	4	2

Sr. No.	Learning Outcome	Learning Outcome Statement
1	LO1	Demonstrate the basic symbols, types of lines and material Symbols to develop submission drawing as per building byelaws.
2	LO2	Examine the development plan before submission for Approval by competent authority.
3	LO3	Justify submission drawing of residential building as well as public building as per norms.
4	LO4	Assemble all construction details in submission drawing As per the specifications as per relevant IS code.

Syllabus:

Sr. No.	Name of Experiments
1	Sketches of various types of lines, Lettering and material symbols on sketch book.
2	Graph paper design (line plans) based on various requirements for Hospital /Hostel buildings.
3	Draw columns, beams, and other structural elements using appropriate AutoCAD tools such as RECTANGLE, LINE, or POLYLINE.
4	Utilize the OFFSET command to create wall thickness based on design specifications.
5	Use the RECTANGLE command to draw outlines for doors and windows at their respective locations.
6	Development of Residential plan, elevation & Section by Auto CAD
7	Organize drawing elements into layers based on their type (e.g., walls, doors, windows, annotations) using appropriate AutoCAD tools.
8	Assign different colors to layers for clarity and ease of understanding using appropriate AutoCAD tools.
9	Include additional details such as furniture, fixtures, and room labels to enhance the floor plan using appropriate AutoCAD tools.

Semester	Course Code	Name of Course	L	T	P	Credits
III	CE3L006	Mechanics of Rigid Bodies	0	0	2	1

Sr. No.	Learning Outcome	Learning Outcome Statement
1	LO1	Demonstrate the basic symbols, types of lines and material symbols to develop submission drawing as per building byelaws
2	LO2	Examine the development plan before submission for approval by competent authority
3	LO3	Justify submission drawing of residential building as well as Public building as per norms.
4	LO4	Assemble all construction details in submission drawing as per the specifications as per relevant IS code.

Syllabus:

Sr. No.	Name of Experiments
1	Verification of law of parallelogram of forces/ polygon of forces.
2	Support reaction of simple / compound beams..
3	Determination of Coefficient of friction on inclined plane.
4	Determination of Coefficient of coil friction.
5	Determine forces in Space Force System
6	Determination of mass moment of inertia of fly wheel
7	Determination of gravitational acceleration by compound pendulum.
8	Determination of velocity ratio, law of machine of simple screw jack.
9	Determination of velocity ratio, law of machine of differential wheel axle.
10	Determination of velocity ratio, law of machine of worm and worm wheel.
11	Determination of velocity ratio, law of machine of single purchase crab.
12	Determination of velocity ratio, law of machine of double purchase crab.

Semester	Course Code	Name of Course	L	T	P	Credits
III	CE3L007	Engineering Geology	0	0	2	1

Sr. No.	Learning Outcome	Learning Outcome Statement
1	LO1	Understand the geological time scale and recognize its importance in understanding Earth's history.
2	LO2	Demonstrate the ability to identify common rocks, minerals, and soil types based on visual and physical characteristics.
3	LO3	Apply their knowledge to basic engineering scenarios, including foundation design and landslide mitigation, demonstrating an understanding of how geological factors influence engineering decisions.
4	LO4	Develop field observation and data collection skills through hands-on experiences, including geological mapping and slope stability assessments.

Syllabus:

Sr. No	Name of Experiments
1	Study of physical properties and Identification of minerals.
2	Megascopic description and identification of Sedimentary rocks.
3	Dip and Strike Problems: To measure dip, dip direction and strike of given formations.
4	Megascopic description and identification of Igneous rocks.
5	Megascopic description and identification of Metamorphic rocks.



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Semester	Course Code	Name of Course	L	T	P	Credits
IV	CE4T001	Surveying and Geomatics	2	0	0	2

Prerequisites for the course

1	Basics of Physics and mathematics upto 12th standard
2	Mathematics, including trigonometry, geometry, calculus, and algebra.
3	A fundamental understanding of the principles of surveying, including measurement, precision, and accuracy

Prior Reading Material/ useful Links

1	12 th Standard Physics and mathematics books
2	https://www.youtube.com/watch?v=PG4ByTyYp-U
3	https://www.youtube.com/watch?v=CNJuHpqK1Ik

Sr. No.	Course Outcome	Course Outcome Statement
1	CO1	Acquire the knowledge of basic surveying equipment used in basic and advanced surveying techniques.
2	CO2	Identify the various concepts involved in surveying to observe horizontal, vertical and angular measurements on the field using the latest surveying technology.
3	CO3	Evaluate Reduced Levels, Horizontal Distances, Vertical Distances, Offset for curve plotting and Parameters of Photogrammetry.
4	CO4	Analyze the data obtained from Compass Surveying, Leveling, Theodolite Survey, Tacheometry Survey, Plane Table Survey and Photogrammetry Survey.
5	CO5	Judge suitable method for a various surveying map and data Required for further purpose in civil engineering projects.
6	CO6	Develop various types of Survey maps and suggest suitable method according to the requirement of client and field conditions.

Syllabus:

Course Content	
Unit I	Introduction to Surveying: Definition, Uses, Principles of Surveying, Classifications, conventional signs, Equipment of survey, Scale, Representative Fraction. Compass Surveying: Prismatic compass, surveyor's compass, bearing systems and conversions, local attraction, magnetic declination, traversing. [08 hrs]
Unit II	Leveling and Contouring: Leveling: - Introduction, Instrument used in leveling, Temporary and permanent adjustments, Type of leveling, Benchmarks & their Type, RL & Methods of calculating RL. Contouring: - Introduction, Methods - Characteristics and uses of contours – Plotting. Planimeter: -Types, Theory, concept of zero circle, Study of Digital Planimeter, Computation of Areas and Volumes [08 hrs]
Unit III	Theodolite and Tachometric Survey Theodolite survey: Classifications, Components, Uses, Terms used in Theodolite, Temporary and permanent adjustments, Measurement of horizontal, vertical angle and Deflection Angle, Consecutive Co-ordinates and Independent Co-ordinates with Numerical, Gales's table. Tachometric Survey: Definitions, Distinguish Theodolite and Tachometer, Constants in Tachometry, Principle of Tachometry, Tachometric Methods, Numerical. [08 hrs]
Unit IV	Curves and Plane Table Survey Curves: Necessity of curve, Classification of curve, Notation of simple circular curve, Designation of curve setting simple circular curve by offsets from long chord and Rankin's deflection angle method, Simple numerical problems. Plane Table Survey: Plane table instruments and accessories, merits and demerits, methods: radiation, intersection, resection, traversing. [08 hrs]
Unit V	Advanced Surveying Instruments: Basic introduction of Speedometer, EDM, Laser Tape, Total Station, Remote sensing & GIS, Drone Survey. Photogrammetry Surveying: Introduction, Basic concepts, Numerical. [08hrs]

Text Books:

1	Kanetkar, Kulkarni, "Surveying and Leveling", Volume I And II, Pune Vidyarthi Prakashan.
2	Punmia BC; Jain Ashok; Jain Arun "Surveying", Volume I And II, Laxmi Publication.

Reference Book:

1	Basak NN, "Surveying and Leveling", Volume I And II, Tata McGraw-Hill.
2	Duggal S.K. "Surveying", Volume I and II, Tata McGraw-Hill.

Useful Link:

1	onlinecourses.nptel.ac.in/noc23_ce05/
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Semester	Course Code	Name of Course	L	T	P	Credits
IV	CE4T002	Concrete Technology	3	0	0	3

Prerequisites for the course	
1	Basics of Civil Engineering
2	A basic understanding of chemical reactions, compounds, and elements.
3	Basic mathematical skills such as algebra and geometry are necessary for understanding concepts such as mix design, strength calculations, and testing results.
4	A basic understanding of physics concepts such as mechanics, force, and energy is necessary for understanding the behavior of materials and structures.
5	A basic understanding of civil engineering principles, including structures, construction materials, and testing methods, is necessary for understanding the principles and practices of concrete making.

Prior Reading Material/useful link	
1	http://assets.press.princeton.edu/chapters/s9638.pdf
2	https://ftp.idu.ac.id/wp-content/uploads/ebook/tdg/ADVANCED%20MATERIAL%20DESIGN/pdf .

Sr. No.	Course Outcome	Course Outcome Statement
1	CO1	Identify Quality Control tests on concrete making materials
2	CO2	Understand the behavior of fresh and hardened concrete
3	CO3	Understand the durability requirements of concrete
4	CO4	Understand the need for special concretes.
5	CO5	Design concrete mixes as per standard methods.
6	CO6	Identify Quality Control tests on concrete making materials

Syllabus:

Course Content	
Unit I	Concrete Making Materials: Cement, Fine Aggregate, Coarse aggregate, Water, Chemical & Mineral admixtures. [06 hrs]
Unit II	Quality tests on cement: Different test on cement as per Indian standards Hydration of Cement: Bogue's compounds, Hydration, Gel formation, Types of cement, pore & capillary water. [06 hrs]
Unit III	Aggregates: Tests on aggregates as per Indian standards, Bulking of sand, Sieve analysis – Grading. Fresh concrete: Properties of fresh concrete- Workability – different tests of workability- Factors influencing workability compaction, finishing, curing. [06 hrs]
Unit IV	Hardened concrete: Tests on hardened concrete as per IS codes, Relationship between different strengths – factors influencing strength, NDT techniques. Durability: Factors influencing durability – Chemical effects on concrete- Carbonation, Sulphate attack, Chloride attack. [06 hrs]
Unit V	Concrete Mix design: Different methods of mix design – factors affecting mix design – exercises. Special concrete: Heavy density concrete, underwater concrete, self-compacting concrete, light weight concrete etc. [06 hrs]

Text Books:	
1	ShettyM.S., “Concrete Technology’s. Chand Publication.
2	Pillai & Menon: RCC Design.
3	Dr.ShahV.L.& KarveS.R.:Limit State Design
Reference Book:	
1	Gambhir ML,“Concrete Technology”, Tata Mc Graw Hill.
2	Neville.A.M, Brooks.J.J, “Concrete Technology”, Pearson Publication.
3	JainA.K.: Plain & Reinforced Concrete, Vol. I &II
4	SinhaS.K.& RoyS.K.: Fundamentals of RCC.
Useful Link:	
1	https://onlinecourses.nptel.ac.in/noc23_ce50/preview
2	https://onlinecourses.nptel.ac.in/noc23_ce50/preview

Semester	Course Code	Name of Course	L	T	P	Credits
IV	CE4T003	Solid Mechanics	2	0	0	2

Prerequisites for the course	
1	Equilibrium of Force system
2	Types of beams; simple and compound beams, type of supports and reaction
3	Plane frames
4	Kinematics-Basic concepts

Prior Reading Material/useful link	
1	https://www.youtube.com/watch?v=JVMCOcUW_zc
2	https://www.youtube.com/watch?v=tM5hsUiNpGA
3	https://www.youtube.com/watch?v=8r4Zek6EB28
4	https://www.youtube.com/watch?v=MJeRFzs4oRU

Sr. No.	Course Outcome	CourseOutcomeStatement
1	CO1	Acquire the concepts of stresses, strain, columns and elastic Failure theory.
2	CO2	Identify the critical section to resist deformation for safe design against external loading for suitable design.
3	CO3	Calculate the stresses in beams, shafts, columns and springs.
4	CO4	Analyze the thick and thin cylinders, columns using Euler's and Rankin's theory.
5	CO5	Draw bending moment, shear force and Bending stress diagram under different loading conditions.
6	CO6	Justify the various types of stresses, moments and forces Developed in structural members for designing purpose.

Syllabus:

Course Content	
Unit I	Mechanical properties: Concept of direct, bearing and shear stresses and strains, stress strain relations, Biaxial and triaxial loading, elastic constants and their relationship, stress-strain diagrams and their characteristics for mild steel, TOR steel and concrete, Generalized Hook's law, factor of safety. Uniaxial stresses and strains: Stresses and strains in compound bars in uniaxial tension and compression, temperature stresses in simple restrained bars and Compound bars of two metals only.
Unit II	Shear force & bending moment diagrams: Beams, loading and support conditions, bending moment, shear force and axial load diagrams for all types of loadings for simply supported beams, cantilevers and beams with overhangs, relation between shear forces, bending moment and loading intensity.
Unit III	Stresses in beams (Bending, Shear): i) Bending: Theory of simple bending, section modulus, moment of resistance, bending stresses in solid, hollow and builtup section. ii) Shear: Distribution of shear stresses on beam cross sections, iii) Strain energy under uniaxial tension and compression, impact loads and instantaneous stresses.
Unit IV	Torsion: Theory of torsion & assumptions, derivation of torsion equation, polar modulus, stresses in solid & hollow circular shaft Principal stresses: Biaxial stress system, principal stresses, principal planes, principal strains. Thin and Thick cylinders and thin spherical shells subjected to internal pressures. Combined direct & bending stresses: Combined direct and bending stresses, applications to short columns with eccentric loads.
Unit V	Slope & deflection of beams: Slope & deflection in statically determinate beams subjected to point loads, uniformly distributed loads, moments by Macaulay method, Moment Area method and Conjugate Beam method. Columns: Theory of long columns, Euler, Rankin formula Introduction to fatigue.

Text Books:	
1	Strength of Materials Vol.I by D.S.Prakasa Rao University Press
2	Engineering Mechanics by R. K.Bansal ,Laxmi Publications(p)Ltd., New Delhi
Reference Book:	
1	Engineering Mechanics by S.Timoshenko, D.H. Young and J. V. Rao
2	Strength of Materials by S. S. Rattan, Tata Mc Graw Hill Education Pvt.,Ltd.,
3	Strength of materials by R.K. Rajput, S. Chand & Co, New Delhi.,
4	Strength of materials by S. Ramamurtham, Dhanpat Rai & publication.
Useful Link:	
1	https://onlinecourses.nptel.ac.in/noc19_ce27/announcements?force=true

Semester	Course Code	Name of Course	L	T	P	Credits
IV	CE4M002	Geographic Information System (GIS)	2	0	0	2

Prerequisites for the course	
1	Access to a computer with AutoCAD software installed.
2	A basic understanding of mathematical concepts and geometry will facilitate precision drafting and measurements in AutoCAD.
3	Prior exposure to engineering drawings.

Prior Reading Material/Useful Links
" AutoCAD for Civil Engineering Applications" by Bethune, James A."
" Mastering AutoCAD" by George Omura and Brian C. Benton".
"CAD Standards Manual for Civil Engineering" by Rick Ellis"

Sr. No.	Course Outcome	Course Outcome Statement
1	CO1	Understand geospatial database management concepts.
2	CO2	Apply GIS skills to complete a project.
3	CO3	Apply GIS in Civil Engineering projects.
4	CO4	Explore advanced GIS topics or specialized applications in Civil Engineering.
5	CO5	Analyze the ethical and legal considerations of GIS.
6	CO6	Create effective maps and visualizations using GIS.

Syllabus:

Course Content	
Unit I	Introduction to GIS; Engineering applications: utility system maintenance, urban hydrologic modeling, urban flood control, water supply, water distribution system design, stormwater quality monitoring/control, solid waste management and hazardous waste management.
Unit II	Introduction to Arc GIS Desktop GIS; exploring the ArcMap interface and ArcCatalog for spatial data management
Unit III	Urban stormwater runoff modeling in GIS; spatial data requirements for EPA SWMM model; GIS in urban stormwater management; base map layers; derived maps; zone-risk analysis.
Unit IV	Image processing; supervised and unsupervised classification; image rectification and resampling; Arc Scan Extension for vectorizing raster lines.
Unit V	ArcGIS Network Analyst Extension; network modeling and analysis; defining cost surfaces; finding best routes; closest facility; service areas.

Text Books:	
1	Kang – Tsung Chang, Introduction to Geographic Information Systems, McGraw Hill Publishing, 2nd Edition, 2011.
2	Ian Heywood, Sarah Cornelius, Steve Carver, Srinivasa Raju, An Introduction Geographical Information Systems, Pearson Education, 2nd Edition, 2007.
Reference Book:	
1	Lo.C.P., Albert K.W. Yeung, Concepts and Techniques of Geographic Information Systems, Prentice-Hall India Publishers, 2006
2	"Geographic Information Science and Systems" by Paul A. Longley, Michael F. Goodchild, David J. Maguire, and David W. Rhind.

Semester	Course Code	Name of Course	L	T	P	Credits
III	CE4A002	Principles of Corporate Success	2	0	0	2

Prerequisites for the course	
1	Basic knowledge of business concepts and terminology.
2	Understanding of economics and market dynamics.
3	Proficiency in critical thinking and analytical skills.

Prior Reading Material/useful link	
1	https://www.youtube.com/watch?v=vOykcERGW9Y&list=PLLy_2iUCG87DH0iQSVWZ8iamV15SaLIXQ
2	https://www.youtube.com/watch?v=kTWyt6KC9Jw&list=PLAhQ2ofZZRBjpgXHPpWF0sYwiLD5Gh1k
3	https://www.youtube.com/watch?v=eH6VgHs5mwU&list=PLzs7q4LSx_1Td42jaMK45vE2fWwhxcJzp

Sr. No.	Course Outcome	Course Outcome Statement
1	CO1	Students will develop a deep understanding of the concept of corporate success, its historical evolution, and its significance in the business world.
2	CO2	Students will be able to analyze and assess the interests and influence of various stakeholders (e.g., shareholders, employees, customers, communities) and how they impact corporate performance.
3	CO3	Students will learn to evaluate the key drivers and determinants of corporate success, including strategic planning, competitive forces, and industry dynamics.
4	CO4	Students will be able to create and analyze strategic plans that align with the goals and objectives of an organization, considering factors such as competition,
5	CO5	Students will understand the critical role of leadership in shaping corporate culture and success, and they will be able to analyze the impact of different leadership styles on corporate performance.
6	CO6	Students will recognize the importance of ethical leadership and corporate social responsibility, and they will be able to evaluate how ethical leadership practices contribute to corporate success.

Syllabus:

Course Content	
Unit I	Foundations of Corporate Success
Unit II	Strategic Management for Corporate Success
Unit III	Leadership and Organizational Culture
Unit IV	Corporate Innovation and Adaptability
Unit V	Corporate Social Responsibility and Sustainable Business Practices

Text Books:	
1	"Built to Last: Successful Habits of Visionary Companies" by Jim Collins and Jerry I. Porras
2	"The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail" by Clayton M. Christensen
3	"Firms of Endearment: How World-Class Companies Profit from Passion and Purpose" by Raj Sisodia, Jagdish N. Sheth, and David B. Wolfe
Reference Book:	
1	"Good to Great: Why Some Companies Make the Leap... and Others Don't" by Jim Collins
2	"Creative Confidence: Unleashing the Creative Potential Within Us All" by Tom Kelley and David Kelley

Semester	Course Code	Name of Course	L	T	P	Credits
IV	CE4H002	Engineering Economics	2	0	0	2

Sr. No.	Course Outcome	Course Outcome Statement
1	CO1	Grasp basic economic concepts in civil engineering.
2	CO2	Estimate and understand project costs.
3	CO3	Evaluate benefits and costs of projects.
4	CO4	Make wise financial choices for projects.
5	CO5	Recognize ethical and environmental aspects in decisions.

Syllabus:

Course Content	
Unit I	Introduction to Engineering Economics: - Why economics matters in civil engineering, understand key concepts like supply, demand, and time value of money, Learn how economics guides project decisions.
Unit II	Estimating and Analyzing Costs: - Different types of costs in engineering, Techniques to figure out project costs, How to analyze costs and make decisions.
Unit III	Weighing Benefits and Costs: - Introduction to benefit-cost analysis, counting project benefits: economic, social, environmental, Comparing benefits and costs over time.
Unit IV	Picking the Right Projects: - Simple ways to decide on projects, Internal Rate of Return (IRR) and Payback Period, understanding which projects is worth it.
Unit V	Financing and Feasibility: - Finding money for projects, Public-private partnerships and their impact, checking if projects make sense: feasibility studies.

Text Books:	
1	Engineering Economics and cost Analysis by Dr. E. Gnanasekaran, Dr. M. Shivakumar.
2	Engineering Economics and Costing by Dr. K. K. Patra , Dhiraj Bhattacharjee
3	Engineering Economics by Dr. S. K. Singh, Rita Goyal, Nidhi Gulati.
4	Engineering Economics and Financial management by Kiran H. Ghorpade, Shrikant R. Kate.
Reference Book:	
1	Engineering Economy" by Thuesen H.
2	Economics for Engineering Students" by Seema Singh.
Useful Link:	
1	https://youtu.be/84Ejjd9YP8I?feature=shared

Semester	Course Code	Name of Course	L	T	P	Credits
IV	CE4V002	IPR	2	0	0	2

Sr. No.	Course Outcome	Course Outcome Statement
1	CO1	State the fundamental terms such as copyrights, Patents, Trademarks etc.,
2	CO2	Interpret Laws of copyrights, Patents, Trademarks and various IP registration Processes.
3	CO3	Exhibit the enhance capability to do economic analysis of IP rights, technology and innovation related policy issues and firms' commercial strategies.
4	CO4	Create awareness at all levels (research and innovation) to develop patentable technologies.
5	CO5	Apply trade mark law, copyright law, patent law and also carry out intellectual property audits.
6	CO6	Manage and safeguard the intellectual property and protect it against unauthorized use.

Syllabus:

Course Content	
Unit I	Introduction to Intellectual Property Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.
Unit II	Introduction to Intellectual Property Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.
Unit III	Law of Patents Foundation of Patent law, Patent searching process, Patent Filling Process, ownership rights and transfer.
Unit IV	Trade Secret & Trademarks: Trade secretes law, determination of trade secretes status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation. Unfair competition: Misappropriation of right of publicity, false advertising. Purpose and function of trademarks, acquisition of trademark rights, protectable matter, selecting and evaluating trademark, trademark registration processes

Text Books:	
1	Deborah, E. Bouchoux, "Intellectual Property Right", Cengage learning.
2	Prabuddha Ganguli, "Intellectual property right: Unleashing the knowledge economy", Tata McGraw Hill Publishing Company Ltd.
Reference Book:	
1	Ajit Parulekar, Sarita D"Souza, "Indian Patents Law-Legal and Business implications", Macmillan India Ltd., 2006.
2	B. L. Wadhwa, "Law related to patents, Trademarks, Copyrights, Designs and Geographical indications", Universal law Publishing Pvt. Ltd., India, 2000.
3	P. Narayanan, "Law of copyright and Industrial Designs", Eastern Law house, Delhi, 2010. Deborah, E. Bouchoux, "Intellectual Property Right", Cengage learning.

Semester	Course Code	Name of Course	L	T	P	Credits
IV	CE4L004	Surveying and Geomatics Lab	0	0	4	2

Sr. No.	Learning Outcome	Learning Outcome Statement
1	LO1	Apply the principles of surveying on various surveying Methods as per the field conditions.
2	LO2	Analyze the data collected during the survey to plot the map on the paper.
3	LO3	Evaluate the horizontal distances, Reduced Levels, Area of irregular figures, and independent coordinates of traverse.
4	LO4	Judge the topography of the field from the map

Syllabus:

Sr. No.	Name of Experiments
1	Measurement of bearings of sides of traverse with prismatic compass And computation of correct included angles.
2	Determination of elevation of various points with leveling instrument by collimation method and rise & fall Method.
3	Measurement of horizontal angles and vertical angles with Theodolite.
4	Methods of Plane Table Survey. A) Radiation. B) Intersection. C) Traversing. D) Resection.
5	Determination of area of an irregular figure by using Digital Planimeter.
6	Setting out a simple circular curve by offsets from long chord produced.
7	Setting out a simple circular curve by offsets from Rankine's method.
8	Determine horizontal distances using tacheometer between the stations when line of sight is inclined.
Survey Project	
1	To prepare block contour.
2	To prepare contour for the natural waterbody.
3	To prepare road project.
4	Preparing the sheet of Theodolite Traversing.

Semester	Course Code	Name of Course	L	T	P	Credits
IV	CE4L005	Concrete Technology	0	0	2	1

Sr. No.	Learning Outcome	Learning Outcome Statement
1	LO1	Demonstrate tests on ingredients of concrete and concrete mix
2	LO2	Analyze the data obtained from testing.
3	LO3	Evaluate the properties of ingredients of concrete and Concrete mix and check it's suitability in construction
4	LO4	Judge the material behavior in fresh and hardened state.

Syllabus:

Sr. No.	Name of Experiments
1	Determination of specific gravity of the given cement sample.
2	Determine fineness of the given cement sample.
3	Determine soundness of the given cement sample.
4	Determine standard consistency, initial and final setting time of concrete.
5	Determine bulking of fine aggregates.
6	Determine the workability of concrete by slump cone test and compaction factor test.
7	Determine effect on workability after addition of admixture- Accelerator, Retarder, Superplasticizer.
8	Find Compressive, flexural and tensile strength of concrete as per Indian standards.
9	Exercise and verification of Concrete Mix Design as per IS 10262: 2019 Method.
10	Determine the quality of concrete by Non-destructive Testing methods using Rebound Hammer and ultrasonic Pulse velocity apparatus (Demo only).

Semester	Course Code	Name of Course	L	T	P	Credits
IV	CE4L006	Solid Mechanics Lab	0	0	2	1

Sr. No.	Learning Outcome	Learning Outcome Statement
1	LO1	Perform tension, compression, impact, hardness, torsion test on different specimens and observe the nature of failure..
2	LO2	Compare and observe the result obtained with standard IS values and comment on nature of failure and determine the compressive stress
3	LO3	Formulate the compressive and shear stresses in specimen and compare the resistance qualities of different materials under different testing and loading conditions.
4	LO4	Interpret the graph of torque and angle of twist and determine shear strength and modulus of rigidity of the specimen.

Syllabus:

Sr. No.	Name of Experiments
1	To perform tension test on mild steel and compare the results obtained with standard IS values and comment
2	To perform tension tests on TOR steel also perform bend tests. Compare the results obtained with standard IS values and comment. Refer I.S. 1608.
3	To perform a compression test on metals. Observe the nature of failure and determine the compressive stress. Refer I.S.1708 for test procedure.
4	To perform a compression test on Wood (parallel and perpendicular to grains). Observe the nature of failure and determine the compressive stress. Refer I.S.1708 for test procedure. Comment on results.
5	To perform shear tests on metals. Study single & double shear action. Interpret failure pattern and calculate shear strength in single & double shear. Refer I.S 5242-9779.
6	To perform an impact test on metals. Determine the shock absorbing capacity of the material using Izod impact test apparatus. Compare the impact resisting qualities of different metals. Refer IS: 1598 and IS: 1757 – 1973.
7	To perform a hardness test on different metals and compare hardness number for different metals. Refer IS 1500.
8	To perform torsion test on metals. Interpret the graph of torque and angle of twist and determine shear strength and modulus of rigidity of the specimen. Refer I.S. 1717.
9	To find deflection of beams, bending stresses and their relation for simply supported beam. Also find Young's modulus.
10	Determine modulus of rupture of wooden beam. Observe the parameters that affect modulus of rupture.
11	Observe types of columns, their deflection behaviors. Understand buckling of columns and factors affecting strength of columns. Find buckling load of given set of columns with different end conditions.
12	Observe deflection and working of different types of springs. Determine modulus of rigidity of spring material and stiffness of spring.

Part B: At least four problems from four different topics to be solved using either programming or spreadsheet or solvers or any software.