Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5	IV	4CE205PC	Surveying	3	45 Hrs	3 Hours	60

Course Description:
Subject Code 4CE205PC Surveying is a compulsory Programme Core Course for Second Year B. E. Civil Engineering.

Course Objectives:
The objective of the Surveying course aims to equip students with the knowledge and skills to perform land surveys, measure distances, and create accurate maps for construction projects using modern and traditional methods.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome
CO1	Classify the types of survey in the field of civil engineering.
CO2	Determine linear and angular measurements using chains, tapes, and compasses.
CO3	Describe the types and applications of levelling, characteristics of contours.
CO4	Illustrate theodolite principles and tacheometric methods for accurate angle measurement in land surveying.
CO5	Describe traversing methods for data collection, balancing, and coordinate computation.
CO6	Apply the working principles of GPS and total station.

Details of Syllabus:

Unit 1	**Introduction to Surveying**: Definition and scope of surveying, Surveying Principles, Importance of surveying in civil engineering: construction, land management, Applications of surveying in urban planning, transportation, construction, and environmental engineering , Types of surveying (topographical, cadastral, geodetic, etc.) , Plane Table (Overview), Surveying units and conversions (e.g., distance, angles, elevations)	7 Hrs
Unit 2	**Measurement Techniques:** Introduction to linear measurement, Types of tapes/chains/EDM used in surveying, Procedures for chain surveying, Types of errors in surveying (systematic, random, and gross errors), Measurement errors and correction techniques, Importance of angular measurements in surveying, Use of prismatic and surveyor's compass Bearings and angles, local attraction errors and adjustments.	8 Hrs
Unit 3	**Measurement of Elevation**: Various terms, Methods of height determination, Spirit leveling, different types of levels, booking and reduction of data, profile leveling, cross	8 Hrs

	sectioning, collimation errors and reciprocal leveling. Contours and its characteristics, uses and methods of contouring.	
Unit 4	**Theodolite Surveying:** Detailed study of theodolites: parts, operation, and adjustments, Methods of using theodolites for angle measurement in horizontal and vertical planes, Theodolite traversing and its applications in land surveying	8 Hrs
Unit 5	**Traversing Surveying:** Purpose and classification of each; Compass and theodolite traverses, methods of observation and booking of data, balancing of traverses, computation of coordinates, Gale's traverse table, Adjustment methods (Bowditch method, Transit method).	7 Hrs
Unit 6	**Advanced Surveying Techniques:** Total station and its working principle, Advantages of total stations over conventional instruments, Global Positioning System (GPS), Fundamentals of GPS and its applications in surveying, Introduction to Remote Sensing and GIS for Surveying.	7 Hrs

Text Books:

1. R. Agor, Surveying and Levelling, Khanna Publisher, New Delhi.
2. P. Venugopala Rao, Surveying, PHI Learning Private Limited, New Delhi.

Reference Books:

1. Introduction to Surveying and Levelling by S. K. Duggal, McGraw-Hill Education (India) Private Limited, New Delhi.
2. Surveying Vol. 1 & II by B.C. Punmia, Laxmi Publications (P) Limited, New Delhi.
3. Surveying and Levelling" by S. S. Bhavikatti, I. K. International Publishing House, New Delhi.
4. Surveying and Levelling" by N.N. Basak, McGraw-Hill Education (India) Private Limited, New Delhi.

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5	IV	4CE206PC	Transportation Engineering	3	45 Hrs	3 Hours	60

Course Description:

Subject Code 4CE206PC Transportation Engineering is compulsory Programme Core Course for Second Year B. E. Civil Engineering.

Course Objectives:

The objective of this course is to provide knowledge of transportation systems, highway and pavement design, railway, airport, waterway, and bridge engineering for efficient infrastructure planning and development.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Classify the types of transportation system and its role in economic development.
CO2	Determine the sight distance, gradient using highway planning principle.
CO3	Design flexible and rigid pavements.
CO4	Describe the fundamentals of railway track components.
CO5	Describe the principles of airport and waterway engineering for efficient transportation systems.
CO6	Identify the components of bridge engineering.

Details of Syllabus:

Unit 1	**Introduction to Transportation Systems** Definition, scope, and importance of transportation engineering, Types of transportation modes: Road, Rail, Air and Water, Transportation and its role in economic development, Principles of highway planning and alignment.	7 Hrs
Unit 2	**Geometric Design** Geometric Design: cross sectional elements, Right of way, Camber, Gradient, Typical Highway cross section in embankment and in cutting, PIEV Theory, stopping sight distance, Overtaking sight distance, Horizontal alignment - curves, superelevation, Extra widening, transition curves, vertical alignment, Design of summit and valley curves, IRC Standards for Geometric design.	8 Hrs
Unit 3	**Pavement Design** Components of pavements, Pavement Types and Materials: Flexible and rigid pavements, Materials used in pavement construction (bitumen,	8 Hrs

	cement concrete, aggregates), Pavement design considerations (subgrade, traffic load, climatic conditions). Pavement Design Methods: IRC, Structural design of flexible and rigid pavements.	
Unit 4	**Railway Engineering** Fundamentals of railway track components: rails, sleepers, ballast, and fastenings, Track geometry and alignment, stations and yard planning.	7 Hrs
Unit 5	**Airport and Waterway Engineering** Components of an airport: Runways, taxiways, terminals, and aprons, Airport layout and air traffic control systems, Airport capacity and demand forecasting, Basics Sof ports, harbours, and shipping logistics, Design of dockyards, terminals, and harbour facilities, Navigation aids and their role in water transport.	8 Hrs
Unit 6	**Bridge Engineering** Bridge Engineering-Components, classification and identification, data collection, site selection, economic span, Estimation of flood discharge, water way, scour depth, depth of foundation, Afflux, clearance and free board, different structural form – culverts, types of foundation, abutments, piers and wing wall.	7 Hrs

Text Books:

1. "Principles of Transportation Engineering" by Partha Chakroborty and Animesh Das
2. "Transportation Engineering: An Introduction" by Dr. S.P. Chandramouli

Reference Books:

1. Khanna S.K. & Justo C.E. : Highway Engineering
2. Saxena &Arora : Railway Engineering.
3. Khanna S.K., Arora M.G., Jain S.S. : Airport Planning & Design,
4. BindraS.P. : Principles & Practice of Bridge Engg.

Draft of Syllabus

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5	IV	4CE207PC	Building Planning, Designing	2	30 Hrs	3 Hours	60

Course Description:

Subject Code 4CE207PCBuilding Planning, Designing is a compulsory Programme Core Course for Second Year B.E. Civil Engineering

Course Objectives:

This course aims to develop skills in interpreting building drawings, applying standards, designing buildings, understanding bye-laws, and creating detailed working and submission drawings with structural and layout plans.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Identify the fundamental principles of building planning**.**
CO2	Classify various types of buildings and structural systems.
CO3	Apply building bye-laws, NBC standards, and fire safety regulations.
CO4	Design sustainable layouts for residential and public buildings.
CO5	Identify structural safety, building services, and construction materials**.**
CO6	Apply drafting and rendering tools techniques for building plans and elevations.

Details of Syllabus:

Unit 1	**Introduction to Building Planning:** Principles of Planning: Aspect, Prospect, Orientation, Circulation, Privacy, Architectural Principles: Balance, Proportion, Scale, Aesthetics.	5 Hrs
Unit 2	**Building Components and Structural Overview:** Classification of Buildings: Residential, Commercial, Institutional, Industrial, Functional Requirements of Buildings, Overview of Structural Systems: Load-Bearing, Framed, Composite Structures.	5 Hrs
Unit 3	**Building Bye-Laws and Regulation:** Introduction to National Building Code: NBC, Zoning Laws, Floor Space Index (FSI), Setbacks, Basics of Fire Safety Regulations.	5 Hrs
Unit 4	**Planning of Residential and Public Buildings:** Residential Buildings: Apartments, Bungalows, Row Houses, Functional Space Requirements and Room Layout Design, Layout, Public Buildings: Schools, Hospitals, Offices, Auditoriums, Preparation of Residential & Commercial Building Plans.	5 Hrs

Unit 5	**Building Services and Safety Considerations:** Plumbing Applications: Water Supply and Drainage Systems, Ventilation and Natural Lighting, Introduction to Electrical & HVAC Systems. Fire Safety Planning.	5 Hrs
Unit 6	**Design and Drafting of Buildings:** Introduction to drafting and rendering softwares for Building Design, Basics of Manual and Digital Building Drawings, Overview of Conceptual Design and Presentation of Architectural Plans.	5 Hrs

Reference Books:

1. Shah, Kale & Patki, Building Planning & Drawing, Tata McGraw-Hill Publication.
2. Kumar Swamy & Rao Swamy, Building Planning & Drawing, Charotar Publications.
3. Chery R, Auto-CAD Pocket Reference, BPB Publication.
4. National Building Code of India (NBC)
5. S.C. Rangwala, *Building Planning and Drawing*
6. M.G. Shah, C.M. Kale, *Building Drawing and Planning*
7. N. Kumara Swamy, *Building Construction & Planning*

Level	Semester	Course Code	Course Name	Credits	Practical Hours	Exam Duration	Maximum Marks
5	IV	4CE209PC	Surveying Lab	1	30 Hrs	-	25

Course Description:

Subject Code 4CE209PC Surveying Lab is a compulsory Laboratory Program Core Course for Second Year B.E. Civil Engineering.

Course Objectives:

The objective of the Surveying Laboratory demonstrates hands-on experience with instruments and techniques for accurate field measurements, data collection, and map creation.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Choose the technique for setting up and handling surveying instruments like the levelling equipment, theodolite and total station
CO2	Select methods for finding Levels and detecting local attractions to correct bearings.
CO3	Adopt appropriate surveying methods such as chain, tape, and total station for accurate field measurements
CO4	Apply contour surveying techniques for mapping elevations and generating topographic maps.

Details of Syllabus:

Minimum Eight practical from the list mentioned below.

1. Distance measurement by chain tape and EDM.
2. To Find RL of given points by using differential levelling.
3. Profile and cross sectioning of road for the minimum distance of 100 m length.
4. Contour survey of a small plot of land.
5. Measurement of bearings with prismatic compass.
6. Chain and compass traversing.
7. Local attraction detection- correction of bearings.
8. measurement horizontal and vertical angle by using a repetition method of theodolite.
9. Theodolite Traversing.
10. Measurement of irregular area by using Digital Planimeter.
11. Measurement of distances, angles and elevation by using total station.

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5	IV	4CE210PC	Transportation Engineering Lab	1	30 Hrs	-	25

Course Description:
Subject Code 4CE210PC Transportation Engineering Lab is a compulsory Laboratory Program Core course for Second Year B.E Civil Engineering.

Course Objectives:
The objective of this course is to provide hands-on experience in material testing, pavement evaluation, traffic studies, and total station surveying for effective transportation engineering and infrastructure planning.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome
CO1	Carry out Abrasion and impact test on aggregates.
CO2	Conduct tests like softening point, viscosity and ductility on bitumen.
CO3	Carryout various traffic and road survey studies.
CO4	Identify the components of bridge, railway and airport.

Details of Syllabus:

Minimum eight experiments from the list should be perform

1. Determination of Aggregate Impact value.
2. Determination of Flakiness and Elongation Index of Aggregate.
3. Determination of Abrasion value of Aggregates.
4. Determination of Aggregate Crushing value.
5. Determination of softening point of bituminous material.
6. Determination of viscosity of bitumen.
7. Determination of ductility of bitumen.
8. Pavement Condition Survey.
9. Conduct surveys to collect origin-destination data for a specific region and use it to plan transportation improvements.
10. Conduct Field Visit to Railway Stations/Airport.
11. Conduct Field visit to study bridge components.
12. Carryout the road density survey.

Level	Semester	Course Code	Course Name	Credits	Teaching & Practical Hours	Exam Duration	Maximum Marks
5	IV	4CE306VS	Computer Aided Planning, Design	2 (T- 1 P- 1)	45 Hrs	-	50

Course Description:

Subject Code 4CE306VS Computer Aided Planning, Design is a compulsory Vocational & Skill Enhancement Course for Second Year B.E. Civil Engineering.

Course Objectives:

The course aims to develop skills in drafting building elements, interpreting drawings, creating residential and public building plans, operating CAD software, and designing multi-storeyed buildings, adhering to standards and regulatory requirements.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Draw residential and public building line plans with essential features.
CO2	Apply drafting tools and techniques for building plans, elevations and 3D views.

Unit 1	**Fundamentals of Building Design:** Overview of basic building elements load-bearing and framed structures: line conventions, graphical symbols, and freehand sketching techniques, residential drawings: room orientation and structural details, Principles of drafting line plans for residential and public buildings	6 Hrs
Unit 2	**Building Drawing and Drafting Tools:** Role of CAD tools in modern building design, Basics of drafting softwares: interface, commands, editing, and dimensioning tools, Elements of submission drawings: plans, sections, elevations, and structural notes	6 Hrs

Details of Syllabus:

Minimum four Practical on drafting software,

1. Develop line plans for residential buildings, incorporating essential features like rooms, staircases, WC, and bathrooms.
2. Create line plan layouts for public buildings.
3. Prepare detailed submission drawings for a single-story load-bearing residential building, including plans, sections, and notes.
4. Draft multi-storeyed building plans with structural details.
5. Prepare a site layout plan.
6. Prepare 3D rendered drawing for residential block.
7. Prepare Mechanical, Electrical and Plumbing (MEP) plan for residential building.

Reference Books

1. Building Planning and Drawing" by S.S. Bhavikatti and M.V. Chitawadag
2. "Civil Engineering Drawing and House Planning" by B.P. Verma
3. "Planning and Designing Buildings" by Y.S. Sane

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5	IV	4CEC309 EM	Entrepreneurship in Civil Engineering	2	30 Hrs	2 Hrs	30

Course Description:
Subject Code 4CEC309EM Entrepreneurship in Civil Engineering is a compulsory Humanities Social Science and Management course for Second Year B.E. Civil Engineering.

Course Objectives:
The objective of this course is to equip students to integrate entrepreneurship in civil engineering, addressing challenges, analysing and evaluating business plans.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome
CO1	Apply entrepreneurial traits to innovate, solve challenges, and value entrepreneurship.
CO2	Identify the opportunities and creativity in construction industry.
CO3	Illustrate market feasibility and value intellectual property in construction business planning

Details of Syllabus:

Unit 1	**Concept of Entrepreneurship:** Introduction to Entrepreneurship, Traits of successful Entrepreneur: perception, consistency, creativity, decision making. Importance of Entrepreneurship in civil engineering, Civil Engineering industry overview (trends, challenges, opportunities), Types of entrepreneurships (businesses and startups).	9 Hrs
Unit 2	**Idea Generation and Opportunities:** Recent Trends in civil engineering, Role of innovation and creativity in entrepreneurship, Techniques of Generation of ideas: Brainstorming, SWOT analysis, research, Identification of Opportunities in construction industry, Evaluating Idea and competition in industry.	10 Hrs
Unit 3	**Feasibility study of Idea & Market Conditions:** Construction industry research and opportunities, Evaluating and analysing feasibility of idea as per market conditions, Intellectual Property rights, Case study on Business plan, project management consultancy services, successful contractor firms, successful architecture firms	11 Hrs

Text Books:

1. Entrepreneurship Development and Business Communication, by S. S. Khanka, S. S. Chand & Company
2. Civil Engineering Systems, by A. K. Gupta, New Age International Publications
3. Creativity and Innovation for Engineers, Peter H. Williams, Pearson Educations

Reference Books:

1. Intellectual Property Rights: Unleashing the Knowledge Economy, by PrabuddhaGanguli, Tata McGraw-Hill Education
2. Brainstorming and Beyond: A User-Centered Design Method, by Chauncey Wilson

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5.0	IV	4CE310AE	Technical Writing	2	30 Hrs	—	25

Course Description:

Subject Code 4CE310AE Technical Writing is compulsory Ability Enhancement course for Second Year B.E. Civil Engineering.

Course Objectives:

The objective of this course is to enhance technical writing skills, particularly in creating reports, proposals, manuals, and specifications.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Apply the fundamentals of technical writing in civil engineering.
CO2	Prepare site visit reports and laboratory manuals.
CO3	Generate graphs and charts for technical reports

Details of Syllabus:

Unit 1	**Fundamentals of Technical writing:** Importance of technical writing in civil engineering, Characteristics of technical documents: clarity, conciseness, and accuracy, Planning, drafting, revising, and finalizing documents, Common Technical documents: Reports, Proposals, Specifications, manuals, and guidelines in civil engineering project	9 Hrs
Unit 2	**Writing Civil Engineering Documents:** Writing laboratory reports for tests, Writing material and construction specifications, Structuring site visit reports: objectives, observations, findings, and conclusion, Writing tenders for construction project.	11 Hrs
Unit 3	**Professional Communication and Advanced Documentation:** Creating tables, graphs, and charts for technical reports, Preparing technical presentations for civil engineering projects, Drafting proposals for client approvals and funding agencies, Plagiarism and Copy Rights.	10 Hrs

Text Books:

1. "Professional Communication" by Aruna Koneru
2. "Building Construction Handbook" by Roy Chudley and Roger Greeno
3. "Technical Communication: Principles and Practice" by Meenakshi Raman and Sangeeta Sharma
4. Data Visualization: A Practical Introduction" by Kieran Healy
5. "Plagiarism: Why It Happens, How to Prevent It" by Barry Gilmore

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5	IV	4CE305M	Water Purification And Supply	2	30 Hrs	2 Hours	30

Course Description:

Subject Code 4CE305M Water Purification and Supply (Multidisciplinary Minor-II) is a course for minor in Civil Engineering for Second Year.

Course Objectives:

The objective of this course is to develop knowledge of water supply systems by understanding water demand, sources, treatment processes, and distribution systems, and to cultivate analytical and responsible approaches to sustainable water management.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Identify the importance of planned water supply, water demand types, influencing factors, and intake structures.
CO2	Describe water impurities, purification processes, and appreciate the significance of safe and treated water.
CO3	Classify various distribution system layouts, types, water conveyance conduits, and pumps for water lifting.

Details of Syllabus:

Unit 1	**Water Supply And Demand:** Importance & Necessity of planned water supplies, Various types of water demand, Per capita demand, Variation in water demand, Factors affecting water demand. Sources of water-Surface & sub-surface sources, Intake structure, Various types of intake structure, Factors governing selection of intake structure.	9 Hrs
Unit 2	**Water Treatment Process:** Analysis of water, Impurities present in water,variousprocesses of water purification: Screening, Plain sedimentation, Sedimentation with coagulation, Filtration, Disinfection, Water Softening, Miscellaneous treatment.	11 Hrs
Unit 3	**Distribution System:**Requirements of a good distribution system, Variouslayoutof distribution system, Methods of distribution,Detection of leakage in the distribution pipes.	10 Hrs

Text Books:

1. Garg S.K. Water Supply Engineering,Khanna Publication.
2. Punmia B.C. Water Supply Engineering,Laxmi Publication.
3. Birde G.S. Water Supply And Sanitary Engineering,DhanpatRai& Sons Delhi.

Reference Books:

1. Steel E.W. Water Supply And Sewerage Mc-Graw Hill.
2. Kshirsagar S.R. Water Supply Engineering Roorkee Pub house, Roorkee.

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5.0	IV	4CE307OP	Fundamental of Vastushastra	2	30 Hrs	2 Hours	30

Course Description:

Subject Code 4CE307OP Fundamental of Vastushastra is Open Elective for Second Year.

Course Objectives:

The objective of this course is to introduce the principles of Vastushastra, its historical and cultural significance, and its application in modern construction, fostering sustainable and harmonious designs by integrating traditional knowledge with contemporary engineering practices.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Identify the fundamentals and historical relevance of Vastushastra.
CO2	Apply Vastushastra principles to create efficient and harmonious layouts.
CO3	Apply sustainable practices inVastushastra.

Details of Syllabus:

Unit 1	**Introduction to Vastushastra and Its Fundamentals:** Definition, origin, and evolution of Vastushastra, Significance of Vastushastra in civil engineering and modern construction practices, five elements (Panchabhutas) and their role in design principles, Vastupurusha Mandala and its applications in spatial arrangement.	9 Hrs
Unit 2	**Application of Vastushastra in Building Design:** Principles of orientation and layout: Residential, commercial, and institutional buildings, Placement of key elements (rooms, doors, windows) as per Vastushastra, Importance of natural ventilation, lighting, and energy flow, Examples of Vastushastra-compliant structures in modern architecture.	10 Hrs
Unit 3	**Sustainable Practices in Vastushastra:** Implementing Vastushastra in modern civil engineering projects, Balancing traditional principles with contemporary design needs and technologies. Remedial Vaastu - Identifying the Vastu Defects, Rectification of Vastu Defects in Existing Building, Color therapy, Discussion on different building plans. Design a small-scale structure adhering to Vastushastra principles.	11 Hrs

Reference Books:

1. Dr. SatyendraGautam, *VastuShastra: Science and Technology for Design and Architecture*, CBS Publishers & Distributors Pvt. Ltd.
2. Ashok K. Jain, *Architecture and VastuShastra*, DhanpatRai Publications
3. B. B. Puri, *Introduction to VastuShastra*, V&S Publishers.
4. Dr. B. K. Chaturvedi, *Vastu Science for 21st Century*, Diamond Books.
5. Ashwini Kumar, *Vaastu and Architecture: Ancient Indian Concepts and Their Relevance Today*, Sterling Publishers Pvt. Ltd.
6. Remedial Vaastu for home by Janhavi N. Sahasrabuddheand Narendra Hari Sahasrabuddhe

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5.0	IV	4CE307OP	Infrastructure Planning & Management	2	30 Hrs	2 Hours	30

Course Description:

Subject Code 4CE307OPInfrastructure Planning & Management is Civil Engineering Open Elective for Second Year.

Course Objectives:

The objective of this course is to equip students with knowledge of infrastructure systems, project management skills, sustainability principles, and innovative technologies for effective, sustainable, and resilient infrastructure planning and management.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Explain the role of infrastructure systems in promoting sustainable economic and social development.
CO2	Understand and Apply project management tools and techniques to develop and evaluate infrastructure project plans.
CO3	Analyse Contract terms and types , Bidding process and apply emerging technologies into infrastructure planning.

Details of Syllabus:

Unit 1	**Fundamentals of Infrastructure Systems:** Types of Civil Projects: real and infrastructure , Introduction to infrastructure: Definition, types, and key components, Significance of infrastructure in economic, social, and environmental development, Principles of infrastructure planning: strategic, tactical, and operational approaches.	9 Hrs
Unit 2	**Infrastructure Project Planning and Management:** Term Project, Project Life Cycle , Project development steps , Project planning fundamentals: Work Breakdown Structure (WBS), scheduling, resource allocation. Role and importance of Controlling. Introduction to Planning and Controlling tools – BAR chart and Network (CPM, PERT)	10 Hrs
Unit 3	**Infrastructure Projects Contracts and Emerging Trends in Infrastructure Development:** Term Contract, types of Contracts – Cost Plus, Lump sum , Item Rate,	11 Hrs

	Percentage rate, BOT, labour , Turnkey contracts ,sub contract, Bidding Process, Emerging technologies in infrastructure: IoT, AI, and smart cities.	

Reference Books:

1. Alvin S. Goodman and Makarand Hastak, *Infrastructure Planning Handbook*, McGraw-Hill Education.
2. R. Dennis Cooke, *Civil Infrastructure Systems: Analysis and Design*, Wiley-Blackwell.
3. E. R. Yescombe, *Public-Private Partnerships: Principles of Policy and Finance*, Elsevier.
4. Michael Neuman and Angela Wilkinson, *Sustainable Infrastructure: Principles into Practice*, Routledge.
5. Kief Morris, *Infrastructure as Code: Managing Servers in the Cloud*, O'Reilly Media.

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5.0	IV	4CE307OP	Principles of Management	2	30 Hrs	2 Hours	30

Course Description:

Subject Code 4CE307OPPrinciples of Management is Civil Engineering Open Elective for Second Year.

Course Objectives:

The objective of this course is to encompass key management principles, focusing on their application in civil engineering projects, enhancing students' ability to manage resources, teams, and construction processes efficiently while integrating sustainable practices.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Identify the fundamental concepts of management, its importance in civil engineering projects.
CO2	Apply project management tools to plan, organize, and control construction projects.
CO3	Develop leadership and communication skills for managing construction teams.

Details of Syllabus:

Unit 1	**Introduction to Management:** Definition, nature, and importance of management in engineering, Roles and responsibilities of a manager in construction projects, Basic management functions: Planning, organizing, staffing, directing, and controlling ;Introduction, importance of various types of management in construction – Humar resource, inventory, safety , quality , planning and contract management .	9 Hrs
Unit 2	**Project Management and Organizational Structures:** Term Project, need and functions of project management ,Overview of project management: life cycle Phases, Scheduling, Resource allocation , project optimization concept. Organizational structures in construction: Type - Functional, projectized, and matrix organizations.	11 Hrs
Unit 3	**Leadership, Risk Mitigation and Decision Making:** Leadership styles and their application in construction project teams, various risk and process of risk mitigation,Decision-making models: Rational, bounded rationality, and intuitive decision-making, Conflict resolution and negotiation skills in project management.	10 Hrs

Reference Books:

1. Harold Koontz and Heinz Weihrich, *Essentials of Management: An International Perspective*, McGraw-Hill Education.
2. R. P. Rastogi, *Management of Construction Projects*, Alpha Science International Ltd.
3. J. K. Liker, *The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer*, McGraw-Hill Education.
4. R. A. K. Rao, *Principles of Management in Construction*, Oxford University Press.

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5	IV	_____	Environmental Laws & policy	3	45 Hrs	3 Hours	60

Course Description:

Subject Code _____Environmental Laws & policy is a Double Minor Course for specialization in Environmental Engineering for second Year.

Course Objectives:

The objective of this course is providing knowledge of environmental laws, policies, and judicial interventions for sustainable environmental management and legal compliance.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Identify the significance of environmental laws, principles, and agreements while appreciating their global relevance.
CO2	Illustrate the regulatory provisions of the Water Act (1974), its impact on water conservation.
CO3	Illustrate the provisions of the Air Act (1981), and its role in air quality management.
CO4	Describe the regulatory framework of the Environment Protection Act, 1986,
CO5	Illustrate policies on renewable energy, waste management and Environmental Impact Assessment (EIA) process
CO6	Analyse landmark environmental cases and appreciate the judiciary's role in upholding environmental justice and rights

Details of Syllabus:

Unit 1	**Introduction to Environmental Laws and Policy:** Introduction, Concept and significance of environmental laws and policies, National Environmental policies, Precautionary Principle and Polluter Pays Principle, Concept of absolute liability, multilateral environmental agreements and Protocols – Montreal Protocol, Kyoto agreement, Rio declaration.	8 Hrs
Unit 2	**Water (P & Cp) Act, 1974:** Power & functions of regulatory agencies - responsibilities of Occupier, Provision relating to prevention and control, Scheme of Consent to establish, Consent to operate – Conditions of the consents – Outlet –	7 Hrs

	Legal sampling procedures, State Water Laboratory – Appellate Authority – Penalties for violation of consent conditions etc. Provisions for closure/directions in apprehended pollution situation.	
Unit 3	**Air (P & Cp) Act, 1981:** Power & functions of regulatory agencies - responsibilities of Occupier, Provision relating to prevention and control, Scheme of Consent to establish, Consent to operate – Conditions of the consents – Outlet – Legal sampling procedures, State Air Laboratory – Appellate Authority – Penalties for violation of consent conditions etc. Provisions for closure/directions in apprehended pollution situation.	7 Hrs
Unit 4	**Environment (Protection) Act 1986:** Genesis of the Act – delegation of powers – Role of Central Government - EIA Notification – Sitting of Industries – Coastal Zone Regulation - Responsibilities of local bodies mitigation scheme etc., for Municipal Solid Waste Management - Responsibilities of Pollution Control Boards under Hazardous Waste rules and that of occupier, authorization – Biomedical waste rules – responsibilities of generators and role of Pollution Control Boards.	8 Hrs
Unit 5	**Environmental Policy Frameworks in India** Policy Development and Implementation– Role of central and state governments in policy formation; Policies on renewable energy, climate change, and waste management; Environmental Impact Assessment (EIA)– Definition, process, and public participation, Case studies of successful EIA implementation; National Environmental Policies (NEPs) Overview of key national policies for environmental protection and management, Relevant Provisions of Indian Forest Act.	8 Hrs
Unit 6	**Case Studies and Judicial Intervention:** Landmark Environmental Cases in India–Ganga River Pollution Case, Vellore Citizens Welfare Forum Vs. Union of India (tanneries pollution), Sterlite Copper Case (industrial pollution and citizen protest), MC Mehta cases (pollution, conservation, and right to clean environment) Role of Judiciary–Interpretation of Article 21 (Right to Life) concerning the environment, Public Interest Litigations (PILs) and their impact.	7 Hrs

Text Books:

1. Divan, S., & Rosencranz, A. Environmental Law and Policy in India.
2. Leelakrishnan, P. Environmental Law in India.

Reference Books:

1. Sands, P., & Peel, J. Principles of International Environmental Law.
2. Cullet, P. Water Law, Poverty, and Development.
3. UNEP Reports on Environmental Governance and Sustainability

Draft of Syllabus

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5	IV	_____	Plates and Shells	3	45 Hrs	3 Hours	60

Course Description:

Subject Code _____ Plates and Shells is a Double Minor Course for specialization in Structural Design for second Year.

Course Objectives:

The objective of the course is to equip students with the knowledge and skills to analyze, design, and apply theories of plates and shells under various loading conditions.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Determine behaviour of plates under small and large deflections.
CO2	Determine differential equations for plates using Cartesian and Polar coordinates.
CO3	Apply Navier's and Levy's methods for rectangular plate analysis.
CO4	Explain thin shell theory, stress resultants, and equilibrium equations.
CO5	Describe stress resultants and stress-displacement relations for shell structures.
CO6	Design conical and spherical shells using membrane and bending theory.

Details of Syllabus:

Unit 1	Plates: Classification-Thin and thick plates, small and large deflections, Assumptions in theory of thin plates with small deflection, Governing Differential equation in Cartesiancoordinates, moment curvature relations, stress resultants.	7 Hrs
Unit 2	Rectangular plates: Navier solution for plates with all edges simply supported, Distributed loads, Point loads, rectangular patch load, Green function. Rectangular plates: Levy's method, Distributed load, line load Energy method: Minimum potential theorem, Rayleigh-Ritz approach for	8 Hrs

	simple cases.	
Unit 3	Circular Plates: Governing differential equation in Polar coordinates, Axi-symmetric situation, moment curvature relations, simply supported and fixed edge, distributed load, line load, linearly varying load.	7 Hrs
Unit 4	Shells: Introduction to thin shell theory, classification on shell geometry, equation to shell surfaces, stress resultants, stress-displacement relations, compatibility Conditions, equilibrium equations.	8 Hrs
Unit 5	Circular cylindrical shells: Membrane theory. Bending theory for circular-cylindrical shell: Design procedure	7 Hrs
Unit 6	Shell of revolution: Membrane theory, spherical and conical shells with axisymmetric loading. Simple methods: Analysis and design for conical and hyperbolic paraboloid shells	8 Hrs

Reference Books:

1. Theory of Plates and Shells, S. P. Timoshenko and W. Kriger, 2na edition, TMH, l. 1987.
2. Elementary Theory of Plates, L. G. Jaeger, Macmillan, 1964.
3. Analysis of Plates, Szilard Rudolp, PHI, 1974
4. Design and Construction of Concrete Shell Roofs, G. S. Ramaswamy, CBS, 1986

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5	IV	____	Subsurface Exploration: Importance and Technique Involved	3	45 Hrs	3 Hours	60

Course Description:

Subject Code _____ Subsurface Exploration: Importance and Technique Involved is a Double Minor Course for specialization in Geotechnical Engineering for second Year.

Course Objectives:

The objective of the course to encompass the significance of subsurface exploration, various geotechnical investigation techniques, and develop skills in soil, rock, and groundwater analysis for infrastructure projects.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Explain the importance of geotechnical investigations in construction projects**.**
CO2	Identify different boring and drilling techniques such as auger, wash, rotary, and core drilling.
CO3	Classify various types of soil sampling techniques**.**
CO4	Determine the shear strength and bearing capacity of soil using various soil field tests
CO5	Describe geophysical exploration techniques used in subsurface investigations.
CO6	Identify the purpose and importance of a soil investigation report in geotechnical engineering.

Details of Syllabus:

Unit 1	**Introduction to Subsurface Exploration:** Definition and objectives of subsurface exploration, Importance of geotechnical investigations in construction projects, Factors affecting site investigation, Overview of soil exploration, rock exploration, and groundwater investigations, Geotechnical investigation as per IS codes (IS 1892, IS 2131, IS 2720).	8 Hrs.
Unit 2	**Types of boring and drilling:** Auger, wash, rotary, percussion, core etc.,	8 Hrs.

	Methods for stabilization of borehole, Types of soil samples, Sample disturbance, storage, labelling and transportation of samples.	
Unit 3	**Types of soil samplers:** Split spoon sampler, Scraper bucket sampler, Shelby tube and thin wall samplers, piston sampler, Denison sampler, hand carved samples etc.	7 Hrs.
Unit 4	**Field Tests:** Standard Penetration Test, cone penetration Test, vane Shear Test, plate Load rest, pressure Meter Test.	7 Hrs.
Unit 5	**Geophysical Exploration Techniques:** Introduction to geophysical methods in subsurface exploration, Electrical resistivity method for soil and groundwater studies, Seismic methods: Seismic refraction and reflection, Ground Penetrating Radar (GPR) and its applications, Advantages and limitations of geophysical techniques.	8 Hrs.
Unit 6	**Soil investigation report:** bore log, soil profile and contents of report, Field records Site investigation in the view of ground improvement.	7 Hrs.

Text Books:

3. K. R. Arora Soil Mechanics and Foundation Engineering, Standard Publisher and Distributer.
4. Craig, Soil Mechanics.
5. S. K. Gulhati& M. Datta, Geotechnical Engineering, Tata McGraw-Hill, New Delhi.

Reference Books:

8. Bramha : Foundation Engineering.
9. Hanson : Theoretical Soil Mechanics.
10. Rao G.V. : Engineering with Geosynthetics.
11. P. P. Raj : Geotechnical Engineering.

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5	IV	_____	Waste to Energy	3	45 Hrs	3 Hours	60

Course Description:

Subject Code _____Waste to Energy is an Honors course for Second Year B.E.in Civil Engineering.

Course Objectives:

This course objective is to provide overview of waste to energy concepts, focusing on the design and operation of gasifiers, biomass combustors, biogas plants and biofuels. It covers key equipment, design principles, and operational aspects of these energy conversion systems.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Illustrate the classification of waste and its conversion to different types of fuels.
CO2	Apply the concept of biomass pyrolysis for fuel extraction.
CO3	Classify various types of biomass gasifier for thermal heating.
CO4	Identify various types of biomass combustion techniques.
CO5	Describe the properties of biogas and its composition.
CO6	Apply the principles of Biofuel in transportation industry.

Details of Syllabus:

Unit 1	**Introduction to Energy from Waste** Classification of waste as fuel, Agro based, Forest residue, Industrial Waste, MSW, Incinerators, gasifier, digester. Status of waste to Energy conversion in India.	7 Hrs
Unit 2	**Biomass Pyrolysis** Types of Biomass Pyrolysis, Manufacture of Charcoal, Methods, Yields and application, Manufacture of pyrolytic oils and gases, yields and applications.	8 Hrs

Unit 3	**Biomass Gasification** Types of Biomass Gasifiers, Basic design of selected Biomass Gasifiers. Operational aspect of a typical Biomass gasifier, Gasifier engine arrangement and electrical power, Equilibrium and kinetic consideration in gasifier operation.	8 Hrs
Unit 4	**Biomass Combustion** Biomass stoves, Improved chullahs, types, some exotic designs, Fixed bed combustors Types of biomass combustors, Basic design of selected biomass combustors, and Operational aspect of a typical biomass combustor.	8 Hrs
Unit 5	**Biogas** Properties of biogas - calorific value and its composition. Types of Biogas plants, Basic design of a biogas plant. Operational aspect of a typical biogas plant.	7 Hrs
Unit 6	**Biofuels from Waste** Conversion of organic waste into bioethanol and biodiesel, Algae-based biofuels and emerging technologies, Applications of biofuels in transportation and industry, Challenges and opportunities in biofuels production from waste.	7 Hrs

Text Books:

1. Edgard and Mercier (2009) Energy Recovery, Nova Science Publishers.
2. Worrell and Vesilind (2012) Solid Waste Engineering, Cengage Learning.

Reference Books:

1. Tchobanoglous (1993) Integrated Solid Waste Management, Mc Graw Hill.
2. Prabir Basu (2010) Biomass Gasification and Pyrolysis, Academic Press/ElsevierInc.
3. Clark and Deswarte (2015) Introduction to Chemicals from Biomass, John Wiley & Sons.

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5	IV		Quantity Survey & its equipment's	4	60 Hrs.	3 Hours	100

Course Description:

Subject Quantity Survey & its Equipment's is an Exit Course after Second Year B. E. Civil Engineering.

Course Objectives:

The objective of the Quantity Survey & its Equipment's is to equip students with skills in quantity surveying, rate analysis, earthwork estimation, material calculation, contract management, and equipment application.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Identify the type of construction, elements of a structure and understand the measuring unit for different construction items .
CO2	Understand types of estimation methods and prepare estimate of RCC work by different methods.
CO3	Analyse and Prepare the Quantity survey sheets for Road and Paving work
CO4	Understand part and process of rate analysis and its techniques .
CO5	Understand the process and concept of valuation.
CO6	Understand the type of contract and process of tendering. Identify and choose proper construction equipment as per utility.

Details of Syllabus:

Unit 1	**Introduction to Construction material and methods:** Types of Construction Projects – Load bearing and frame structures. Construction materials, their specific weight,Item of Work and measuring units,Specifications.	10 Hrs
Unit 2	**Quantity surveying, its types and methods: -** Definition of Quantity surveying;Need and Duties of Quantity Surveyor;	10 Hrs

	Estimation – its need and types. Formats of estimation RCC framed Single Room Quantity Surveying by Centreline method. Masonry Single room quality surveying by Long wall short wall method.	
Unit 3	**Quantity analysis for Paving &Road work: -** Quantity analysis for 1 km stretch of Concrete Road Quantity analysis for 1 km stretch of Bitumen Road Quantity survey for paved Footpath.	10 Hrs
Unit 4	**Rate Analysis:** Steps involved in the analysis of rates, factors affecting rate analysis , procedure of rate analysis- Lead and Lift, Overhead charges, water charges , contractor profit. Prepare rate analysis for: - Plain Cement Concrete, Reinforced cement concrete, brick masonry, plaster for cum or sqm.	10 Hrs
Unit 5	**Valuation** – Purpose ; types of value ; term depreciation , methods of calculating deprecation.	10 Hrs
Unit 6	**Civil engineering contracts and Construction Equipment:** Contract and its types, Requirement of valid contract ; Tender and tender document,Process of Tendering. Introduction to :- Construction equipment's and their types, Excavator , Compactor , Vibrator and Crane	10 Hrs

Text Books:

6. R. Agor, Surveying and Levelling, Khanna Publisher, New Delhi.
7. P. Venugopala Rao, Surveying, PHI Learning Private Limited, New Delhi.

Reference Books:

5. Introduction to Surveying and Levelling by S. K. Duggal, McGraw-Hill Education (India) Private Limited, New Delhi.
6. Surveying Vol. 1 & II by B.C. Punmia, Laxmi Publications (P) Limited, New Delhi.
7. Surveying and Levelling" by S. S. Bhavikatti, I. K. International Publishing House, New Delhi.
8. Surveying and Levelling" by N.N. Basak, McGraw-Hill Education (India) Private Limited, New Delhi.
9. "Estimating and Costing" by B.N. Dutta , Ubs Publisher Distributors Private Ltd.

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
5.0	IV		Fundamentals of Structural Analysis	4	60 Hrs	3 Hours	100

Course Description:

Subject Code _ Fundamentals of Structural Analysis is an Exit Course after Second Year B.E. Civil Engineering

Course Objectives:

The objective of this course is to introduce foundational concepts in structural analysis,.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Classify types of loads, supports, equilibrium conditions, significance of indeterminate structures and types of indeterminacy.
CO2	Analyse trusses using the methods of joints and sections
CO3	Apply moment distribution method for continuous beams and frames analysis.
CO4	Apply slope deflection method for continuous beams and frames analysis.
CO5	Apply energy method for Beam and single bay frame analysis.
CO6	Classify types of dynamic loads, natural frequency, resonance and damping.

Details of Syllabus:

Unit 1	**Introduction to Structural Analysis:** Types loads, Types support and equilibrium condition, significance of indeterminate structure Types of indeterminacy, degree of indeterminacy of various structure.	10 Hrs
Unit 2	**Analysis of Trusses:** Analysis of planar trusses using methods of joints and sections. Analysis of indeterminate truss by using Castigliano's theorem/stiffness method etc.	10 Hrs
Unit 3	**Moment Distribution method:** Analysis of continuous Beams with and without sinking support.	10 Hrs

	Analysis of single bay single storey frame with and without sinking support.	
Unit 4	**Slope Deflection Method:** Analysis of continuous Beams with and without sinking support. Analysis of single bay single storey frame with and without sinking support.	10 Hrs
Unit 5	**Energy Methods in Structural Analysis:** Work and energy principles: Strain energy, work done by external forces, Castigliano's theorem and virtual work, Application of energy methods in analysing beams.	10 Hrs
Unit 6	**Plastic Analysis:** Introduction to plastic analysis of steel structure, shape factor, plastic section modulus, Redistribution of moment, upper and lower bound theorems, collapse loads for beams, single bay, single storey portals .	10 Hrs

Reference Books:

1. R.C. Hibbeler, *Structural Analysis*, Pearson Education.
2. S. Ramamrutham, *Theory of Structures*, Dhanpat Rai Publishing Company.
3. Timoshenko and Young, *Theory of Structures*, McGraw-Hill Education.
4. C. S. Reddy, *Basic Structural Analysis*, McGraw-Hill Education.
5. J. M. Gere and W. Weaver, *Mechanics of Materials*, Brooks/Cole Publishing.