

- **Department Name: - Civil Engineering**
- **UG Program Name: -B.Tech. Civil Engineering**
- **Vision and Mission: -**

Vision:

To be an outstanding department devoted to provide high end research and technical education in civil engineering which will produce socially aware professionals to provide solutions to global community.

Mission:

- To design curriculum based on changing needs of stakeholders & provide excellence in delivery & assessment to ensure holistic development of civil engineering students.
- To enhance research & consultancy resulting in solving problems related to civil engineering infrastructure as well as society at large.
- To mentor students in pursuit of higher education, entrepreneurship and global professionalism.

Sr. No.	Program Outcomes
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
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Sr. No.	Program Specific Outcomes
1	Enhance employability and/or entrepreneur skills through in-house and onsite training.
2	Provide solutions/procedures to societal and rural development problems through research and innovative practices.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1	III	CE2033	Engineering Mechanics	CO1- Apply conditions of equilibrium to solve real life problems
				CO2- Determine Centroid & Moment of Inertia of the geometrical plane laminae
				CO3-Apply fundamental concepts of Kinematics and Kinetics to solve engineering problems
2	III	CE2053	Strength of Material	CO1-Analyze the section for various types of stresses and strains.
				CO2-Construct shear force and bending moment diagrams for determinate beams.
				CO3-Determine stresses (bending, and torsional) in the beam cross sections
				CO4 - Evaluate strain energy stored in a body due to various loading conditions
3	III	CE2193	Professional Ethics, Values & Code of Conduct	CO1- Practice moral values in the engineering profession
				CO2- Resolve moral issues in the profession
				CO3 -Justify the moral judgement concerning the profession
4	III	CE2213	Building Planning & Design	CO1- Select appropriate materials for building construction applications
				CO2- Prepare a functional design of components for buildings
				CO3 - Plan and design residential buildings

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO4 - Choose the appropriate type of plumbing and electrification system for building
				CO5- Explain types and uses of items related to building finishes
5	III	CE2073	Surveying	CO1- Calculate reduced levels and interpret the characteristics of contour for topographical study
				CO2- Calculate the angular and linear measurements by using tacheometry and trigonometry
				CO3 - Design and set out the curve
				CO4- Demonstrate the principles of advanced surveying techniques
6	III	SH2173	Environmental Science	CO1-Discuss the importance and sensitivity of the environment
				CO2-Interpret the over exploitation of natural resources and follow the environmental ethics
				CO3-Explain methods to protect the environment and prevent environmental pollution
				CO4-Apply their knowledge and skills to solve environment related problems
7	III	CE2233	Building Planning & Design Laboratory	CO1- Design building components using AutoCAD
				CO2- Draw details of building components using AutoCAD
				CO3 -Prepare measurement, submission and working drawings of residential buildings using AutoCAD
8	III	CE2113	Surveying Laboratory	CO1- Determine reduced levels and prepare contour maps by using theodolite
				CO2-Design and set out the curve on the field
				CO3- Perform setting out for various construction works
				CO4-Determine distances and elevations by using Tacheometry and Trigonometry
				CO5- Prepare the layout map by using the Total Station
9	III	CE2133	Strength of Materials Laboratory	CO1-Determine behaviour of material under axial shear and bending forces

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO2- Identify various types of stresses in various structural elements CO3- Determine various strengths of different construction materials
10	III	CE2173	Engineering Mechanics Laboratory	CO1- Verify law of polygon of forces, law of triangle of forces and principle of moment CO2-Compare coefficient of friction of various surfaces in contact CO3-Correlate theoretical and practical results of support reactions and centroid of plane lamina CO4- Analyze a simple truss
11	III	SH2603	Environmental Science Project	CO1-Utilize scientific methods to solve environmental problems CO2-Evaluate technologies for restoration of degraded environment CO3-Develop presentation and report writing skills CO4-Develop as an individual and in group leadership quality
12	III	SH2633	Professional Leadership Skills	CO1-Explain the traits of a leadership through real life examples CO2-Exhibit the ability to work effectively in team CO3- Prepare a presentation as per the audience and context requirements
13	III	SH2613	Interpersonal skills - (Jivan Vidya for Work Life Balance)	CO1-Exhibit interpersonal communication skills CO2-Demonstrate decision making skills CO3-Apply conflict resolution styles appropriate in different situations CO4-Demonstrate skills to manage balance in work and life CO5- Apply Jeevanvidya wisdom in day to day life
14	III	SH2693	Innovation tools and methods for entrepreneurs	CO1-Explain structured approach to define the problem with every possible detail, identify conflicts and solve them CO2-Apply user journey map to the selected problem to show user interaction at various stages CO3-Analyze the solutions provided by competitors for effectiveness and gaps if any

Sr. No.	Semester	Course Code	Course Name	Course Outcome
15	III	SH2593	Personal effectiveness and body language	CO1-Develop skills to build self-esteem and positive attitude
				CO2-Develop interpersonal skills characterized by effective communication and conflict resolution
				CO3-Discover ways to overcome procrastination
				CO4-Demonstrate responsiveness towards stress and health issues
				CO5-Interpret the non-verbal behaviour of a person
16	III	SH2733	German language-basic level	CO1-Interpret the language if the next person is speaking slowly and clearly
				CO2-Make use of the language in routine life with the routing topics like family, shopping, work etc.
				CO3-Demonstrate the language by self-introduction in German with simple sentences
17	III	SH2713	Japanese language-Level III	CO1-Make use of basic conversations in various situations
				CO2-Identify the sentence patterns
				CO3-Explain insights about the communication required for living in Japan
				CO4-Interpret Japanese work ethics required in their professional career
18	IV	SH2063	Engineering Mathematics-III	CO1- Solve problems on linear differential equations (LDE) and linear partial differential equations (PDE).
				CO2-Apply linear differential equations (LDE) to deflection of beams and columns.
				CO3-Determine Fourier series of given functions.
				CO4-Compute Karl Pearson's coefficient of correlation and to fit regression lines.
				CO5-Solve problems on probability distributions.
19	IV	CE2043	Concrete Technology	CO1-Explain properties of various materials used in the manufacture of different kinds of concretes and role played by them in developing strong, durable concretes

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO2-Describe various properties of concretes in fresh and hardened state
				CO3-Design concrete mixes of given grade using mix design procedures recommended by IS Code and ACI code.
				CO4-Describe the properties and applications of special types of concrete.
				CO5-Illustrate various mechanisms causing the deterioration of concrete /elements of concrete structures
20	IV	CE2063	Fluid Mechanics	CO1-Analyze different physical properties of fluid.
				CO2-Calculate various forces acting on submerged and floating bodies.
				CO3-Discriminate fluid kinematics and fluid dynamics.
				CO4-Illustrate flow through pipes and flow through open channels.
				CO5-Prepare dimensional analysis using different theories and models.
				CO6-Explain the concept of hydraulic pumps.
21	IV	CE2083	Mechanics of Structures	CO1-Analyze and design axially loaded columns.
				CO2-Analyze and design structural members subjected to direct and bending stresses.
				CO3-Compute slopes and deflections at various locations for determinate beams.
				CO4-Construct ILD for determinate beams and 2D trusses.
				CO5-Analyze three hinged arches and suspended cables.
22	IV	CE2123	Applications of Programming Language in Civil Engineering	CO1-Apply programming language concepts to solve problems of civil engineering domain.
				CO2-Apply Microsoft excel concepts to solve problems of civil engineering domain
				CO3-Validate and execute the programs and correct syntax and logical errors.
23	IV	CE2143	Engineering Geology Laboratory	CO1-Recognize and describe common geological formations related to civil engineering.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO2- Identify the different Rock types.
				CO3- Implement various methods for water conservation techniques.
				CO4- Use of electrical resistivity method for determining depth of bedrock or groundwater.
24	IV	CE2163	Fluid Mechanics Laboratory	CO1- Determine metacentric height, type of flow, major losses, minor losses, coefficient of discharge, coefficient of contraction, and coefficient of velocity of liquid.
				CO2- Design the most economical open channel section.
				CO3- Measure velocity of flow using wind tunnel
25	IV	CE2183	Concrete Technology Laboratory	CO1-Assess properties of various concrete ingredients as per the standard testing procedures.
				CO2-Perform tests on ingredients of concrete and on fresh as well as hardened concrete for determining their properties as per the standard procedures
				3. Design the concrete mix for a given grade of concrete as per the guidelines of IS code.
				4. Prepare the test set up for conducting various tests on concrete mixes / specimens
				5. Evaluate the quality of concrete specimens/ elements using NDT equipments
26	IV	SH2643	German language-advanced level	CO1-Interpret the language if the next person is speaking slowly and clearly
				CO2-Make use of the language in routine life with the routing topics like family, shopping, work, etc.
				CO3-Demonstrate the language by self introduction in German with simple sentences
27	IV	SH2623	Japanese Language-Level- IV	CO1-To be able to make sentence patterns
				CO2-To recognize Japanese Language proficiency

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO3-To improve Japanese Language proficiency
				CO4-To give students insights about the communication required for living in Japan
				CO5-To expose students to the Japanese work ethics required in their professional careers
28	IV	CE2223	Internship	CO1- Make aware the responsibility of students on work site
				CO2- Seek knowledge, information and details at site from live situations at field
				CO3- Correlate practical and theoretical information and understand the concept of experienced learning
29	V	CE3013	Design of Steel Structures	CO1-Refer and use design codes hand book for design of steel structure elements.
				CO2-Analyse steel structure members.
				CO3-Design of steel structure member.
30	V	CE3033	Geotechnical Engineering	CO1-Classify types of soil using different index properties of soil.
				CO2-Calculate permeability of various types of soil using different methods.
				CO3-Analyze compressibility phenomenon of soil using Laboratory and field considerations.
				CO4-Determine settlement, shear strength and bearing capacity of soil.
31	V	CE3053	Irrigation and Hydraulic Structures	CO1-Explain hydrological cycle and ground water flow.
				CO2-Calculate various surface and ground water hydrology parameters
				CO3-Estimate water requirement of crops.
				CO4-Design canal and canal regulator structures.
32	V	CE3073	Environmental Engineering	CO1-Analyze water and wastewater for various parameters.
				CO2-Identify and value the effect of pollutants on the environment: atmosphere, water and soil.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO3-Prepare layout of water and wastewater treatment process.
				CO4-Design water and wastewater Treatment Plant.
				CO5-Interpret the impact of humans on environment.
33	V	CE3093	Transportation Engineering	CO1-Design of geometric components of highway
				CO2-Determine traffic volume for design of road infrastructure
				CO3-Perform pavement design and different tests on highway materials
				CO4-Design geometrically rail transportation system.
34	V	CE3193	Structural Analysis	CO1-Analyze pin jointed truss for deflection by strain energy method.
				CO2-Analyze and design thin and thick shells under various loading.
				CO3-Evaluate stresses in curved bars and springs.
				CO4-Determine bending stresses in beams due to unsymmetrical bending.
				CO5-Evaluate principal strains of a loaded element.
				CO6-Predict failure of structure by using various theories of failure.
35	V	CE3213	Composite Materials	CO1-Explain the methods of manufacturing, properties and applications of various composites materials.
				CO2-Determine stresses and strains in composites.
				CO3-Apply failure criteria and critically evaluate the results.
				CO4-Explain mechanical behavior of composites due to variation in temperature and moisture.
36	V	CE3233	Construction Safety and Quality Management	CO1-Apply various quality improvement techniques.
				CO2-Diagnose problems in the quality improvement process
				CO3-Suggest safety precautions to be taken during the execution of various construction works.
				CO4-Analyze possible hazards and accidents in construction projects

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO5-Interpret various legal aspects of safety in construction.
	V	CE3253	Construction Techniques	CO1-Develop method statements for construction techniques. CO2-Select construction techniques for particular activities. CO3-Justify application of construction technique for particular tasks. CO4-Justify construction safety needs and management on projects.
37	V	CE3273	Advanced Water Treatment	CO1-Explain the need of water treatment for sustainable development. CO2-Explain importance of water analysis in water treatment CO3-Prepare layout of water treatment plant CO4-4. Design Water Treatment Plant and water Supply Scheme for rural/urban area CO5-Calculate efficiency of water treatment plant
38	V	CE3293	Tunnel Docks and Harbor Engineering	CO1-Compare tunnel construction technologies CO2-Decides a safety and ventilation system for tunnels CO3-Suggest appropriate location for construction of docks and harbours CO4-Select dredging method for particular operation.
39	V	CE3313	Urban Transportation Systems	CO1-Categorize the transportation problems in urban area CO2-Perform the transportation survey in urban area to predict the travel demand CO3-Explain different urban transportation planning methods CO4-Predict route and schedule for mass transit system CO5-Explain different methods of preparation of transportation plan
40	V	CE3113	Geotechnical Engineering Laboratory	CO1-Design geometrically rail transportation system. CO2-Classify soil based on its index properties. CO3-Analyze field conditions through Laboratory tests

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41	V	CE3133	Environmental Engineering Laboratory	CO1-Analyse water and wastewater characteristics.
				CO2-Prepare a layout of the water treatment plant and design.
				CO3-Prepare a layout of wastewater treatment plant and design.
42	V	CE3153	Transportation Engineering Laboratory	CO1-Characterize the pavement materials
				CO2-Perform quality control tests on pavement materials
				CO3-Design bituminous mixes for flexible pavement
				CO4-Design concrete mix for rigid pavement
				CO5-Calculate thickness of different layers of pavement
43	V	SH3033	Scholastic Aptitude -I	CO1-Develop a logical approach towards solving Aptitude and Reasoning problems.
				CO2-Analyze usage of basic aptitude terms of percentages, averages, ratios and applications of business aptitude in terms of profits and interests.
				CO3-Develop a bridge in analogies, series and visualizing directions.
				CO4-Apply various short cuts & techniques to manage speed and accuracy to get equipped for various competitive and campus recruitment exams.
44	V	CE3173	Technical Aptitude -III	CO1-Design of Steel Structures
				CO2-Geotechnical Engineering
				CO3-Irrigation and Hydraulic Structure
				CO4-Environmental Engineering
				CO5-Transportation Engineering
45	V	SH3011	Indian Constitution	CO1-Create awareness about law depiction and importance of Constitution
				CO2-Define Fundamental Rights and Fundamental Duties of the Indian Citizen to instill morality, social values, honesty, dignity of life and their social responsibilities.
				CO3-Create Awareness of their Surroundings, Society, Social problems and their suitable solutions

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				while keeping rights and duties of the citizen in mind.
				CO4-Recognize distribution of powers and functions of Local Self Government.
				CO5-Comprehend the National Emergency, Financial Emergency and their impact on Economy of the country.
46	VI	CE3023	Theory of Structures	CO1-Analyze indeterminate structures using force methods- Consistent deformation method and three moment equation.
				CO2-Analyze indeterminate structures using displacement methods- Slope-deflection equation and moment distribution method.
				CO3-Analyze indeterminate beam and portal frame using matrix methods of analysis- Stiffness and flexibility matrix method.
47	VI	CE3043	Estimation and Contracts	CO1-Apply standard requirements to prepare detailed estimate
				CO2-Prepare detailed estimate of building,
				CO3-Determine Rates for construction items,
				CO4-Prepare tenders and contracts documents
				CO5-Perform valuation of property.
48	VI	CE3063	Construction Management	CO1-Apply the functions & principles of management.
				CO2-Develop and analyze the network diagram for civil engineering projects.
				CO3-Use various project monitoring and controlling methods.
				CO3-Use various project monitoring and controlling methods.
				CO4-Demonstrate AON Concept and its applications.
				CO5-Explain principles of work study & apply it to real-time construction projects
				CO6-Apply various techniques for inventory control.
49	VI	CE3163	Design of Industrial Structures	CO1-Design industrial buildings, beam columns

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO2-Design open web sections
				CO3-Design steel towers, water tanks, truss bridge
50	VI	CE3183	Repair and Rehabilitation of Structure	CO1-Diagnose the causes of distress and deterioration of concrete structure
				CO2-Describe the procedures of various repair techniques or methods.
				CO3-Suggest appropriate materials and techniques for repair and strengthening of structures/elements
				CO4-Prepare a report on condition assessment of buildings based on observations
51	VI	CE3203	Construction Economics & Finance	CO1-Identify appropriate economic alternatives.
				CO2-Calculate depreciation and taxes for economic analysis.
				CO3-Select appropriate alternatives related to equipment.
				CO4-Discuss methods of estimate.
				CO5-Discuss basics of financial management.
52	VI	CE3243	Air Quality Monitoring and Modeling	CO1-Illustrate structure of the atmosphere Air Pollution, Scales of air pollution
				CO2-Interpret impact of air pollution on natural and artificial elements.
				CO3-Analysis of air quality parameters by using air quality monitoring methods
				CO4-Design Stack height for pollution control.
53	VI	CE3263	Railway and Airport Engineering	CO1-Design of geometric component of rail transport system.Design of geometric component of rail transport system.
				CO2-Analyze needs of modern rail system.
				CO3-Design of runway and taxiway
				CO4-Carry out airport planning
54	VI	CE3383	Foundation Engineering	CO1-Investigate soil using different soil exploration methods.
				CO2-Compute stress distribution in soil using different theories.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO3-Design shallow and deep foundation on different types of soil.
				CO4-Analyze stability of slope using different slope stability analysis techniques.
				CO5-Compute lateral earth pressure for different conditions of soil.
55	VI	CE3323	Advanced Wastewater Engineering	CO1- Explain need of wastewater treatment for sustainable development
				CO2- Explain importance of wastewater analysis in waste treatment.
				CO3- Prepare layout of wastewater treatment plant.
				CO4- Design wastewater treatment scheme for rural/urban area.
				CO5- Calculate efficiency of wastewater treatment system
56	VI	SH3021	Biology for Engineers	CO1-Apply biological engineering principles, procedures needed to solve real-world problems
				CO2-Describe the functions of biological systems
				CO3-Analyze biological phenomena and compute work done at microscale.
				CO4-Explain working of different biomedical instruments
				CO5-5. Select the sensors for given biological applications
				CO6-Explain relevant aspects of the movement control process.
57	VI	CE3083	Estimation & Contracts Laboratory	CO1-Explain mode of measurement and current market rates of civil engineering materials and labours
				CO2-Prepare detailed estimate of different structures
				CO3-Prepare bar bending schedule of different RCC items,
58	VI	CE3103	Design of Steel Structures Laboratory	CO1- Analyze and design steel industrial shed using STAAD-Pro software
				CO2-Interpret the results obtained from the software
				CO3- Prepare structural drawing of steel industrial shed
59	VI	CE3123	Technical Aptitude- IV	—

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60	VI	CE3143	Capstone Project Phase- I	CO1-Function efficiently as an individual and in group with the capacity to be a leader
				CO2-Identify gap and analyze the social, cultural, global and environmental issues related to civil engineering
				CO3-Design and conduct experiments and interpret data
				CO4-Develop technical material through oral presentation and report
				CO5-Develop interest to carry out research
61	VI	SH304	Psychology for Engineers	CO1-Interpret human behaviour as a system from a psychological perspective
				CO2- Apprise the various factor affecting human behaviour at work
				CO3-Apply behaviour theories to manage/lead people and emotional work
62	VII	CE4632	Construction Management	CO1-Apply principles of management
				CO2- Develop and analyze the network diagram for civil engineering projects.
				CO3- Apply principles of work study to design site layout
				CO4- Apply various techniques for inventory control
63	VII	CE4032	Construction Equipment and Methods	CO1- Plan equipment utilization for earthwork operation
				CO2- Perform economic analysis of equipment
				CO3-Select earthwork equipment based on production and site requirements.
				CO4- Decide plant capacity required for a project.
				CO5- Select Equipment fleet for Project.
64	VII	CE4092	Advanced Structural Analysis	CO1- Construct ILD for indeterminate beams.
				CO2- Analyze and construct BMD, TMD for beams curved in plan.
				CO3- Analyze beam on elastic foundation under various loads

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO4- Analyze beam-column with different support and loading conditions.
				CO5- Determine forces in space truss members.
				CO6- Evaluate various forces developed in cables and stiffening girders.
65	VII	CE4112	Finite Element Analysis	CO1- Apply variational and direct approach method for 1D, 2D problems
				CO2- Develop element stiffness matrix for 1D, 2D & 3D problem
				CO3- Describe Convergence and compatibility requirements
				CO4- Generate relationship between natural and cartesian coordinate systems.
				CO5- Formulate element stiffness matrix for axisymmetric elements.
66	VII	CE4132	Project Management	CO1- Analyze impact of time, cost and scope on construction projects.
				CO2- Develop pre-feasibility report for construction project
				CO3- Plan the project using various techniques.
				CO4- Develop project close out checklist for given project.
				CO5- Apply techniques for manpower planning.
67	VII	CE4152	Rock Mechanics	CO1- Describe the theory and analysis of in-situ induced stresses in a rock mass and structurally controlled failure.
				CO2- Apply the principles of rock mechanics and excavation design to develop excavation proposals for given geologic environments
				CO3- Analyze the rock and soil slope stability and rockfall hazards.
				CO4- Explain the principles and techniques of reinforcement design for the primary failure modes in underground rock excavations
68	VII	CE4172	Industrial Waste Management	CO1- Apply various techniques of wastewater volume and strength reduction

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO2- Analyze characteristics of Industrial wastewater.
				CO3- Suggest different wastewater treatment options for industrial wastewater.
				CO4- Design Effluent Treatment Plant for Industrial wastewater treatment.
69	VII	CE4192	Pavement Analysis & Design	CO1- Suggest suitable materials for different types of pavements.
				CO2- Analyse the pavement components with respect to their material composition.
				CO3- Estimate the stresses induced due to wheel load and temperature.
				CO4- Design the pavement, flexible or rigid, for the conditions prevailing at site.
				CO5- Understand the variation in specification for pavement materials used in other countries.
70	VII	CE4212	Advanced Structural Analysis Laboratory	CO1- Analyze beams curved in plan, multistoried buildings, space frames using classical methods and software
				CO2- Compare results of classical methods of structural analysis using software results.
				CO3- Critique on the analysis results obtained by software.
71	VII	CE4232	Finite Element Analysis Laboratory	CO1- Illustrate terms used in Finite Element Method
				CO2- Analyse 1D & 2D problems
				CO3- Develop solution of 2D & 3D problems using Finite Element software
72	VII	CE4652	Project Management Laboratory	CO1- Develop a project charter for a construction project.
				CO2- Analyze feasibility of project.
				CO3- Determine optimum time and optimum cost of project through network compression.
				CO4- Develop project in Microsoft project tool.
				CO5- Plan resources required for execution of the project.
73	VII	CE4272	Rock Mechanics Laboratory	CO1- Determine the physical and mechanical properties of rock samples.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO2- Identify various types of rock based on observations and laboratory testing.
				CO3- Prepare the site investigation report.
74	VII	CE4672	Industrial Waste Management Laboratory	CO1- Analyse Industrial wastewater characteristics.
				CO2- Prepare a layout of wastewater treatment plants for Industrial wastewater.
				CO3- Design of Effluent Treatment Plant for Industrial wastewater.
				CO4- Prepare Field visit Report of ETP of Industry.
75	VII	CE4312	Pavement Analysis & Design Laboratory	CO1- Categorize bituminous materials.
				CO2-Analyse quality control of pavement materials
				CO3-Design bituminous mixes for flexible pavement
				CO4-Design concrete mix for rigid pavement
76	VII	CE4392	Advanced Structural Design	CO1-Analyze and design RC structures and their components like building frames, flat slab, retaining walls, water tanks and piles using relevant codes and applying codal provisions.
				CO2-Analyze the slabs of irregular shapes by yield line theory and design rectangular and circular slabs for yield moments.
				CO3-Sketching the detailing of reinforcement in structural components of building frames, flat slab, retaining walls, water tanks and piles.
77	VII	CE4412	Prestressed Concrete Structures	CO1- Explain the concept and importance of pre-stressing.
				CO2- Analyse the pre-stressed concrete sections.
				CO3- Design the prestressed concrete sections for flexure and shear.
				CO4- Design an end block for prestressed members.
				CO5- Design the pre-stressed concrete beams.

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78	VII	CE4432	Matrix Method of Structural Analysis	CO1- Perform the structural analysis of determinate and indeterminate structures using classical methods, force and displacement methods
				CO2- Analyze the structures by using the stiffness & flexibility method.
				CO3- Solve multiple degrees of freedom two-dimensional problems involving trusses & beams.
79	VII	CE4472	Total Quality Management	CO1- To identify basic requirements for applying TQM in construction.
				CO2- To prepare the TQM framework.
				CO3- To apply seven QC tools of quality assurance
				CO4- To use six sigma techniques to improve quality.
80	VII	CE4492	Air Pollution & Control	CO1- Examine structure of the atmosphere air pollution, scales of air pollution
				CO2- Interpret on sources of air pollution natural and artificial, air pollution Episodes
				CO3- Analyze the effect of different air pollutants on man, animals and plants.
				CO4- Design Stack height and explain meteorology, transport and control mechanism
				CO5- Evaluate effects of noise pollution.
81	VII	CE4512	Fundamentals of Urban & Regional Planning	CO1- To apply international planning and design theories in a development design.
				CO2- To measure the impact of manmade activities on urbanization.
				CO3- To evaluate the impact of urban development plans in regards to sustainable urban development and urban quality.
				CO4- To use tools and techniques of region planning.
82	VII	CE4532	Solid and Hazardous Waste management	CO1- Determine solid waste properties and quantity for municipal and hazardous waste.
				CO2- Illustrate health effects by municipal, hazardous waste.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO3- Design Physicochemical and biological treatment and landfill site for solid waste.
				CO4- Design of landfill design
83	VII	CE4552	Photogrammetry Surveying	CO1- Apply advanced surveying methodologies to conduct topographical survey.
				CO2- Analyse and correct the errors from the topographical survey maps.
				CO3- Illustrate the principles of advanced surveying techniques
84	VII	CE4572	Geo-informatics for Engineering	CO1-Apply GIS tool for solving civil engineering industry problem
				CO2-Develop infrastructural planning
				CO3-Collect data and query analysis
				CO4-Develop base and thematic maps
				CO5 -Develop projects and device solution for the area.
85	VII	CE4592	Docks, Harbour & Airport Engineering	CO1- Analyze theoretical and practical aspects related to docks, harbour and airport management.
				CO2- Apply diverse knowledge of Docks, Harbour and Airport engineering practices applied to real life problems.
				CO3- Categorize port components
				CO4- Design airport components
86	VII	CE4052	Design of Concrete Structures Laboratory	CO1- Estimate primary and combination design loads on building consulting appropriate standards and handbooks
				CO2- Design the component parts of the building manually
				CO3- Model the same building using any standard software
				CO4- Design the building.
				CO5- Demonstrate effective team membership/leadership through a group project
87	VII	CE4372	Capstone Project Phase- II	CO1- Function effectively as an individual and in group with the capacity to be a leader
				CO2- Identify gap and analyze the social, cultural, global and

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				environmental issues related to civil engineering.
				CO3- Design and conduct experiments and interpret data.
				CO4- Develop technical material through oral presentation and reports and commit to professional ethics and responsibilities in civil engineering practice.
				CO5- Develop interest to carry out research in civil engineering.
88	VII	CE4072	Employment Enhancement Skills	CO1- Develop technical competence in a Soft skill in the Civil Engineering field,
				CO2-Apply the techniques and soft skills for Civil Engineering practice.
				CO3-Develop oral and written presentation skills for soft skill projects.
				CO4- Design and interpret data by soft skill Civil Engineering projects.
89	VIII	OE438	Finance for Engineers	CO1- Discuss the fundamental aspects of accounting and finance.
				CO2- Apply rules of accounting while recording transactions.
				CO3- Prepare financial statements and analyze the financial position of the firm by applying various techniques.
				CO4- Describe the various long term sources of finance available for the business organization.
90	VIII	OE436	Engineering Management & Economics	CO1-Develop technical competence in a Soft skill in the Civil Engineering field,
				CO2-Apply the techniques and soft skills for Civil Engineering practice.
				CO3- Develop oral and written presentation skills for soft skill projects.
				CO4-Design and interpret data by soft skill Civil Engineering projects.
91	VIII	IP4022	Internship & Project	Internship CO1-Examine the functioning of the company on the terms of inputs, transformation process and the outputs (products and services)

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				<p>CO2-Develop an attitude to adjust with the company culture, work norms, code of conduct.</p> <p>CO3-Recognize and follow the safety norms, Code of conduct.</p> <p>CO4-Demonstrate the ability to observe, analyse and document the details as per the industry practices.</p> <p>CO5-Interpret the processes, systems and procedures and to relate to the theoretical concepts- studies.</p> <p>CO6-Develop leadership abilities, communication.</p> <p>CO7-Demonstrate project management and finance sense</p> <p>Project</p> <p>After the successful completion of the project, the student should be able to;</p> <p>CO1- Identify the project/problem in the domain of a program relevant for the company.</p> <p>CO2- Compile the information pertaining to the problem identified.</p> <p>CO3- Analyse the information using the statistical tools/ techniques.</p> <p>CO4-develop the feasible solution for a given problem.</p> <p>CO5-Analyse the impact of the project on the performance of company/department</p>
92	VIII	RE4042	Research Project	<p>CO1- Investigate the technical literature.</p> <p>CO2-Recognize and evaluate theories, practices, and/or research on a chosen topic by conducting a thorough literature review and submitting a written integrative, critical summary of the current literature.</p> <p>CO3-Design a research problem and develop a methodology.</p> <p>CO4-Develop and implement an advanced original research or creative project.</p> <p>CO5- Develop the ability to explain the conceptual viability of the project and describe the major components involved.</p>

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO6-Develop the ability to explain how the project will impact the relevant body of work. CO7-Develop advanced discipline-relevant skills and competencies. CO8-Construct an accurate record of research performed. CO9- Write a research report and paper.
93	VIII	ED4102	Project Management	CO1- Prepare a business Plan for selected business. CO2- Make risk analysis & market analysis of selected project. CO3- Make risk analysis & market analysis of selected projects. CO4- Make financial appraisal of selected project.
94	VIII	ED4042	Commercial Aspects of Projects	CO1- Interpret basic Financial Terminologies. CO2- Prepare to analyze financial statements. CO3- Prepare a financial Plan for a venture. CO4- Apply basic principles of marketing for various products. CO5- Prepare market survey. CO6-Apply knowledge of marketing management for selected businesses.
95	VIII	ED4062	Entrepreneurship Development Program	CO1 - Apply knowledge of engineering, economics, marketing and finance for preparation of project report CO2- Make commercial, technical and financial appraisal of projects.
96	VIII	ED4082	Entrepreneurship Development Project	CO1-Apply knowledge of engineering, economics, marketing and finance for formulation of business plan, starting & managing new business.

- **Department Name : Civil Engineering**
- **PG Program Name: M.Tech. Structural Engineering**
- **Vision and Mission: -**

Vision:

To be an outstanding department devoted to provide high end research and technical education in civil engineering which will produce socially aware professionals to provide solutions to the global community.

Mission:

- To design curriculum based on changing needs of stakeholders & provide excellence in delivery & assessment to ensure holistic development of civil engineering students.
- To enhance research & consultancy resulting in solving problems related to civil engineering infrastructure as well as society at large.
- To mentor students in pursuit of higher education, entrepreneurship and global professionalism.

Sr. No.	Program Outcomes
1	An ability to independently carry out research /investigation and development work to solve practical problems.
2	An ability to write and present a substantial technical report/document.
3	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

Sr. No.	Program Specific Outcomes
1	An ability to design civil engineering structures and execute the projects.
2	An ability to use modern tools and techniques, skills, instrumentation and software packages necessary to predict and solve complex engineering problems.
3	An ability to perform efficiently with others as part of a collaborative and/or multidisciplinary team with ethics.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1	I	CES1015	Advanced Solid Mechanics	CO1- Analyse bodies for stresses and strains CO2- Analyse prismatic bars and tubes subjected to torsion CO3- Analyse beams and thick cylinders for elasto-plastic loading
2	I	CES1035	Advanced Structural Analysis	CO1- Develop ILD for reactions, S.F. and B.M. for indeterminate structures

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO2- Construct SFD, BMD and TMD for beams curved in plan for various loading and support conditions.
				CO3- Analyse the beam-column structures
				CO4- Analyse the structures by using the stiffness & flexibility matrix method.
				CO5- Solve boundary value problems from civil engineering
3	I	CES1055	Structural Dynamics & Earthquake Engineering	CO1- Analyse the response of single and multi-degree freedom systems by fundamental theory.
				CO2- Explain principles of seismology and conceptual design.
				CO3- Evaluate lateral loads developed on multi-storeyed structures.
4	I	CES1135	Theory of Plates and Shells	CO1- Analyse various problems using different theories based on plates and shells.
				CO2- Derive equilibrium equations related with different theories of plates and shells
5	I	CES1155	Advanced Concrete Technology	CO1- Select binders and admixtures to design strong, durable and sustainable concrete.
				CO2- Describe various special processes and techniques involved in various concreting jobs.
				CO3- Identify reasons affecting durability of concrete / concrete structures /elements.
				CO4- Design concrete mix for special concrete.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO5- Analyse qualities of concrete elements using appropriate destructive or non-destructive testing methods for evaluating quality
6	I	CES1175	Analysis and Design of Tall Structures	CO1- Evaluate forces on tall structures due to wind load.
				CO2- Construct SFD and BMD in a building frame by approximate analysis method.
				CO3- Design RC shear wall, chimney, bunkers and silos
7	I	CES1195	Design of Bridges	CO1- Evaluate various loadings on bridges.
				CO2- Analyse and design of superstructure of various bridges.
				CO3- Analyse and design of sub-structure of various bridges
8	I	CES1213	Structural Health Monitoring	CO1- Discuss the concept and various components of SHM
				CO2- Identify suitable Sensors and Instruments required in SHM for in-service performance structures.
				CO3- Assess the health of structures using different techniques of SHM
				CO4- Select the appropriate strengthening and retrofitting techniques for regaining the structure strength
				CO5- Design the sensor layouts of SHM for the civil engineering structures
9	I	SHP5171	Numerical Methods for Structural Engineers	CO1- Apply numerical methods for error analysis.
				CO2- Compute the roots of the given equations and polynomials

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO3- Apply the relevant numerical method for interpolating the polynomial.
				CO4- Develop the equation to be fitted to the given data.
				CO5- Solve problems involving linear algebraic equations
10	I	SHP5511	Technical Communication	CO1- Use grammatically correct sentences in different types of technical writings.
				CO2- Apply technical writing skills to improve readability of documents.
				CO3- Demonstrate professional skills required in job interviews and at workplace
11	I	CES1075	Computer Aided Design of Steel Structures Lab.	CO1- Analyze and design of the steel structures such as truss, towers, steel building frame and hoarding board etc. using standard software packages.
				CO2- Interpret the results of analysis and design obtained from the software
				CO3- Prepare drawings of detailing of structural elements
12	I	CES1095	Structural Dynamics Lab	CO1- Examine damping effect on beam model.
				CO2- Perform testing of various models of structures for dynamic loading
13	I	CES1115	Mini project-I	CO1- Identify research problems.
				CO2- Prepare and present a statement of Purpose.
				CO3- Perform analysis work
				CO4- Communicate with outside agencies.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO5- Prepare a report and present the work carried out.
				CO6- Develop self-learning ability
14	II	CES1025	Finite Element Analysis	CO1- Describe the finite element method and convergence requirement
				CO2- Apply the basic finite element formulation techniques to solve civil engineering problems by 1D, 2D and axisymmetric elements
				CO3- Explain shape function and isoparametric element
				CO4- Derive element stiffness matrix for thin plate and shell element
				CO5- Use commercial software to solve problems related to civil engineering
15	II	CES1045	Design of Concrete Structures	CO1- Analyse R.C. slabs using yield line theory.
				CO2- Design R.C.C. deep beam and flat slab.
				CO3- Design R.C.C. elevated service reservoir, retaining wall
				CO4- Design R.C. members for fire resistance
16	II	CES1145	Advanced Earthquake Engineering	CO1- Design RCC structural elements for ductility requirements as per IS 13920 2016.
				CO2- Apply clauses given in IS codes to design water tanks for earthquake force.
				CO3- Apply new techniques for controlling the vibrations of the structures.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO4- Evaluate natural frequency of continuous elements/systems.
				CO5- Apply IS code clauses masonry structures for improving resistance to earthquake forces
17	II	CES1161	Composite Structures	CO1- Design composite structural elements like beams, columns, floors, trusses.
				CO2- Design of Multi-storeyed commercial and residential composite building
				CO3- Design composite girder bridges
18	II	CES1181	Maintenance and Rehabilitation of Structures	CO1- Diagnose the causes of distress and deterioration of concrete structure.
				CO2- Describe the procedures of various repair techniques or methods.
				CO3- Suggest appropriate materials and techniques for repair and strengthening of structures/elements
				CO4- Prepare a report on condition assessment of buildings based on observations
19	II	CES1205	Design of Prestressed Concrete Structures	CO1- Explain the concept, material requirement and behaviour of the pre-stressed concrete.
				CO2- Calculate the losses of prestress in pre-tensioning and post-tensioning concrete.
				CO3- Analyse & design the statically determinate, indeterminate prestressed concrete beams and end block
				CO4- Analyse & design the pre-stressed concrete pipes and tanks

Sr. No.	Semester	Course Code	Course Name	Course Outcome
20	II	CES1225	Design of Steel Structures	CO1- Design steel structures and frames by varying methods.
				CO2- Design various connectivity of structure as per code provisions
21	II	CES1240	Design of Foundations	CO1- Explain various types of foundations and their design procedures
				CO2- Design different types of foundations
				CO3- Perform the analysis and design of various types of foundation using available software
22	II	CES1065	Research Methodology & Intellectual Property Rights (IPR)	CO1- Prepare abstract through literature review.
				CO2- Formulate a research problem.
				CO3- Prepare and present research proposals/papers by following research ethics.
				CO4- Prepare and present report on intellectual property rights
23	II	CES1085	Computer Aided Design of Concrete Structures Lab	CO1- Analyse and design of the RCC structures such as building, retaining wall, flat slab and foundations using standard software packages.
				CO2- Interpret the results of analysis and design obtained from the software.
				CO3- Prepare drawings of detailing of structural elements.
24	II	CES1105	Advanced Concrete Technology Lab	CO1- Design special concretes using IS 10262-2019.
				CO-2 Evaluate durability properties of concrete
				CO3- Judge the quality of concrete using NDT

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO4- Write a technical report on special concreting techniques based on site visit
25	II	CES1125	Mini project-II	CO1- Identify research problems.
				CO2- Prepare and present a statement of Purpose.
				CO3- Perform analysis work.
				CO4- Communicate with outside agencies.
				CO5- Prepare a report and present the work carried out.
				CO6- Develop self-learning ability
26	II	SHP552	Framework of Indian Constitution	CO1- Realize the significance of the constitution of India to students from all walks of life and help them to understand the basic concepts of the Indian constitution.
				CO2- Identify the importance of fundamental rights as well as fundamental duties
				CO3- Understand the functioning of Union, State and Local Governments in Indian federal system
				CO4- Learn procedure and effects of emergency, composition and activities of election commission and amendment procedure
27	III	CES2015	Industry Internship	CO1- Identify the training area.
				CO2- Prepare on site work report of training.
				CO3- Perform analysis work
				CO4- Communicate with agencies.
				CO5- Prepare report and present the work carried out

Sr. No.	Semester	Course Code	Course Name	Course Outcome
28	III	CES2024	Dissertation phase-I	CO1- Identify research problems from literature surveys.
				CO2- Prepare research design for identified problem.
				CO3- Prepare synopsis report.
				CO4- Present the work plan to be carried out.
29	III	CES2034	Dissertation phase-II	CO1- Prepare the set up for experimentation/ develop/ learn software.
				CO2- Perform experimental/ software analysis for validation of research work.
				CO3- Generate report of work carried out.
				CO4- Present the work carried out.
30	IV	CES2064	Dissertation phase III	CO1- Perform experimental/ software analysis for developing research work.
				CO2- Generate report work carried out.
				CO3- Present the work carried out
31	IV	CES2074	Dissertation phase IV	CO1- Perform experimental/software analysis for developing research work.
				CO2- Generate report work carried out.
				CO3- Publish a research paper in journals/conferences.
				CO4- Prepare a report using total work done as a dissertation report.
				CO5- Present the work carried out

- **Department Name: Civil Engineering**
- **PG Program Name: M.Tech. Construction Management**
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Mission:

- To design curriculum based on changing needs of stakeholders & provide excellence in delivery & assessment to ensure holistic development of civil engineering students.
- To enhance research & consultancy resulting in solving problems related to civil engineering infrastructure as well as society at large.
- To mentor students in pursuit of higher education, entrepreneurship and global professionalism.

Sr. No.	Program Outcomes
1	An ability to independently carry out research /investigation and development work to solve practical problems.
2	An ability to write and present a substantial technical report/document.
3	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.
4	An ability to Analyze, evaluate, and select computer applications for the purpose of efficient and effective construction project management.
5	An ability to Analyze construction projects relative to fundamental aspects of construction management (i.e., cost, schedule, quality, safety, ethics) and develop appropriate solutions
6	Apply ethical business principles and Demonstrate responsibility for safety planning and productivity in construction management settings.

Sr. No.	Program Specific Outcomes
1	Enhance employability and/or entrepreneur skills through in-house and onsite training.
2	Provide solutions/procedures to societal and rural development problems through research and innovative practices.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1	I	CCM1010	Construction Planning and Scheduling	CO1- Develop project work breakdown structure CO2- Estimate activity time durations and define scope of project.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO3- Prepare and update schedule of a construction project.
				CO4- Analyze resource requirements for a construction project.
2	I	CCM1030	Construction Equipment	CO1- Select equipment/plant for particular task.
				CO2- Perform productivity analysis for equipment.
				CO3- Design equipment fleet for construction tasks.
				CO4- Perform economic analysis of equipment use
3	I	CCM1050	Construction Practices	CO1- Develop method statements for various construction activities.
				CO2- Differentiate among various practices used to complete construction activities.
				CO3- Choose appropriate technique for particular construction activity
4	I	CCM1070	Quality Assurance and Quality Control in Construction	CO1- Differentiate between QA and QC in consideration with different construction activities.
				CO2- Apply statistical quality control and monitoring methods.
				CO3- Develop quality checks for construction activities.
				CO4- Develop guideline in accordance with quality standard codes and quality management system
5	I	CCM1095	Management Information System	CO1- Demonstrate Information Systems used in organizations for meeting strategic and operational goals.
				CO2- Develop skills using current end-user software for communication, data transformation, collaboration, and problem solving.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
6	I	CCM1115	Disaster Management	CO1- Summarize effects of natural and man-made disasters.
				CO2- Develop disaster management programs.
				CO3- Analyze vulnerable conditions and risk assessment.
				CO4- Prepare plan for post disaster management
				CO5-Describe stakeholder's role in disaster response
7	I	CCM1135	Pavement Construction and Management	CO1- Conduct highway condition assessment surveys.
				CO2- Develop methods for pavement management using the PMS system.
				CO3- Select material as per MORTH and IRC specifications.
				CO4- Plan and design pavement structures
8	I	CCM1150	Repair and Rehabilitation of Structures	CO1- Perform Assessment of buildings.
				CO2- Recognize damages in the structure.
				CO3- Select proper repair materials.
				CO4- Suggest repair or rehabilitation method for particular damage
9	I	CCM1175	Bridge Construction	CO1- Select location for bridge based on topographical and geotechnical investigation.
				CO2- Perform hydrological calculations of design parameters.
				CO3- Apply standard loadings and safety consideration for bridge design.
				CO4- Select appropriate bridge superstructure elements for bridges
10	I	CCM1195	Prefabricated Structures	CO1- Choose prefabricated elements for construction.
				CO2- Develop detailed drawings of prefabricated elements.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO3- Design prefabricated elements for construction.
				CO4- Prepare project report for establishing a production unit.
11	I	CCM1210	Advanced Concrete Technology	CO1- Select binders, SCMs and admixtures to design strong, durable and sustainable concrete.
				CO2- Analyze the factors affecting properties of fresh concrete
				CO3- Develop a quality control plan for a concrete construction.
				CO4- Design special purpose concrete mixes using mix design procedures recommended by pertinent codes of practices and handbooks
12	I	CCM1235	Construction Waste Management	CO1- Develop strategies for construction and demolition waste management and resource efficiency.
				CO2- Examine the environmental impact of building materials.
				CO3- Design site waste management plans.
				CO4- Justify the application of waste minimization techniques on construction site
13	I	CCM1255	Microsoft Project (MSP) Laboratory	CO1- Develop Work Breakdown Structure for project.
				CO-2 Prepare project schedule using Microsoft project.
				CO-3 Modify construction schedule based on site progress.
				CO4- Extract and present various types of reports
14	I	CCM1275	Geographic Information System Laboratory	CO1- Perform data collection using tools.
				CO2- Analyze data using GIS software.
				CO3- Prepare and present maps in GIS

Sr. No.	Semester	Course Code	Course Name	Course Outcome
15	I	SHP5511	Technical Communication	CO1- Acquire skills required for good oral and written communication.
				CO2- Demonstrate improved writing skills and level of readability.
				CO3- Ensure the good quality of technical reports at very first-time submission
16	II	CCM1020	Project Economics & Financial Management	CO1- Analyze projects using different techniques.
				CO2- Suggest different sources of finance.
				CO3- Analyze different financial statement with the help of ratio analysis
17	II	CCM1040	Legal Aspects in Construction	CO1- Select the appropriate type of contract for construction projects.
				CO2- Develop tender documents for construction projects.
				CO3- Perform comparative analysis of types of contract.
				CO4- Analyze arbitration documents for construction project.
18	II	CCM1060	Project Formulation and Appraisal	CO1- Perform technical and financial analysis of construction projects.
				CO2- Perform BC ratio analysis.
				CO3- Select project based on appraisal.
				CO4- Develop administration process for project execution
19	II	CCM1080	Advanced Construction Techniques	CO1- Use modern construction techniques in the high rise structures.
				CO2- Identify the suitable formwork technique used to construct a structure.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO3- Justify the concepts used in the construction of special structures
20	II	CCM1105	Health and Safety Management	CO1- Classify hazards to employees on construction sites.
				CO2- Determine safe practices necessary for a project site.
				CO3- Identify the causes of accidents and suggest preventive measures to avoid accidents.
				CO4- Prepare safety management plan
21	II	CCM1125	Human Resource Management	CO1- Plan manpower for a project.
				CO2- Develop organization for a project.
				CO3- Apply aspects of human behavior to HRM.
				CO4- Select the right person to build the team.
				CO5- Discuss solutions for human resource problems
22	II	CCM1145	Shoring, Scaffolding and Form-work	CO1- Develop proper plan for form-work.
				CO2- Select appropriate material and type of form-work.
				CO3- Design form-work for components.
				CO4- Design scaffold for construction task
23	II	SHP5261	Probability and Statistics for Engineers	CO1- Apply relevant probability distribution for given problems.
				CO2- Use different methods of sampling and testing in statistical inference.
				CO3- Solve problems on correlation and regression
24	II	CCM1165	Material Management	CO1- Apply supplier selection methods.
				CO2- Produce optimal store layout.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO3- Perform codification and classification.
				CO4- Perform material requirement planning
				CO5- Apply inventory control techniques for materials management
25	II	CCM1180	Advanced Construction Materials	CO1- Justify the need for new material development.
				CO2- Choose material for construction process based on material properties
26	II	CCM1200	International Contracting	CO1- Prepare tender documents as per international contracting procedures.
				CO2- Apply of various conditions of international contract under the FIDIC document.
				CO3- Understand the labour laws.
				CO4- Act as arbitrator for dispute resolving
27	II	CCM1225	Research Methodology & IPR	CO1- Prepare abstract through literature review.
				CO2- Formulate a research problem.
				CO3- Prepare and present research proposals/papers by following research ethics.
				CO4- Prepare and present a report on Intellectual Property Rights
28	II	CCM1245	Fundamentals of BIM Laboratory	CO1- Develop drawings as per software requirement.
				CO2- Compute quantities of building items.
				CO3- Develop project schedule using “Revit” application
29	II	CCM1265	Primavera Laboratory	CO1- Prepare a schedule plan for a construction project.
				CO2- Analyze construction projects using primavera.
				CO3- Prepare and present various types of reports
30	II	CCM1285	Mini Project	CO1- Select mini project problem.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO2- Prepare and present statement of purpose.
				CO3- Develop solutions to the selected problem.
				CO4- Prepare and present report related to project undertaken
31	II	SHP552	Framework of Indian Constitution	CO1- Realise the significance of the constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution.
				CO2- Identify the importance of fundamental rights as well as fundamental duties
				CO3- Understand the functioning of Union, State and Local Governments in Indian federal system
				CO4- Learn procedure and effects of emergency, composition and activities of election commission and amendment procedure
32	III	CCM2015	Industry Internship	CO1- Describe central machine learning methods and techniques and how they relate to artificial intelligence
				CO2- Differentiate between supervised and unsupervised learning techniques
				CO3- Apply the ML algorithms to a real-world problem,
				CO4- Optimize the models learned and report on the expected accuracy that can be achieved by applying the models.
				CO5- Evaluate a given problem and apply appropriate machine learning technique
33	III	CCM2034	Dissertation phase-I	CO1- Select research problems through literature survey

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO2- Develop research design for research problems
				CO3- Prepare and present synopsis reports
34	III	CCM2054	Dissertation phase-II	CO1- Perform data/experimental data collection for the project.
				CO2- Analyze collected data using appropriate tools / techniques / software.
				CO3- Perform experimental/software analysis for validation of research work.
				CO4- Prepare and present report
35	IV	CCM2024	Dissertation phase III	CO1- Analyze collected data using appropriate tools/techniques/software's.
				CO2- Prepare and present/publish technical papers
				CO3- Prepare and present report
36	IV	CCM2044	Dissertation phase IV	CO1- Compile the work done in appropriate sequence.
				CO2- Derive conclusion of the work done of the project.
				CO3- Analyze proposed system.
				CO4- Perform plagiarism analysis of compiled report.
				CO5- Prepare and present the final dissertation report in desired format