

Civil Engineering

POs, PSOs, Cos

Program Outcomes

1. **PO-1: Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **PO-2: Problem analysis:** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **PO-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. **PO-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. **PO-5: Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **PO-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. **PO-7: Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of need for sustainable development.
8. **PO-8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **PO-9: Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **PO-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. **PO-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. **PO-12: Life-long learning:** Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Program Specific Outcomes

1. Develop /demonstrate strong problem solving and communication skill.
2. Achieve leadership position in technical or managerial area.
3. Demonstrate initiative and innovative thinking in project work
4. Maintain a keen awareness of ethical, social, environmental and global concerns
5. Remain engaged in continuous learning, including advanced degree.

Course Outcomes

YEAR: 1 SEM: 1

Course Name: ELEMENTS OF CIVIL ENGINEERING AND MECHANICS

Sub code:18CIV14/24

CO	Course Outcomes
1.	Mention the applications of various fields of Civil Engineering.
2.	Compute the resultant of given force system subjected to various loads.
3.	Comprehend the action of Forces, Moments and other loads on systems of rigid bodies and compute the reactive forces that develop as a result of the external loads
4.	Locate the Centroid and compute the Moment of Inertia of regular and built-up sections
5.	Express the relationship between the motion of bodies and analyze the bodies in motion.

YEAR: 2 SEM: 3

Course Name: Transform Calculus, Fourier Series and Numerical Techniques

Sub code:18MAT31

CO	Course Outcomes
1.	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
2.	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
3.	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
4.	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods
5.	Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

Course Name: Strength of Materials

Sub code:18CV32

CO	Course Outcomes
1.	To evaluate the basic concepts of the stresses and strains for different materials and strength of structural elements.
2.	To evaluate the development of internal forces and resistance mechanism for one dimensional and two dimensional structural elements
3.	To analyse different internal forces and stresses induced due to representative loads on structural elements.
4.	To evaluate slope and deflections of beams.
5.	To evaluate the behaviour of torsion members, columns and struts.

Course Name: Fluid Mechanics

Sub code:18CV33

CO	Course Outcomes
1.	Possess a sound knowledge of fundamental properties of fluids and fluid Continuum
2.	Compute and solve problems on hydrostatics, including practical applications

3.	Apply principles of mathematics to represent kinematic concepts related to fluid flow
4.	Apply fundamental laws of fluid mechanics and the Bernoulli's principle for
5.	Compute the discharge through pipes and over notches and weirs

Course Name: Building Materials and Construction

Sub code:18CV34

CO	Course Outcomes
1.	Select suitable materials for buildings and adopt suitable construction techniques.
2.	Decide suitable type of foundation based on soil parameters.
3.	Supervise the construction of different building elements based on suitability
4.	Exhibit the knowledge of building finishes and form work requirements

Course Name: Basic Surveying

Sub code:18CV35

CO	Course Outcomes
1.	Posses a sound knowledge of fundamental principles Geodetics
2.	Measurement of vertical and horizontal plane, linear and angular dimensions to arrive at solutions to basic surveying problems
3.	Capture geodetic data to process and perform analysis for survey problems
4.	Analyse the obtained spatial data and compute areas and volumes. Represent 3D data on plane

Course Name: Engineering Geology

Sub code:18CV36

CO	Course Outcomes
1.	Apply geological knowledge in different civil engineering practice.
2.	Students will acquire knowledge on durability and competence of foundation rocks, and confidence enough to use the best building materials.
3.	Civil Engineers are competent enough for the safety, stability, economy and life of the structures that they construct
4.	Able to solve various issues related to ground water exploration, build up dams, bridges, tunnels which areoften confronted with ground water problems
5.	Intelligent enough to apply GIS, GPS and remote sensing as a latest tool in different civil engineering construction.

Course Name: Computer Aided Building Planning and Drawing

Sub code:18CVL37

CO	Course Outcomes
1.	Prepare, read and interpret the drawings in a professional set up
2.	Know the procedures of submission of drawings and Develop working and submission drawings for building.
3.	Plan and design a residential or public building as per the given requirements.

CO	Course Outcomes
1	Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion.
2	Identify, formulate and solve engineering problems of structural elements subjected to flexure.
3	Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials.

CO	Course Outcomes
	<p>ಆಡಳಿತ ಕನ್ನಡ ಕಲಿಕೆಯ ಫಲಿತಾಂಶಗಳು:</p> <ul style="list-style-type: none"> • ಆಡಳಿತ ಭಾಷೆ ಕನ್ನಡದ ಪರಿಚಯವಾಗುತ್ತದೆ. • ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕನ್ನಡ ಭಾಷೆಯ ಪ್ರಾಕಾರಣದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡುತ್ತದೆ. • ಕನ್ನಡ ಭಾಷಾ ರಚನೆಯಲ್ಲಿನ ನಿಯಮಗಳು ಮತ್ತು ಲೇಖನ ಚಿಹ್ನೆಗಳು ಪರಿಚಯಿಸಲ್ಪಡುತ್ತವೆ. • ಸಾಮಾನ್ಯ ಅರ್ಜಿಗಳು, ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ಪತ್ರವ್ಯವಹಾರದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡುತ್ತದೆ. • ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಅನುಕ್ರಮ ಮೂಡುತ್ತದೆ. • ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ ಮತ್ತು ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳು ಪರಿಚಯಿಸಲ್ಪಡುತ್ತವೆ.

CO	Course Outcomes
1	Have constitutional knowledge and legal literacy
2	Understand Engineering and Professional ethics and responsibilities of Engineers.
3	Understand the the cybercrimes and cyber laws for cyber safety measures.

CO	Course Outcomes
1.	Apply concepts of complex numbers and vector algebra to analyze the problems rising in related area.
2.	Use derivatives and partial derivatives to calculate rate of change of multivariate functions
3.	Analyze position, velocity and acceleration in two and three dimensions of vector valued functions.
4.	Learn techniques of integration including the evaluation of double and triple integrals
5.	Identify and solve first order ordinary differential equations.

Course Name: COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS Sub code:18MAT41

CO	Course Outcomes
1.	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
2.	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing
3.	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
4.	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
5.	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

Course Name: ANALYSIS OF DETERMINATE STRUCTURES**Sub code:18CV42**

CO	Course Outcomes
1.	Identify different forms of structural systems.
2.	Construct ILD and analyse the beams and trusses subjected to moving loads
3.	Understand the energy principles and energy theorems and its applications to determine the deflections of trusses and beams.
4.	Determine the stress resultants in arches and cables.

Course Name: Applied Hydraulics**Sub code:18CV43**

CO	Course Outcomes
1.	Apply dimensional analysis to develop mathematical modeling and compute the parametric values in prototype by analyzing the corresponding model parameters
2.	Design the open channels of various cross sections including economical channel sections
3.	Apply Energy concepts to flow in open channel sections, Calculate Energy dissipation,
4.	Compute water surface profiles at different conditions
5.	Design turbines for the given data, and to know their operation characteristics under different operating conditions

Course Name: Concrete Technology**Sub code:18CV44**

CO	Course Outcomes
1.	Relate material characteristics and their influence on microstructure of concrete.
2.	Distinguish concrete behavior based on its fresh and hardened properties.
3.	Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes.
4.	Adopt suitable concreting methods to place the concrete based on requirement.

Course Name: Advanced Surveying**Sub code:18CV45**

CO	Course Outcomes
1.	Apply the knowledge of geometric principles to arrive at surveying problems
2.	Use modern instruments to obtain geo-spatial data and analyse the same to appropriate engineering problems
3.	Capture geodetic data to process and perform analysis for survey problems with the use of
4.	Design and implement the different types of curves for deviating type of alignments.

Course Name: Water supply and treatment Engineering

Sub code:18CV46

CO	Course Outcomes
1.	Estimate average and peak water demand for a community.
2.	Evaluate available sources of water, quantitatively and qualitatively and make appropriate choice for a community.
3.	Evaluate water quality and environmental significance of various parameters and plan suitable treatment system
4.	Design a comprehensive water treatment and distribution system to purify and distribute water to the required quality standards.

Course Name: Engineering Geology Laboratory

Sub code:18CVL47

CO	Course Outcomes
1.	The students able to identify the minerals, rocks and utilize them effectively in civil engineering practices
2.	The students will interpret and understand the geological conditions of the area for implementation of civil engineering projects
3.	The students will interpret subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical methods
4.	The students will learn the techniques in the interpretation of LANDSAT Imageries to find out the lineaments and other structural features for the given area.
5.	The students will be able to identify the different structures in the field

Course Name: Fluid Mechanics and hydraulic machines Laboratory

Sub code:18CVL48

CO	Course Outcomes
1.	Solve systems of linear equations using matrix algebra.
2.	Apply the knowledge of numerical methods in modelling and solving of engineering
3.	Apply the knowledge of numerical methods in modelling and solving of engineering
4.	Classify partial differential equations and solve them by exact methods.
5.	Apply elementary probability theory and solve related problems

YEAR: 3 SEM: 5

Course Name: Construction Management And Entrepreneurship

Sub code:18CV51

CO	Course Outcomes
1.	Prepare a project plan based on requirements and prepare schedule of a project by Understanding the activities and their sequence.
2.	Understand labour output, equipment efficiency to allocate resources required for an activity / project to achieve desired quality and safety.
3.	Analyze the economics of alternatives and evaluate benefits and profits of a construction activity based on monetary value and time value.
4.	Establish as an ethical entrepreneur and establish an enterprise utilizing the provisions offered by the federal agencies

Course Name: Analysis of Indeterminate Structures

Sub code:18CV52

CO	Course Outcomes
1.	Determine the moment in indeterminate beams and frames having variable moment of inertia and subsidence using slope deflection method
2.	Determine the moment in indeterminate beams and frames of no sway and sway using moment distribution method.
3.	Construct the bending moment diagram for beams and frames by Kani's method.
4.	Construct the bending moment diagram for beams and frames using flexibility method
5.	Analyze the beams and indeterminate frames by system stiffness method.

Course Name: Design of RC Structural Elements

Sub code:18CV53

CO	Course Outcomes
1.	Understand the design philosophy and principles
2.	Solve engineering problems of RC elements subjected to flexure, shear and torsion.
3.	Demonstrate the procedural knowledge in designs of RC structural elements such as slabs, columns and footings
4.	Owns professional and ethical responsibility.

Course Name: Basic Geotechnical Engineering

Sub code:18CV54

CO	Course Outcomes
1.	Ability to plan and execute geotechnical site investigation program for different civil engineering projects
2.	Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils
3.	Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures
4.	Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure
5.	Capable of estimating load carrying capacity of single and group of piles

Course name:MUNICIPAL WASTEWATER ENGINEERING

Subject Code:18CV55

CO	Course Outcome
1.	Select the appropriate sewer appurtenances and materials in sewer network..

2.	Design the sewers network and understand the self-purification process in flowing water.
3.	Design the various physic- chemical treatment units
4.	Design the various biological treatment units
5.	Design various AOPs and low cost treatment units.

Course name: **HIGHWAY ENGINEERING**

Subject Code: **18CV56**

CO	Course Outcome
1.	Acquire the capability of proposing a new alignment or re-alignment of existing roads, conduct necessary field investigation for generation of required data.
2.	Evaluate the engineering properties of the materials and suggest the suitability of the same for pavement construction.
3.	Design road geometrics, structural components of pavement and drainage
4.	Evaluate the highway economics by few select methods and also will have a basic knowledge of various highway financing concepts.

Course name: **Surveying Practice**

Subject Code: **18CVL57**

CO	Course Outcome
1.	Apply the basic principles of engineering surveying and for linear and angular measurements.
2.	Comprehend effectively field procedures required for a professional surveyor.
3.	Use techniques, skills and conventional surveying instruments necessary for engineering practice.

Course Name: **Concrete and Highway Materials Laboratory**

Sub code: **18CVL58**

CO	Course Outcomes
1.	Able to interpret the experimental results of concrete and highway materials based on laboratory tests.
2.	Determine the quality and suitability of cement
3.	Design appropriate concrete mix Using Professional codes.
4.	Determine strength and quality of concrete
5.	Evaluate the strength of structural elements using NDT techniques.
6.	Test the soil for its suitability as sub grade soil for pavements

Course Name: **Environmental Studies**

Sub code: **18CIV59**

CO	Course Outcomes
1.	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global
2.	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment
3.	Demonstrate ecology knowledge of a complex relationship between biotic and a biotic components
4.	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.

YEAR 3 SEM: 6

Course name: DESIGN OF STEEL STRUCTURAL ELEMENTS Subject Code:18CV61

CO	Course Outcomes
1.	Possess knowledge of Steel Structures Advantages and Disadvantages of Steel structures, steel code provisions and plastic behaviour of structural steel.
2.	Understand the Concept of Bolted and Welded connections.
3.	Understand the Concept of Design of compression members, built-up columns and columns splices
4.	Understand the Concept of Design of tension members, simple slab base and gusseted base.
5.	Understand the Concept of Design of laterally supported and un-supported steel beams.

Course Name:APPLIED GEOTECHNICAL ENGINEERING

Subject Code:18CV62

CO	Course Outcome
1.	Ability to plan and execute geotechnical site investigation program for different civil engineering projects
2.	Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils
3.	Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures
4.	Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure
5.	Capable of estimating load carrying capacity of single and group of piles

Course Name: HYDROLOGY AND IRRIGATION ENGINEERING

Subject Code :18CV63

CO	Course Outcome
1.	Understand the importance of hydrology and its components
2.	Measure precipitation and analyze the data and analyze the losses in precipitation.
3.	Estimate runoff and develop unit hydrographs.
4.	Find the benefits and ill-effects of irrigation.
5.	Find the quantity of irrigation water and frequency of irrigation for various crops. 6. Find the canal capacity, design the canal and compute the reservoir capacity.

CO	Course Outcome
1.	Evaluate the structural systems to application of concepts of flexibility and stiffness matrices for simple problems. 2.. 3.. 4.
2.	Identify, formulate and solve engineering problems with respect to flexibility and stiffness matrices as applied to continuous beams, rigid frames and trusses
3.	Identify, formulate and solve engineering problems by application of concepts of direct stiffness method as applied to continuous beams and trusses
4.	Evaluate secondary stresses

CO	Course Outcome
1.	Analyse existing solid waste management system and to identify their drawbacks
2.	Evaluate different elements of solid waste management system
3.	Suggest suitable scientific methods for solid waste management elements.
4.	Design suitable processing system and evaluate disposal sites.

CO	Course Outcome
1.	Solve the problems of Environmental issues concerned to building materials and cost effective building technologies
2.	Select appropriate type of masonry unit and mortar for civil engineering constructions; also they are able to Design Structural Masonry Elements under Axial Compression.
3.	Analyse different alternative building materials which will be suitable for specific climate and in an environmentally sustainable manner. Also capable of suggesting suitable agro and industrial wastes as a building material.
4.	Recommend various types of alternative building materials and technologies and design a energy efficient building by considering local climatic condition and building material.

CO	Course Outcomes
1.	Give solutions to solve various problems associated with soil formations having less strength.
2.	Use effectively the various methods of ground improvement techniques depending upon the requirements
3.	Utilize properly the locally available materials and techniques for ground improvement so that economy in the design of foundations of various civil engineering structures

Course name:RAILWAYS, HARBOUR, TUNNELING AND AIRPORTS Subject code:18CV645

CO	Course Outcomes
1.	Acquires capability of choosing alignment and also design geometric aspects of railway system, runway and taxiway. 2.. 3.. 4.
2.	Suggest and estimate the material quantity required for laying a railway track and also will be able to determine the hauling capacity of a locomotive
3.	Develop layout plan of airport, harbor, dock and will be able relate the gained knowledge to identify required type of visual and/or navigational aids for the same
4.	Apply the knowledge gained to conduct surveying, understand the tunneling activities.

Course Name: REMOTE SENSING AND GIS

Subject Code:18CV651

CO	Course Outcomes
1.	Collect data and delineate various elements from the satellite imagery using their spectral signature
2.	Analyze different features of ground information to create raster or vector data.
3.	Perform digital classification and create different thematic maps for solving specific problems
4.	Make decision based on the GIS analysis on thematic maps.

Course Name: TRAFFIC ENGINEERING

Subject Code:18CV652

CO	Course Outcomes
1.	Understand the human factors and vehicular factors in traffic engineering design
2.	Conduct different types of traffic surveys and analysis of collected data using statistical concepts
3.	Use an appropriate traffic flow theory and to comprehend the capacity & signalized intersection analysis.
4.	Understand the basic knowledge of Intelligent Transportation System.

Course Name: OCCUPATIONAL HEALTH AND SAFETY

Subject Code:18CV653

CO	Course Outcomes
1.	Identify hazards in the workplace that pose a danger or threat to their safety or health, or that of others.
2.	Control unsafe or unhealthy hazards and propose methods to eliminate the hazard.
3.	Present a coherent analysis of a potential safety or health hazard both verbally and in writing, citing the occupational Health and Safety Regulations as well as supported legislation.
4.	Discuss the role of health and safety in the workplace pertaining to the responsibilities of workers, managers, supervisors.
5.	Identify the decisions required to maintain protection of the environment, workplace as well as personal health and safety.

Course Name: SUSTAINABILITY CONCEPTS IN CIVIL ENGINEERING Subject Code:18CV654

CO	Course Outcomes
1.	Learn the sustainability concepts; understand the role and responsibility of engineers in sustainable development.
2.	Quantify sustainability, and resource availability, Rationalize the sustainability based on scientific merits

3.	Understand and apply sustainability concepts in construction practices, designs, product developments and processes across various engineering disciplines
4.	Make a decision in applying green engineering concepts and become a lifelong advocate of sustainability in society.

Course Name: SOFTWARE APPLICATION LABORATORY

Subject Code:18CVL66

CO	Course Outcomes
1.	Use software skills in a professional set up to automate the work and thereby reduce cycle time for completion of the work

Course Name: ENVIRONMENTAL ENGINEERING LABORATORY

Subject Code:18CVL67

CO	Course Outcomes
1.	Acquire capability to conduct experiments and estimate the concentration of different parameters.
2.	Compare the result with standards and discuss based on the purpose of analysis.
3.	Determine type of treatment, degree of treatment for water and waste water.
4.	Identify the parameter to be analyzed for the student project work in environmental stream

Course Name: EXTENSIVE SURVEY PROJECT

Subject Code:18CVL68

CO	Course Outcomes
1.	Apply Surveying knowledge and tools effectively for the projects.
2.	Understanding Task environment, Goals, responsibilities, Task focus, working in Teams towards common goals, Organizational performance expectations, technical and behavioral competencies
3.	Application of individual effectiveness skills in team and organizational context, goal setting, time management, communication and presentation skills.
4.	Professional etiquettes at workplace, meeting and general
5.	Establishing trust based relationships in teams & organizational environment
6.	Orientation towards conflicts in team and organizational environment, Understanding sources of conflicts, Conflict resolution styles and techniques

YEAR 4 SEM 7

Course Name: QUANTITY SURVEYING AND CONTRACT MANAGEMENT Sub code:18CV71

CO	Course Outcomes
1.	Taking out quantities and work out the cost and preparation of abstract for the estimated cost for various civil engineering works.
2.	Prepare detailed and abstract estimates for various road works, structural works and water supply and sanitary works
3.	Prepare the specifications and analyze the rates for various items of work.
4.	Assess contract and tender documents for various construction works.
5.	Prepare valuation reports of buildings

Course Name: DESIGN OF RCC AND STEEL STRUCTURES

Subcode:18CV72

CO	Course Outcomes
1.	Students will acquire the basic knowledge in design of RCC and Steel Structures.
2.	Students will have the ability to follow design procedures as per codal provisions and skills to arrive at structurally safe RC and Steel members.

Course Name:THEORY OF ELASTICITY

Subcode:18CV731

CO	Course Outcomes
1.	Ability to apply knowledge of mechanics and mathematics to model elastic bodies as continuum.
2.	Ability to formulate boundary value problems; and calculate stresses and strains.
3.	Ability to comprehend constitutive relations for elastic solids and compatibility constraints.
4.	Ability to solve two-dimensional problems (plane stress and plane strain) using the concept of stress function.

Course Name: AIR POLLUTION AND CONTRO

Sub code:18CV732

CO	Course Outcomes
1.	Identify the major sources of air pollution and understand their effects on health and environment.
2.	Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models.
3.	Ascertain and evaluate sampling techniques for atmospheric and stack pollutants.
4.	Choose and design control techniques for particulate and gaseous emissions.

CO	Course Outcomes
1.	Students will be able to evaluate and assess the suitability of any pavement material to be used in various components of pavement by conducting required tests as per IS,IRC specifications .
2.	Students will be able to formulate the proportions of different sizes of aggregates to suit gradation criteria for various mixes as per MORTH and also design bituminous mixes.
3.	Students will be competent to adapt suitable modern technique and equipment for speedy and economic construction
4.	Student will be able to execute the construction of embankment, flexible, rigid pavement and perform required quality control tests at different stages of pavement construction.

Course Name GROUND WATER HYDRAULICS

Sub code:18CV734

CO	Course Outcomes
1.	Find the characteristics of aquifers
2.	Estimate the quantity of ground water by various methods
3.	Locate the zones of ground water resources. 4. Select particular type of well and augment the ground water storage.

Course Name: MASONRY STRUCTURES

Subcode:18CV735

CO	Course Outcomes
1.	Select suitable material for masonry construction by understanding engineering properties. 2. 3..4.. 5.
2.	Compute loads, load combinations and analyze the stresses in masonry.
3.	Design masonry under compression (Axial load) for various requirements and conditions
4.	Design masonry under bending (Eccentric, lateral, transverse load) for various requirements and conditions
5.	Assess the behavior of shear wall and reinforced masonry.

Course Name:EARTHQUAKE ENGINEERING

Subcode:18CV741

CO	Course Outcomes
1.	Acquire basic knowledge of engineering seismology.
2.	Develop response spectra for a given earthquake time history and its implementation to estimate response of a given structure.
3.	Understanding of causes and types of damages to civil engineering structures during different earthquake scenarios
4.	Analyze multi-storied structures modeled as shear frames and determine lateral force distribution due to earthquake input motion using IS-1893 procedures
5.	Comprehend planning and design requirements of earthquake resistant features of RCC and Masonry structures thorough exposure to different IS-codes of practices

Course Name: DESIGN CONCEPT OF BUILDING SERVICES

Sub code:18CV742

CO	Course Outcomes
1.	Describe the basics of house plumbing and waste water collection and disposal
2.	Discuss the safety and guidelines with respect to fire safety
3.	Describe the issues with respect to quantity of water, rain water harvesting and roof top harvesting.
4.	Understand and implement the requirements of thermal comfort in buildings.

Course Name:REINFORCED EARTH STRUCTURES

Sub code:18CV743

CO	Course Outcomes
1.	Identify, formulate reinforced earth techniques that are suitable for different soils and in different structures
2.	Understand the laboratory testing concepts of Geo synthetics
3.	Design RE retaining structures and Soil Nailing concepts
4.	Determine the load carrying capacity of Foundations resting on RE soil bed.
5.	Asses the use of Geo synthetics in drainage requirements and landfill designs

Course Name:DESIGN OF HYDRAULIC STRUCTURES

Sub code:18CV744

CO	Course Outcomes
1.	Check the stability of gravity dams and design the dam
2.	Estimate the quantity of seepage through earth dams
3.	Design spillways and aprons for various diversion works
4.	Select particular type of canal regulation work for canal network.

Course Name:URBAN TRANSPORT PLANNING

Sub code:18CV745

CO	Course Outcomes
1.	Design, conduct and administer surveys to provide the data required for transportation planning.
2.	Supervise the process of data collection about travel behavior and analyze the data for use in transport planning
3.	Develop and calibrate modal split, trip generation rates for specific types of land use developments
4.	Adopt the steps that are necessary to complete a long-term transportation plan.

Course Name:FINITE ELEMENT METHOD

Sub code:18CV751

CO	Course Outcomes
1.	The student will have the knowledge on advanced methods of analysis of structures.

Course Name:NUMERICAL METHODS AND APPLICATIONS

Sub code:18CV752

CO	Course Outcomes
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1.	After studying this course, The students will have a clear perception of the power of numerical techniques, ideas and would be able to demonstrate the applications of these techniques to problems drawn from Industry, management and other engineering fields.
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Course Name:ENVIRONMENTAL PROTECTION AND MANAGEMENT

Sub code:18CV753

CO	Course Outcomes
1.	Appreciate the elements of Corporate Environmental Management systems complying to international environmental management system standards
2.	Lead pollution prevention assessment team and implement waste minimization options.
3.	Develop, Implement, maintain and Audit Environmental Management systems for Organizations

Course Name:COMPUTER AIDED DETAILING OF STRUCTURES

Sub code:18CVL76

CO	Course Outcomes
1.	Prepare detailed working drawings

Course Name:GEOTECHNICAL ENGINEERING LABORATORY

Sub code:18CVL77

CO	Course Outcomes
1.	Physical and index properties of the soil
2.	Classify based on index properties and field identification
3.	To determine OMC and MDD, plan and assess field compaction program
4.	Shear strength and consolidation parameters to assess strength and deformation characteristics
5.	In-situ shear strength characteristics (SPT-Demonstration)

YEAR 4 SEM 8

Course Name: DESIGN OF PRE-STRESSECONCRETE

Sub code:18CV81

CO	Course Outcomes
1.	Understand the requirement of PSC members for present scenario.
2.	Analyse the stresses encountered in PSC element during transfer and at working.
3.	Understand the effectiveness of the design of PSC after studying losses
4.	Capable of analyzing the PSC element and finding its efficiency.
5.	Design PSC beam for different requirements.

Course Name: BRIDGE ENGINEERING

Sub code:18CV821

CO	Course Outcomes
1.	Understand the load distribution and IRC standards
2.	Design the slab and T beam bridges.
3.	Design Box culvert, pipe culver
4.	Use bearings, hinges and expansion joints and
5.	Design Piers and abutments

Course Name: PREFABRICATED STRUCTURES

Sub code:18CV822

CO	Course Outcomes
1.	Use modular construction, industrialized construction
2.	Design prefabricated elements
3.	Design some of the prefabricated elements
4.	Use the knowledge of the construction methods and prefabricated elements in buildings

Course Name: ADVANCED FOUNDATION ENGINEERING

Sub code:18CV823

CO	Course Outcomes
1.	Estimate the size of isolated and combined foundations to satisfy bearing capacity and settlement criteria.
2.	Estimate the load carrying capacity and settlement of single piles and pile groups including laterally loaded piles.
3.	Understand the basics of analysis and design principles of well foundation, drilled piers and caissons.
4.	Understand basics of analysis and design principles of machine foundations

CO	Course Outcomes
1.	Identify the causes for structural (Concrete) deterioration.
2.	Assess the type and extent of damage and carry out damage assessment of structures through various types of tests.
3.	Recommend maintenance requirements of the buildings and preventive measures against influencing factors.
4.	Select suitable material and suggest an appropriate method for repair and rehabilitation.

CO	Course Outcomes
1.	Describe the project and be able to defend it.
2.	Develop critical thinking and problem solving skills.
3.	Learn to use modern tools and techniques
4.	Communicate effectively and to present ideas clearly and coherently both in written and oral forms.
5.	Develop skills to work in a team to achieve common goal.
6..	Develop skills of self learning, evaluate their learning and take appropriate actions to improve it.
7.	Prepare them for life-long learning to face the challenges and support the technological changes to meet the societal needs.
8.	Develop skills of project management and finance

CO	Course Outcomes
1.	Develop knowledge in the field of Civil Engineering and other disciplines through independent learning and collaborative study
2.	Identify and discuss the current, real-time issues and challenges in engineering & technology
3.	Develop written and oral communication skills.
4.	Apply principles of ethics and respect in interaction with others.
5.	Develop the skills to enable life-long learning
6.	Explore concepts in larger diverse social and academic contexts.