

## B. TECH – CIVIL ENGINEERING

### Department Vision

To Lead Academics and Research in Civil Engineering Globally.

### Department Mission

- To provide high quality education and make the students as ethical, world class professionals.
- To improve the skills of both staff and students with opportunities to innovate and explore knowledge through research projects and consultancy.
- To inculcate the feeling of present needs in students and evoke in them a responsibility to serve the society better.

### Program Educational Objectives (PEOs):

<b>PEO1</b>	Graduate will be able to succeed in diversified fields of industry/higher studies by acquiring technical knowledge and contribute to the sustainable development of infrastructure.
<b>PEO2</b>	Graduate will be able to exhibit professionalism and ethics and show ability to accept modern trends by engaging in lifelong learning.
<b>PEO3</b>	Graduate will be able to apply innovative ideas and succeed as a researcher/entrepreneur to serve societal needs.

### Program Specific Outcomes (PSO's):

<b>PSO1:</b>	Develop critical aptitude skills and become professional to address any problem of the society.
<b>PSO2:</b>	Acquire practical knowledge by field visits and function effectively with the training of software by means of curriculum.
<b>PSO3:</b>	Effectively communicate with the stakeholders and execute engineering projects with high proficiency.

## Program Outcomes(POs):

Engineering Graduates will be able to:

1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	<b>Design/development of solutions:</b> 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	<b>Conduct investigations of complex problems:</b> 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	<b>Modern tool usage:</b> 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	<b>The engineer and society:</b> 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	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustain able development.
8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	<b>Communication:</b> 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	<b>Project management and finance:</b> 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 multi-disciplinary environments.
12	<b>Life-long learning:</b> 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.

Course outcomes (Cos) of all courses of all programs offered by the institution

**Course Outcomes for First Year First Semester Course R19 (2019-2020)****Course Code: B19HS1101****Course Title: ENGLISH**

CO-1	Identify the context, topic and pieces of specific information by understanding and responding to the social or transactional dialogues spoken by native speakers of English.
CO-2	Apply suitable strategies for skimming and scanning to get the main idea of a text and locate specific information.
CO-3	Build confidence and adapt themselves to the social and public discourses, discussions and presentations.
CO-4	Understand and apply the principles of writing to paragraphs, arguments, essays and formal/informal communication.
CO-5	Construct sentences using proper grammatical structures and correct word forms.

**Course Code: B19BS1101****Course Title: MATHEMATICS – I**

CO-1	Solve a given system of linear algebraic equations.
CO-2	Determine Eigen values and Eigen vectors of a system represented by a matrix.
CO-3	Solve linear ordinary differential equations of first order and first degree.
CO-4	Apply the knowledge in simple applications such as Newton's law of cooling, orthogonal trajectories and simple electrical circuits.
CO-5	Solve linear ordinary differential equations of second order and higher order.
CO-6	Determine Laplace transform and inverse Laplace transform and solve linear ODE.

**Course Code: B19BS1103****Course Title: ENGINEERING PHYSICS**

CO-1	Explain the structure of solids and their determination.
CO-2	Demonstrate the synthesis methods and applications of nano materials.
CO-3	Understand the concepts of elasticity and different types of moduli and their relation.
CO-4	Explain the sound propagation in buildings and related aspects.
CO-5	Characterize the magnetic and dielectric materials from their basic behaviour and learn their applications.
CO-6	Understand the basics of modern technologies ultrasonics, lasers and optical fibers and their applications in various fields.

**Course Code: B19CE1101****Course Title: ENGINEERING MECHANICS**

CO-1	Apply laws of mechanics for various force conditions and properties of bodies.
CO-2	Apply laws of forces for general cases in plane.
CO-3	Apply principle of virtual work for various equilibrium conditions.
CO-4	Apply laws of kinematics and kinetics to particles.
CO-5	Apply laws of kinematics and kinetics to rigid bodies.

**Course Code: B19ME1101****Course Title: ENGINEERING DRAWING**

CO-1	Apply principles of drawing to Construct polygons and engineering curves.
CO-2	Apply principles of drawing to draw the projections of points and lines.
CO-3	Apply principles of drawing to draw the projections of planes.
CO-4	Apply principles of drawing to draw the projections of solids.
CO-5	Apply principles of drawing to represent the object in 3D view through isometric views.
<b>Course Code: B19BS1106</b>	
<b>Course Title: ENGINEERING PHYSICS LAB</b>	
CO-1	Students get hands on experience in setting up experiments and using the instruments / equipment individually.
CO-2	Get introduced to using new / advanced technologies and understand their significance.
<b>Course Code: B19HS1102</b>	
<b>Course Title: ENGLISH LAB</b>	
CO-1	Remember and understand the different aspects of English language proficiency with emphasis on LSRW skills.
CO-2	Apply communication skills through various language learning activities.
CO-3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening comprehension.
CO-4	Exhibit an acceptable etiquette essential in social settings.
CO-5	Get awareness on mother tongue influence and neutralize it in order to improve fluency and clarity in spoken English.

<b>Course Outcomes for First Year Second Semester Course</b>
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<b>Course Code: B19BS1201</b>	
<b>Course Title: MATHEMATICS –II</b>	
CO-1	Fit an interpolation formula and perform interpolation for an equally spaced data as well as unequally spaced data.
CO-2	Find a real root of algebraic and transcendental equations, evaluate numerically certain definite integrals & solve a first order ordinary differential equation by Euler and RK methods.
CO-3	Compute partial derivatives, total derivative and Jacobian.
CO-4	Find maxima/minima of functions of two variables and evaluate some real definite integrals.
CO-5	Form partial differential equations and solve Lagrange linear equation. Solve linear higher order homogeneous and non-homogeneous PDEs.
CO-6	Find theoretical solution of one-dimensional wave equation and one-dimensional heat equation.
<b>Course Code: B19BS1202</b>	
<b>Course Title: MATHEMATICS-III</b>	
CO-1	Determine Fourier series and half range series of functions.
CO-2	How to find Fourier transform for a given function and evaluate some real definite integrals.
CO-3	Evaluation of Multiple integrals; definitions of Beta, Gamma and error functions.
CO-4	Concepts of Gradient, divergence and curl and second order operators.
CO-5	To evaluate line integral, compute work done by a force and Flux of a vector function.
CO-6	Green's, Stokes' and Gauss divergence theorems.
<b>Course Code: B19BS1204</b>	
<b>Course Title: ENGINEERING CHEMISTRY</b>	
CO-1	At the end of the course the students learn the advantages and limitations of plastics materials and their use in design.
CO-2	Fuels which are used commonly and their economics, advantages and limitations are discussed.
CO-3	Students gained knowledge reasons for corrosion and some methods of corrosion control.
CO-4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.
CO-5	Similarly students understand liquid crystals and semiconductors. Students can gain the building materials, solar materials, lubricants and energy storage devices.
<b>Course Code: B19CS1201</b>	
<b>Course Title: PROGRAMMING FOR PROBLEM SOLVING USING C</b>	
CO-1	Students will learn about computer systems, computing environments, developing of a computer program and Structure of a C Program.
CO-2	Students will learn to use different operators, data types and loops for developing C Programs.
CO-3	Students will able to write programs using Arrays ,Strings, enumerated types, Structure and Union.
CO-4	Students will able to design and implement programs to analyze the different pointer applications.
CO-5	Students will able to decompose a problem into functions and to develop modular reusable code.

<b>Course Code: B19CE1201</b>	
<b>Course Title: COMPUTER AIDED ENGINEERING DRAWING</b>	
CO-1	Apply principles of drawing to draw the projections of solids.
CO-2	Apply principles of drawing to draw sections of solids and sectional views.
CO-3	Apply principles of drawing to draw the development of solids.
CO-4	Apply the principles of drawing to draw the intersection of right regular solids.
CO-5	Apply the principles of drawing to draw the perspective views of points, lines, plane figures and simple solids.
CO-6	Draw isometric and orthographic drawings using CAD packages.
<b>Course Code: B19BS1207</b>	
<b>Course Title: ENGINEERING CHEMISTRY LAB</b>	
CO-1	An understanding of Professional and develop confidence on recent trends.
CO-2	Able to gain technical knowledge of measuring, operating and testing of chemical instruments and equipments.
CO-3	Acquire ability to apply real time knowledge of chemistry.
CO-4	Exposed to the real time working environment.
CO-5	Demonstrate the ability to learn Principles, design and conduct experiments.
CO-6	Ability to work on laboratory and multidisciplinary tasks.
<b>Course Code: B19HS1202</b>	
<b>Course Title: COMMUNICATION SKILLS LAB</b>	
CO-1	Learn different aspects of English language proficiency in LSRW skills.
CO-2	Apply communication skills through various language learning activities.
CO-3	Draft job application letters.
CO-4	Adopt a professional etiquette in formal settings.
CO-5	Improve fluency and clarity in both spoken and written English.
<b>Course Code: B19CS1204</b>	
<b>Course Title: PROGRAMMING FOR PROBLEM SOLVING USING C LAB</b>	
CO-1	Gains Knowledge on various concepts of a C language.
CO-2	Able to draw flowcharts and write algorithms.
CO-3	Able design and development of C problem solving skills .
CO-4	Able to design and develop modular programming skills.
CO-5	Able to trace and debug a program.
<b>Course Code: B19ME1205</b>	
<b>Course Title: WORK SHOP PRACTICE LAB</b>	
CO-1	Apply wood working skills in real world applications.
CO-2	Build different parts with metal sheets in real world applications.
CO-3	Apply fitting operations in various applications.
CO-4	Apply different types of basic electric circuit connections.
<b>Course Code: B19MC1201</b>	
<b>Course Title: Environmental Science</b>	

<b>Course Outcomes for Second Year First Semester Course</b>	
<b>Course Code: B19BS2102</b>	
<b>Course Title: MATHEMATICS IV</b>	
CO-1	Comprehend the concept of Analytic function and apply in Electrostatics and Fluid dynamics
CO-2	Determine Laurent series of functions about isolated singularities, and determine residues. Use the residue theorem to evaluate certain real definite integrals.
CO-3	Formulate and solve linear difference equations.
CO-4	Use Z-transforms to solve linear difference equations with constant coefficients.
CO-5	Identify a random variable as discrete/continuous, find its expected value and also fit a probability distribution for a given frequency distribution.
CO-6	Decide the test applicable and apply it for giving inference about Population Parameter based on sample statistic for some large samples and small samples.
<b>Course Code: B19CE2101</b>	
<b>Course Title: MECHANICS OF SOLIDS</b>	
CO-1	Summarize the behavior of basic materials under the influence of different external loading conditions and support conditions and also to determine the principal stresses & strains under different loadings
CO-2	Determine shear Force and Bending moments in statically determinate Beams and draw the Diagrams.
CO-3	Calculate the bending stresses, shear stresses, torsional stresses in structural members and also stiffness of springs.
CO-4	Examine the basic methods to find slope and deflection of beams subjected to loads.
CO-5	Determine the crippling load for columns with different end conditions and calculate the stresses in Thin & Thick cylinders.
<b>Course Code: B19CE2102</b>	
<b>Course Title: FLUID MECHANICS</b>	
CO-1	Determine the physical properties of fluids and different types of forces acting on a fluid element extended to forces on various gates.
CO-2	Determine the forces that are acting on immersed bodies in static fluids through application of buoyancy and floatation.
CO-3	Determine velocity of fluid flows, local and convective accelerations in 1D, 2D flows fields and derive the Laplace equation.

CO-4	Apply conservation principles of mass, momentum and energy on fluids using control volume approaches.
CO-5	Calculate the force exerted by the fluid on bends, nozzles using impulse momentum principle
CO-6	Determine the shear stress, Velocity, loss of head in Laminar flow through circular pipes and Turbulent flow for rough and smooth pipes.
CO-7	Analyze the steady laminar and turbulent flows in pipes and solve the pipe networks problems.
<b>Course Code: B19CE2103</b>	
<b>Course Title: BUILDING MATERIALS CONSTRUCTION AND PLANNING</b>	
CO-1	Identify different building materials and their importance in building construction
CO-2	Differentiate brick masonry, stone masonry construction and use of lime and cement in various constructions.
CO-3	Learnt the importance of building components and finishing.
CO-4	Draw developed plan, elevation, section, site plan for residential and public buildings.
CO-5	know the classification of aggregates, sieve analysis and moisture content usually required in building construction.
<b>Course Code: B19CE2104</b>	
<b>Course Title: SURVEYING</b>	
CO-1	Apply the knowledge to calculate angles, distances and levels.
CO-2	Identify data collection methods and prepare field notes.
CO-3	Understand the working principles of survey instruments, measurement errors and corrective.
CO-4	Measures Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies.
<b>Course Code: B19CE2105</b>	
<b>Course Title: ENVIRONMENTAL ENGINEERING-I</b>	
CO-1	Apply the concepts of population forecasting studies to determine the water demand.
CO-2	Explain the concepts of intake structures and pipes in water supply.
CO-3	Explain the quality of water with its physical, chemical and biological characteristics.
CO-4	Determine the sizes of different unit operations in a water treatment plant using the treatment principles.
CO-5	Utilize the concepts of distribution systems for building a better distribution network.
<b>Course Code: B19CE2106</b>	
<b>Course Title: SURVEYING FIELD WORK</b>	
CO-1	Apply the linear measurement in simple Boundary Surveys.
CO-2	Identify direction of any line using compass survey.
CO-3	Relate the importance of Theodolite in Surveying.
CO-4	Apply Concepts of Tachometry in Surveying.
CO-5	Use the Total Station in Surveying.
<b>Course Code: B19CE2107</b>	
<b>Course Title: STRENGTH OF MATERIALS LAB</b>	
CO-1	Conduct test and find Physical properties of steel and wood.
CO-2	Design the specimens for assessing a particular property of the materials with available machines.



CO-3	Decide the range of machine and set the machine accordingly by suitable modifications.
CO-4	Design experiments making use of various techniques of load measuring or deformation measuring instruments.
<b>Course Code: B19MC2103</b>	
<b>Course Title: CONSTITUTION OF INDIA</b>	
CO-1	Understand historical background of the constitution making and its importance for building a democratic India.
CO-2	Understand the functioning of three wings of the government i.e., executive, legislative and judiciary.
CO-3	Understand the value of the fundamental rights and duties for becoming good citizen of India.
CO-4	Analyze the decentralization of power between central, state and local self-government.
CO-5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
CO-6	<ul style="list-style-type: none"> <li>a) Know the sources, features and principles of Indian Constitution.</li> <li>b) Learn about Union Government, State government and its administration.</li> <li>c) Get acquainted with Local administration and Panchayati Raj.</li> <li>d) Be aware of basic concepts and developments of Human Rights.</li> <li>e) Gain knowledge on roles and functioning of Election Commission.</li> </ul>

<b>Course Outcomes for Second Year Second Semester Course</b>	
<b>Course Code: B19CE2201</b>	
<b>Course Title: ENGINEERING GEOLOGY</b>	
CO-1	The course will provide the students with basic knowledge and understanding in the most central part of engineering geology, rock and soil.
CO-2	Students should develop an appreciation of geologic processes and their influence on civil engineering works.
CO-3	The course will give students an overview and an understanding of the engineering properties of rock and soil materials.
CO-4	Based on lectures and exercises, students will gain basic understanding of the importance of engineering geology related to technical issues during construction.
CO-5	Students will develop the ability to perform basic engineering geological assessments and analysis, and to understand the relevance of engineering geology in complex projects in and on solid rock.
<b>Course Code: B19CE2202</b>	
<b>Course Title: STRUCTURAL ANALYSIS - I</b>	
CO-1	Determine deflections in determinate beams, frames & trusses by different methods and apply strain energy concept.
CO-2	Analyze propped cantilever and fixed beams for BM and SF.
CO-3	Analyze different Continuous beams for BM and SF by different methods of analysis.
CO-4	Determine reactions, BM & SF in beams subjected to moving loads using ILD .
CO-5	Determine axial forces in trusses by using influence lines.
<b>Course Code: B19CE2203</b>	
<b>Course Title: CONCRETE TECHNOLOGY</b>	
CO-1	Understand the basic ingredients like cement, sand and pebbles.

CO-2	Familiarize the basic ingredients of concrete and their role in the production of concrete and its behaviour by conducting tests.
CO-3	Testing the hardened concrete for different properties.
CO-4	Evaluate elasticity, shrinkage and creep properties.
CO-5	Design the concrete mix by standard mix designs and familiarize the basic concepts of special concrete, their production and applications.
<b>Course Code: B19CE2204</b>	
<b>Course Title: HYDRAULICS AND HYDRAULIC MACHINERY</b>	
CO-1	Apply the principles of dimensional homogeneity and Similarity laws for irrigation structures and fluid Machinery.
CO-2	Determine the Drag and Lift force for fully submerged bodies.
CO-3	Determine the discharge of most economical channel section for uniform flow in open Channels and Specific Energy , Critical flow , critical depth and critical velocity.
CO-4	Determine length of surface profiles for G V F and Loss of head, height and length of hydraulic jump for Rapidly Varied flows.
CO-5	Use momentum and energy principles for design of turbines and pumps.
CO-6	Recommend suitable type of turbines and pumps for the given project.
<b>Course Code: B19CE2205</b>	
<b>Course Title: ENVIRONMENTAL ENGINEERING-II</b>	
CO-1	Apply the concepts of sewerage systems for design of a sewer.
CO-2	Choose the appropriate house plumbing systems for building better house drainage network.
CO-3	Make use of the quality to determine BOD content in waste water.
CO-4	Solve for the size of conventional treatment unit operations using the engineering principles.
CO-5	Solve for the size of miscellaneous treatment units using design specifications.
<b>Course Code: B19CE2206</b>	
<b>Course Title: ENGINEERING GEOLOGY LAB</b>	
CO-1	Elucidate the mega-scopic identification of minerals.
CO-2	Categorize the rocks according to mega-scopic description.
CO-3	Interpret geological knowledge in various sectors.
<b>Course Code: B19CE2207</b>	
<b>Course Title: FLUID MECHANICS AND HYDRAULIC MACHINERY LAB</b>	
CO-1	Illustrate Flow Measuring Devices used in pipes, channels and Tanks.
CO-2	Analyze characteristics of broad crested notch.
CO-3	Determine the coefficient of impact on a flat plate and curved vane by comparing the theoretical and actual forces by impact.
CO-4	Analyze the working of the reciprocating pump and centrifugal pump and develop the characteristics of power input, head and efficiency under various discharges and plot the characteristic curves.
CO-5	Determine the performance characteristics of pelton wheel turbine and develop the characteristic curves of unit discharge, unit power and unit head under varying unit speed.
CO-6	Determine the performance characteristics of Francis turbine and develop the characteristic curves of unit discharge, unit power and unit head under varying unit speed.

<b>Course Code: B19CE2208</b>	
<b>Course Title: CONCRETE LAB</b>	
CO-1	Conduct test and find Physical properties of cement, fine aggregates and coarse aggregates.
CO-2	Determine the values of physical properties and recommend their suitability for concrete production.
CO-3	Understand and determine workability of concrete by slump, compaction factor, flow table and Vee – Bee tests.
CO-4	Evaluate hardened properties of concrete like compressive strength, split tensile strength and flexural strength.
<b>Course Code: B19MC2202</b>	
<b>Course Title: PROFESSIONAL ETHICS AND HUMAN VALUES</b>	
CO-1	Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field. Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships and field work.
CO-2	Identify the multiple ethical interests at stake in a real-world situation or practice and Articulate what makes a particular course of action ethically defensible.
CO-3	Assess their own ethical values and the social context of problems.
CO-4	Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects.
CO-5	Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research.
<b>Course Outcomes for M.TECH -STRUCTURAL ENGINEERING First Semester Course(19-20)</b>	
<b>Course Code: M19 ST 1101</b>	
<b>Course Title : THEORY OF ELASTICITY</b>	
CO-1	Understand the notations of stress and strain.
CO-2	Analyze the stresses and strains in rectangular co-ordinate system.
CO-3	Analyze the stresses and strains in polar co-ordinate system.
CO-4	Evaluate the equilibrium and compatibility conditions.
CO-5	Analyze members for different shaped bars subjected to torsion.
<b>Course Code: M19 ST 1102</b>	
<b>Course Title: STRUCTURAL DYNAMICS</b>	
CO-1	Understand the response of structural systems to dynamic loads.
CO-2	Understand the behavior and response of linear and nonlinear SDOF and MDOF structures with various dynamic loading.
CO-3	Understand the behavior and response of MDOF structures with various Dynamic loading.
CO-4	Possess the ability to find out suitable solution for continuous system.
CO-5	Understand the behavior of structures subjected to dynamic loads under free vibration.
CO-6	Understand the behavior of structures subjected to dynamic loads Harmonic excitation and earthquake load.
<b>Course Code: M19ST1103</b>	
<b>Course Title: MATRIX ANALYSIS OF STRUCTURES</b>	
CO-1	Perform the structural analysis of determinate and indeterminate structures using classical compatibility methods, such as method of consistent displacements, force and

	equilibrium Methods.
CO-2	Perform structural analysis using the stiffness method.
CO-3	Solve multiple degree of freedom two and three dimensional problems involving trusses, beams, frames and plane stress.
CO-4	Understand basic finite element analysis.
<b>Course Code: M19ST1104</b>	
<b>Course Title: ANALYTICAL &amp; NUMERICAL METHODS FOR STRUCTURAL ENGINEERING</b>	
CO-1	Understand the applications of Laplace and Fourier transforms.
CO-2	Implement the principles and techniques of Calculus of Variations.
CO-3	Find the solutions for different kinds of integral equations.
CO-4	Adopt the principles and techniques of finite difference methods.
CO-5	Use Numerical differentiation and integration techniques for finding numerical solutions.
<b>Course Code: M19ST1105</b>	
<b>Course Title: DESIGN OF REINFORCED CONCRETE FOUNDATIONS</b>	
CO-1	Attain the perception of site investigation to select suitable type of foundation based on soil category.
CO-2	Capable of ensuring design concepts of shallow foundation.
CO-3	Can be efficient in selecting suitable type of pile for different soil stratum and in evaluation of group capacity by formulation.
CO-4	Design different types of well foundation.
<b>Course Code: M19ST1106</b>	
<b>Course Title: BRIDGE ENGINEERING</b>	
CO-1	To decide the structural form for a bridge depending on the functional requirements and site conditions. Identify various structural components of the chosen bridge form.
CO-2	Design theories for super structure and substructure of bridges, R.C.C T Beam Bridge.
CO-3	Design of box culverts.
CO-4	Design of railway bridges, plate girder bridges.
CO-5	Stability analysis of abutments, different types of bearings, abutments, piers and various types of foundations for Bridges.
<b>Course Code: M19ST1107</b>	
<b>Course Title: REPAIR AND REHABILITATION OF STRUCTURES</b>	
CO-1	Recognize the various materials for repair and rehabilitation. Non- destructive evaluation of concrete structures.
CO-2	Design and suggest repair strategies for deteriorated concrete structures including repairing with composites.
CO-3	Understand the methods of strengthening methods for concrete structures.
CO-4	Design of special concretes.
<b>Course Code: M19 ST1108</b>	
<b>Course Title: ADVANCED REINFORCED CONCRETE DESIGN</b>	
CO-1	Analyze fixed and continuous beams after redistribution of moments.
CO-2	Apply virtual work / equilibrium method for analysis of R.C Elements.
CO-3	Design flat slab with and without drop panel or column heads.
CO-4	Analyze and Design deep beams.
CO-5	Compute /determinate manually in slender columns.
<b>Course Code: M19ST1109</b>	

<b>Course Title: ADVANCED CONCRETE TECHNOLOGY</b>	
CO-1	Classify and explain various concrete making materials.
CO-2	Apply fundamental knowledge in the fresh, hardened and high strength properties of concrete.
CO-3	Determine the application and use of various special concrete and form work.
CO-4	Design and develop a concrete mix design for different codes.
<b>Course Code: M19 ST 1110</b>	
<b>Course Title: ADVANCED CONCRETE TECHNOLOGY LABORATORY</b>	
CO-1	Conduct various laboratory tests on Cement, Aggregates.
CO-2	Know the strain measurement.
CO-3	Perform Non- Destructive testing of concrete.
CO-4	Chemical analysis on concrete and Aggregate and Sand.
<b>Course Code: M19 ST 1111</b>	
<b>Course Title: ADVANCED STRUCTURAL ENGINEERING LABORATORY</b>	
CO-1	Design and test the deflection and cracks in R.C. Beams.
CO-2	Design and test the Shear behaviour in RCC Beam.
CO-3	Design and test the flexure behaviour in RCC Beam.
CO-4	Design and test the flexure behaviour in RCC one way slab and Two way slabs.
CO-5	Determine the Young's Modulus of Elasticity of Concrete.
<b>Course Code: M19AC0001</b>	
<b>Course Title: ENGLISH FOR RESEARCH PAPER WRITING</b>	
CO-1	Understand that how to improve your writing skills and level of readability.
CO-2	Learn about what to write in each section.
CO-3	Understand the skills needed when writing a Title Ensure the good quality of paper at very first time submission.
<b>Course Code: M19AC0002</b>	
<b>Course Title: DISASTER MANAGEMENT</b>	
CO-1	
CO-2	
CO-3	
<b>Course Code: M19AC0003</b>	
<b>Course Title: SANSKRIT FOR TECHNICAL KNOWLEDGE</b>	
CO-1	Understanding basic Sanskrit language.
CO-2	Ancient Sanskrit literature about science & technology can be understood.
CO-3	Being a logical language will help to develop logic in students.
<b>Course Code: M19AC0004</b>	
<b>Course Title: VALUE EDUCATION</b>	
CO-1	Knowledge of self-development.
CO-2	Learn the importance of Human values.
CO-3	Developing the overall personality.
<b>Course Code: M19AC0005</b>	
<b>Course Title: CONSTITUTION OF INDIA</b>	
CO-1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.

CO-2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
CO-3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
CO-4	Discuss the passage of the Hindu Code Bill of 1956.
<b>Course Code: M19AC0006</b>	
<b>Course Title: PEDAGOGY STUDIES</b>	
CO-1	
CO-2	
CO-3	
CO-4	
<b>Course Code: M19AC0007</b>	
<b>Course Title: STRESS MANAGEMENT BY YOGA</b>	
CO-1	Develop a healthy mind in a healthy body thus improving social health also.
CO-2	Improve efficiency.
<b>Course Code: M19AC0008</b>	
<b>Course Title: PERSONALITY DEVELOPMENT THROUGH LIFEENLIGHTENMENT SKILLS</b>	
CO-1	Study of Shrimad- Bhagwad- Geeta will help the student in developing his personality and achieve the highest goal in life.
CO-2	The person who has studied Geeta will lead the nation and mankind to peace and prosperity.
CO-3	Study of Neetishatakam will help in developing versatile personality of students.
<b>Course Outcomes for M.TECH -STRUCTURAL ENGINEERING Second Semester Course(2019-2020)</b>	
<b>Course Code: M19 ST 1201</b>	
<b>Course Title: FINITE ELEMENT METHODS IN STRUCTURAL ENGINEERING</b>	
CO-1	Apply finite element method to solve problems in solid mechanics.
CO-2	Formulate and solve problems in one dimensional structures including trusses, beams.
CO-3	Formulate finite element characteristic equations for two dimensional elements and analyze plain stress, plain strain, axis Symmetric and plate bending problems.
<b>Course Code: M19 ST 1202</b>	
<b>Course Title: THEORY OF PLATES AND SHELLS</b>	
CO-1	Gain the knowledge of Navier's solution, Levy's solution and solve for the rectangular and square plates.
CO-2	Analyze circular plates with various boundary conditions.
CO-3	Focus on the finite difference method of solving plate problems.
CO-4	Ability to realize the potential energy principle and find the solution of rectangular plates for various loadings.
<b>Course Code: M19 ST 1203</b>	
<b>Course Title: STABILITY OF STRUCTURES</b>	
CO-1	Analyze different types of structural instabilities.
CO-2	Execute and work out the inelastic buckling using various methodologies.
CO-3	Examine the behaviour of beam columns and frames with and without side sway using classical and stiffness method.

CO-4	To be well versed in the lateral buckling, torsional buckling, Flexural torsional buckling of various beams and non- circular sections.
<b>Course Code: M19ST1204</b>	
<b>Course Title: ADVANCED STEEL DESIGN</b>	
CO-1	The learner will be able to design different connections in steel structures.
CO-2	The learner will be able to apply concepts of plastic analysis and design for beams and frames.
CO-3	The learner will be able to Design of purlins for roofs and Design Of Steel Truss Girder Bridges.
<b>Course Code:M19ST1205</b>	
<b>Course Title: ANALYSIS OF OFFSHORE STRUCTURES</b>	
CO-1	Perform concept development of off-shore structure.
CO-2	Find the wave force on vertical cylinder.
CO-3	Perform static and dynamic analysis of fixed offshore structure.
<b>Course Code:M19ST1206</b>	
<b>Course Title: EARTHQUAKE RESISTANT DESIGN OF BUILDINGS</b>	
CO-1	Determine the natural frequency of a single degree of freedom dynamic system for given mass, stiffness and damping properties.
CO-2	Determine the maximum dynamic response of an elastic vibrating structure to a given forcing function.
CO-3	Determine the static design base shear based on the type of structural system, irregularity, location and occupancy.
CO-4	Distribute the static base shear to the structure based on vertical distribution of mass horizontal distribution of mass, and centers of rigidity.
CO-5	Recognize special conditions such as irregular buildings, building separation, P- delta.
<b>Course Code: M19ST1207</b>	
<b>Course Title: STRUCTURAL OPTIMIZATION TECHNIQUES</b>	
CO-1	Derive optimized structure using classical and modern methods of optimization.
CO-2	Gain the knowledge on Formulation of Structural Optimization problems.
CO-3	Gain the knowledge on the concept of classical methods of optimization for multivariable
CO-4	With equality or inequality constraints: solution by method of Lagrange Multiplier - Applications in structural engineering, Kuhn-Tucker conditions.
<b>Course Code: M19 ST1208</b>	
<b>Course Title: EARTH RETAINING STRUCTURES</b>	
CO-1	Solve for earth pressure exerted by soil on retaining walls using earth pressure theories.
CO-2	Analyze the stability of conventional retaining walls.
CO-3	Design reinforced soil wall using the concept of reinforced soil.
CO-4	Analyze the stability of sheet pile walls.
CO-5	Design various components of braced cuts and coffer dams.
<b>Course Code: M19ST1209</b>	
<b>Course Title: COMPUTER AIDED DESIGN LABORATORY</b>	
CO-1	Develop Computer Programs for Analysis and Design of various Structural Elements.
CO-2	Use different Structural Engineering software's to solve various civil Engineering programs.
<b>Course Code: M19 ST 1210</b>	
<b>Course Title: DESIGN OF STRUCTURES LABORATORY</b>	

CO-1	To design the Folded Plates, blast resistant structures and berth structures.
CO-2	To design the Bow string girder bridge and Balanced cantilever bridge.
<b>Course Outcomes for M.TECH -STRUCTURAL ENGINEERING THIRD SEMESTER Course(2019-2020)</b>	
<b>Course Code: M19 ST 2101</b>	
<b>Course Title: DESIGN OF PRE- STRESSED CONCRETE STRUCTURES</b>	
CO-1	Explain the principle, types and systems of pre-stressing and analyze the deflections.
CO-2	Determine the flexural strength and design the flexural members, end blocks.
CO-3	Analyze the statically indeterminate structures and design the continuous beam.
CO-4	Design the tension and compression members and apply it for design of piles.
CO-5	Analyze the stress, deflections, flexural and shear strength and apply it for the design of bridges.
CO-6	Analyze the Composite construction of Pre- stressed and in- situ concrete.
<b>Course Code: M19 ST 2102</b>	
<b>Course Title: RELIABILITY ANALYSIS AND DESIGN</b>	
CO-1	Understand the importance of reliability in Civil engineering.
CO-2	Apply the concepts of computation of structural reliability for solving engineering problems.
CO-3	Gain the knowledge of reliability based structural design.
<b>Course Code: M19 ST 2103</b>	
<b>Course Title: INDUSTRIAL STRUCTURES</b>	
CO-1	Plan the functional requirements of structural systems for various industries.
CO-2	Get an idea about the materials used and design of industrial structural elements.
CO-3	Design power transmission structures.
CO-4	Possess the ability to understand the design concepts of design of gantry girder.

Course Name: <b>MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY</b>	Course code: <b>B19HS3101</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>	
CO-1	Equip oneself with the knowledge of estimating the Demand and demand elasticities for a product.	
CO-2	Have knowledge of Cost and its types and ability to calculate BEP	
CO-3	Understand the nature of different markets	
CO-4	Understand Pricing Practices prevailing in today's business world	
CO-5	Prepare Financial Statements and know how to calculate Profit & Loss for a firm	



CO-6	Know Types of capital and their sources and know how to calculate Depreciation
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Course Name: <b>STRUCTURAL ANALYSIS - II</b>	Course code: <b>B19CE3101</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>	
CO-1	Analyse Indeterminate Truss by Force method and Energy Method	
CO-2	Analyse Indeterminate Rectangular Portal Frame by Force method.	
CO-3	Analyse Indeterminate Rectangular Portal Frame by Displacement method.	
CO-4	Analyse Determinate and Indeterminate Arches.	
CO-5	Analyse Cable system and Determinate and Indeterminate Suspension Bridges.	

Course Name: <b>DESIGN OF REINFORCED CONCRETE STRUCTURES</b>	Course code: <b>B19CE3102</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>	
CO-1	Understand the various design methodologies for the design of RC elements. Analyse and design the flexural members.	
CO-2	Design the reinforced concrete beams subjected to shear only and also combined action of shear and torsion.	
CO-3	Distinguish between the behaviour of one way and two way actions in slab and familiarize to design of two way slabs whose corners restrained and not restrained from lifting up	
CO-4	Design compression members.	
CO-5	Design stair case and footing.	

Course Name: <b>SOIL MECHANICS</b>	Course code: <b>B19CE3103</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>	
CO-1	Fundamental relationships between different parameters of a soil mass.	
CO-2	Different types of soils and identify their properties.	

CO-3	Processes of compaction and consolidation and apply them to field problems.
CO-4	Stress distribution, settlement, and strength of different soils in different conditions.
CO-5	Importance of Soil Mechanics in solving the engineering problems.

Course Name: <b>ESTIMATION, SPECIFICATIONS &amp; CONTRACTS</b>		Course code: <b>B19CE3104</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>		
CO-1	List out various components, estimations and units of measurement for different works		
CO-2	Apply the method of building estimate to find out the quantities of various items of work		
CO-3	Determine the rate per unit of various items of work and their specifications		
CO-4	Interpret the estimation of various roads and related items		
CO-5	Select various methods to find out the valuation of a property & contracts		

Course Name: <b>REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES</b>		Course code: <b>B19CE3105</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>		
CO-1	Describe the reasons for deterioration in the concrete structures		
CO-2	Evaluate the damage of concrete structures using various techniques like destructive and non-destructive tests		
CO-3	Explain various parameters influencing the serviceability and durability of structures		
CO-4	Understand the suitability of certain materials for a specific type of repair		
CO-5	Recognize suitable techniques for repair and retrofitting.		

Course Name: <b>SOIL MECHANICS LAB</b>		Course code: <b>B19CE3109</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>		

CO-1	Identify the physical properties of soil and classify various types of soil
CO-2	Determine the permeability of soil
CO-3	Determine compaction characteristics of soils and Estimate in-situ density of soil
CO-4	Determine the shear strength parameters of soils by various methods
CO-5	Estimate the California Bearing Ratio (CBR)of a soil
CO-6	Determine the relative density of a coarse-grained soil

Course Name: <b>ENVIRONMENTAL ENGINEERING LAB</b>		Course code: <b>B19CE3110</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>		
CO-1	Determine physical properties of water		
CO-2	Determine hardness, acidity and alkalinity of water		
CO-3	Estimate chloride, available chlorine, BOD and COD		
CO-4	Estimate solids present in water sample		

Course Name: <b>EMPLOYABILITY SKILLS I</b>		Course code: <b>B19MC3101</b>	Course Year: <b>Third year</b>
<b>Part-A: Verbal and Soft Skills-I</b>			
Items	Academic Year : <b>2021-22</b>		
CO-1	Detect grammatical errors in the text/sentences and rectify them while answering their competitive/ company specific tests and frame grammatically correct sentences while writing.		
CO-2	Answer questions on synonyms, antonyms and other vocabulary based exercises while attempting CAT, GRE, GATE and other related tests.		
CO-3	Use their logical thinking ability and solve questions related to analogy, syllogisms and other reasoning based exercises.		
CO-4	Choose the appropriate word/s/phrases suitable to the given context in order to make the sentence/paragraph coherent.		
CO-5	Apply soft skills in the work place and build better personal and professional relationships making informed decisions.		

Course Name: <b>EMPLOYABILITY SKILLS I</b>  <b>Part-B: Quantitative Aptitude-I</b>	Course code: <b>B19MC3101</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>	
CO-1	The students will be able to perform well in calculating on number problems and various units of ratio concepts	
CO-2	Accurate solving problems on time and distance and units related solutions	
CO-3	The students will become adept in solving problems related to profit and loss, in specific, quantitative ability	
CO-4	The students will present themselves well in the recruitment process using analytical and logical skills which he or she developed during the course as they are very important for any person to be placed in the industry	
CO-5	The students will learn to apply Logical thinking to the problems of syllogisms and be able to effectively attempt competitive examinations like CAT, GRE, GATE for further studies	

Course Name: <b>DESIGN OF STEEL STRUCTURES</b>	Course code: <b>B19CE3201</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>	
CO-1	Determine the number of bolts, pitch, gauge and strength of the joint by bolted connections.	
CO-2	Determine the size of weld, length of weld, and strength of the joint by welded connections.	
CO-3	Select suitable section as a tension member and determine the number of bolts, strength of the tension member.	
CO-4	Select suitable section as a compression member and determine the strength of the axially loaded compression members as built up compression column with lateral supporting system.	
CO-5	Select suitable rolled steel section as a flexural member and determine the flexural	

	and shear strength and check the safety of the beam.
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Course Name: <b>TRANSPORTATION ENGINEERING - I</b>	Course code: <b>B19CE3202</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>	
CO-1	Plan the alignment of highway network for the given area.	
CO-2	Design the highway geometrical elements.	
CO-3	Design intersections and prepare traffic management plans.	
CO-4	Identify the suitability of pavement materials and design flexible & rigid pavements.	
CO-5	Understand the principles of construction and maintenance of highways.	

Course Name: <b>FOUNDATION ENGINEERING</b>	Course code: <b>B19CE3203</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>	
CO-1	Plan a detailed soil exploration program	
CO-2	Apply various methods for estimating bearing capacity of different types of foundations.	
CO-3	Estimate load capacity of single piles and groups of piles and know the theory aspects of well foundations	
CO-4	Determine the stability of finite and infinite slopes.	
CO-5	Calculate earth pressures on retaining walls using Rankine's and Coulomb's theories	

Course Name: <b>AIR POLLUTION AND CONTROL</b>	Course code: <b>B19CE3204</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>	
CO-1	Explain the classification, sources and effects of air pollution	
CO-2	Explain the different meteorological conditions that influence the dispersion of the pollutants	

CO-3	Illustrate the plume behaviour for different atmospheric stability conditions
CO-4	Adapt various pollution control equipment's or methods to control the discharge of pollutants
CO-5	Measure the pollution levels by sampling and analysis

Course Name: <b>PRE-STRESSED CONCRETE</b>		Course code: <b>B19CE3205</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>		
CO-1	Understand the general mechanical behaviour of pre stressed concrete.		
CO-2	Analyze and design pre stressed concrete flexural members.		
CO-3	Analyze and design for vertical and horizontal shear in pre stressed concrete.		
CO-4	Analyze transfer and development length as well as pre stress losses.		
CO-5	Analyze and design for deflection and crack control of pre stressed concrete members.		

Course Name: <b>GROUND IMPROVEMENT TECHNIQUES</b>		Course code: <b>B19CE3206</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>		
CO-1	Apply in-situ densification methods for improving cohesive and cohesion less Soil deposits		
CO-2	Apply grouting technique For improving soils		
CO-3	Understand the purpose of geo textile and geo grid		
CO-4	Apply the concepts of reinforced soil to various structures		
CO-5	Understand various soil stabilization techniques		

Course Name: <b>HIGHWAY MATERIALS TESTING LAB</b>		Course code: <b>B19CE3209</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>		
CO-1	Characterize the highway aggregates.		
CO-2	Evaluate the quality of Bitumen		

Course Name: <b>SOCIALLY RELEVANT PROJECT</b>	Course code: <b>B19CE3210</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>	
CO-1	Use scientific reasoning to gather, evaluate, and interpret ideas	
CO-2	Analyze and design solutions to solve the ideas	
CO-3	Use one or more creative tools to complete the projects	

Course Name <b>EMPLOYABILITY SKILLS II Part-A: Verbal and Soft Skills-II</b>	Course code: <b>B19MC3201</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>	
CO-1	Construct coherent, cohesive and unambiguous verbal expressions in both oral and written discourses.	
CO-2	Analyze the given data/text and find out the correct responses to the questions asked based on the reading exercises; identify relationships or patterns within groups of words or sentences	
CO-3	Write paragraphs on a particular topic, essays (issues and arguments), e mails, summaries of group discussions, reports, make notes, statement of purpose(for admission into foreign universities), letters of recommendation(for professional and educational purposes).	
CO-4	Converse with ease during interactive sessions/seminars in their classrooms, compete in literary activities like elocution, debates etc., raise doubts in class, participate in JAM sessions/versant tests with confidence and convey oral information in a professional manner.	
CO-5	Participate in group discussions/group activities, exhibit team spirit, use language effectively according to the situation, respond to their interviewer/employer with a positive mind, tailor make answers to the questions asked during their technical/personal interviews, exhibit skills required for the different kinds of interviews (stress, technical, HR) that they would face during the course of their recruitment process.	

Course Name <b>EMPLOYABILITY SKILLS II Part-B: Quantitative Aptitude-II</b>	Course code: <b>B19MC3201</b>	Course Year: <b>Third year</b>
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Items	Academic Year : <b>2021-22</b>
CO-1	The students will be able to perform well in calculating different types of data interpretation problems.
CO-2	The students will perform efficaciously on analytical and logical problems using various methods.
CO-3	Students will find the angle measurements of clock problems with the knowledge of calendars and clock.
CO-4	The students will skillfully solve the puzzle problems like arrangement of different positions.
CO-5	The students will become good at solving the problems of lines, triangulars, volume of cone, cylinder and so on.

Course Name: <b>BASIC CODING</b>	Course code: <b>B19MC3202</b>	Course Year: <b>Third year</b>
Items	Academic Year : <b>2021-22</b>	
CO-1	Know about Control Structures, Loop Structures and branching in programming	
CO-2	Know about various searching and sorting methods.	
CO-3	Know about Functions, Recursions and Storage Classes	
CO-4	Know about Structures and Unions.	
CO-5	Know different Operating System concepts. 6.	
CO-6	Differentiate OSI Model Vs. TCP/IP suite.	

Course Name: <b>WATER RESOURCES ENGINEERING - I</b>	Course code: <b>B19CE4101</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2022-23</b>	
CO-1	Choose major hydrologic components & apply key concepts to several practical areas of engineering hydrology & related design aspects.	
CO-2	Determine aquifer parameters & yield of wells.	
CO-3	Determine storage capacity & life of reservoirs.	



CO-4	Assess the irrigation needs of crops.
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Course Name: <b>TRANSPORTATION ENGINEERING-II</b>	Course code: <b>B19CE4102</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2022-23</b>	
CO-1	Illustrate the different types of Components of Railway Engineering.	
CO-2	Plan the Geometric Design for a Railway Track.	
CO-3	Characterize the concepts of railway Interlocking and signal systems.	
CO-4	Identify the technical issues related to planning and design of airports.	
CO-5	Distinguish the technical components of harbours.	

Course Name: <b>ADVANCED STRUCTURAL ANALYSIS</b>	Course code: <b>B19CE4103</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2022-23</b>	
CO-1	Determine the fixed end moments of fixed beams with different moment of inertia and member end moments of symmetrical and un symmetrical portal frame by column-analogy method.	
CO-2	Determine the member end moments of single bay single storey portal frames by flexibility and stiffness matrix methods	
CO-3	Determine the moments of multi-storey frames subjected to vertical loads by substitute frame method.	
CO-4	Determine the moments of multi-storey frames subjected to lateral loads by portal, cantilever and girder factor method.	
CO-5	Determine the shear Deflections of statically determinate beams by Force Method and displacement method.	

Course Name: <b>SOLID WASTE MANAGEMENT</b>	Course code: <b>B19CE4104</b>	Course Year: <b>Final year</b>
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Items	Academic Year : <b>2022-23</b>
CO-1	Categorise and communicate the types of solid wastes, along with their sources
CO-2	Elaborate the strategies for the 6 R's of solid waste management
CO-3	Explain transport and segregation of solid wastes
CO-4	Suggest methods for material and energy recovery based on quality and quantity of solid wastes.
CO-5	Outline disposal methods of solid wastes.

Course Name: <b>SURFACE HYDROLOGY</b>	Course Code: <b>B19CE4105</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2022-23</b>	
CO-1	Obtain the complete knowledge on hydrologic cycle, hydrometeorology and formation of precipitation.	
CO-2	Apply the various methods of field measurements and empirical formulae for estimating the various losses of precipitation and runoff.	
CO-3	Know the various methods of runoff estimation.	
CO-4	Analyse stream flow measurement by using various techniques.	

Course Name: <b>TRAFFIC MANAGEMENT</b>	Course code: <b>B19CE4106</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2022-23</b>	
CO-1	Develop the schemes and policies for efficient traffic management.	
CO-2	Design traffic control measures for all type of roads.	
CO-3	Evaluate traffic control system alternatives for urban/rural roadways.	
CO-4	Design traffic safety measures and traffic control devices for all type of roads.	
CO-5	Develop and apply design intersection models at local and regional level road network	

Course Name: <b>ADVANCED STEEL STRUCTURES</b>		Course code: <b>B19CE4107</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2022-23</b>		
CO-1	Determine the size and thickness of the slab base, gusset base and eccentric connections. Design of beam-column connections subjected to eccentric shear connections.		
CO-2	Design components of a plate girder with and without stiffeners by using IS: 800-2007 code		
CO-3	Design of circular water tank in working stress method.		
CO-4	Design of deck type Plate girder bridges		
CO-5	Design of end bearings		

Course Name: <b>EXPANSIVE SOILS</b>		Course code: <b>B19CE4108</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2022-23</b>		
CO-1	Understand the occurrence and effect of expansive soils.		
CO-2	Understand the clay mineralogy of soil.		
CO-3	Apply the knowledge of soil mechanics for predicting the heave of the soil.		
CO-4	Design the foundation of structures for various field conditions.		

Course Name: <b>REMOTE SENSING AND GIS APPLICATIONS</b>		Course code: <b>B19CE4110</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2022-23</b>		
CO-1	Relate the scientific theories to the interaction of electromagnetic spectrum with terrestrial matter.		
CO-2	Identify different types of satellites, sensor platforms and choose appropriate remote sensing data products for mapping, monitoring, and management applications.		
CO-3	Interpret processed satellite images and outputs for extracting relevant information		

CO-4	Structure the concept of a spatial decision support system in its analog and digital forms.
CO-5	Explain the applications of Geoinformatics in various fields of human endeavour

Course Name: <b>CONSTRUCTION TECHNOLOGY &amp; MANAGEMENT</b>		Course code: <b>B19CE4110</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2022-23</b>		
CO-1	Understand the concept of construction management by applying the concepts of planning, scheduling and controlling		
CO-2	Determine various time estimates of a project network		
CO-3	Estimate the optimum cost –time relationship and update the project network		
CO-4	Estimate the truck production and understand the functioning of various earth moving equipment		
CO-5	Apply the safety norms and acts in construction industry		

Course Name: <b>DESIGN OF ADVANCED REINFORCED CONCRETE STRUCTURES</b>		Course code: <b>B19CE4111</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2022-23</b>		
CO-1	Distinguish between the behavior of cantilever and counter fort retaining walls and design the cantilever and counter fort retaining walls.		
CO-2	Design the reinforced concrete circular and rectangular water tanks.		
CO-3	Design the reinforced concrete T-beam bridge.		
CO-4	Design the piles and pile cap.		
CO-5	Design the flat slabs.		

Course Name: <b>DISASTER MANAGEMENT AND PREPAREDNESS</b>		Course code: <b>B19CE4112</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2022-23</b>		

CO-1	Differentiate between the types of disasters, their causes and impact on environment and society.
CO-2	Analyse relationship between development and disasters
CO-3	Express the relation between development and disasters
CO-4	Summarise the role of education and community engagement in disaster mitigation
CO-5	Paraphrase the role of engineering and technology in disaster management.

Course Name: <b>SOIL DYNAMICS AND MACHINE FOUNDATIONS</b>		Course code: <b>B19CE4113</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2022-23</b>		
CO-1	Develop skill in applying theory of vibrations to basic facets of soil behaviour underdynamic loading together with the exposure of the fundamental principles of wave propagation in engineering examples.		
CO-2	Classify theories of vibrations		
CO-3	Calculate modulus of elasticity and Poisons ratio from field and laboratory tests		
CO-4	Classify types of machine foundations		
CO-5	Design impact type of foundations using IS code provisions		

Course Name: <b>INTELLIGENT TRANSPORT SYSTEM</b>		Course code: <b>B19CE4114</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2022-23</b>		
CO-1	Identify the benefits of ITS from various types		
CO-2	Determine various sensor applications and ITS data collection techniques		
CO-3	Identify ITS user services and functional areas		
CO-4	Determine various ITS models, evaluation methods and ITS planning.		
CO-5	Determine the suitable ITS technology and assess its effectiveness to solve transportation Problems.		

Course Name: <b>PROJECT WORK - I</b>	Course code: <b>B19CE4115</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2022-23</b>	
CO-1	Research and analyze the published literature on the relevant topic.	
CO-2	Study existing methodologies relevant to their chosen problem.	
CO-3	Determine the objective based on gaps in the literature.	
CO-4	Develop the abstract of the chosen problem.	
CO-5	Develop methodology for conducting the Experimentation/modeling.	

Course Name: <b>WATER RESOURCES ENGINEERING-II</b>	Course code: <b>B19CE4201</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2022-23</b>	
CO-1	Design Irrigation canals	
CO-2	Understand the various storage works and Diversion works	
CO-3	Classify river training works.	
CO-4	Use the principal components of hydroelectric scheme	

Course Name: <b>IRRIGATION STRUCTURES DESIGN AND DRAWING</b>	Course code: <b>B19CE4202</b>	Course Year: <b>Final year</b>
Items	Academic Year : <b>2021-22</b>	
CO-1	Understand the paper - space environment thoroughly	
CO-2	Develop the components using 2D & 3D wire frame models through various editing commands.	
CO-3	Explain assemble of various components of compound solids.	
CO-4	Design irrigation canal structures.	

Course Name: <b>PROJECT WORK - II</b>	Course code: <b>B19CE4203</b>	Course Year: <b>Final year</b>
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Items	Academic Year : <b>2022-23</b>
CO-1	Work in team to Execute the Experimental work/ Computer modelling following the methodology.
CO-2	Obtain results from the Experimental program.
CO-3	Analysis and discuss the results to draw conclusions.
CO-4	prepare documentation and communicate technical concepts.