



Annamacharya Institute of Technology and Sciences, Tirupati
Department of Civil Engineering Course Outcomes(COs)
AK-19 Regulations



Course Title	Course Outcomes(COs)	
Algebra and Calculus	CO1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications.
	CO2	Utilize mean value theorems to real life problems.
	CO3	Familiarize with functions of several variables which is useful in optimization.
	CO4	Students will also learn important tools of calculus in higher dimensions.
	CO5	Students will become familiar with 2-dimensional coordinate systems
Engineering Physics	CO1	Explain physics applied to solve engineering problems
	CO2	Apply the principles of acoustics in designing of buildings
	CO3	Explains the applications of ultrasonics in various engineering fields
	CO4	Apply electromagnetic wave propagation in different Optical Fibers and the concepts of lasers in various applications
	CO5	Explains the concepts of dielectric and magnetic materials and Identify the sensors for various engineering applications
Problem solving and Programming	CO1	Create interactive visual programs using Scratch.
	CO2	Develop flowcharts using raptor to solve the given problems.
	CO3	Develop Python programs for numerical and text based problems
	CO4	Develop graphics and event based programming using Python
	CO5	Develop Python programs using beautiful Pythonic idiomatic practices
Communicative English -1	CO1	Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
	CO2	Formulate sentences using proper grammatical structures and correct word forms
	CO3	Speak clearly on a specific topic using suitable discourse markers in informal discussions
	CO4	Write summaries based on global comprehension of reading/listening

		texts
	CO5	Produce a coherent paragraph interpreting a figure/graph/chart/table
Engineering Physics Lab	CO1	. Operate various optical instruments and Estimate wavelength of laser and particles size using laser
	CO2	Estimate the susceptibility and related magnetic parameters of magnetic materials and plot the intensity of the magnetic field of circular coil carrying current with distance
	CO3	Evaluate the acceptance angle of an optical fiber and numerical aperture and determine magnetic susceptibility of the material and its losses by B-H curve
	CO4	Identify the type of semiconductor i.e., n-type or p-type using Hall effect
	CO5	Apply the concepts of sensors for various applications
Problem Solving and Programming Lab	CO1	Create interactive visual programs using Scratch.
	CO2	Develop flowcharts using raptor to solve the given problems.
	CO3	Develop Python programs for numerical and text based problems
	CO4	Develop graphics and event based programming using Python
	CO5	Develop Python programs using beautiful Pythonic idiomatic practices
Communicative English -1 Lab	CO1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
	CO2	Apply communication skills through various language learning activities
	CO3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
	CO4	Evaluate and exhibit acceptable etiquette essential in social and professional settings.
	CO5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English
Basic Engineering Workshop	CO1	Apply wood working skills in real world applications.
	CO2	Build different parts with metal sheets in real world applications.
	CO3	Apply fitting operations in various applications.

	CO4	Apply different types of basic electric circuit connections.
	CO5	Demonstrate soldering and brazing.
Differential Equations and Vector Calculus	CO1	Apply the mathematical concepts of ordinary differential equations of higher order.
	CO2	Solve the differential equations related to various engineering fields .
	CO3	Identify solution methods for partial differential equations that model physical processes .
	CO4	Interpret the physical meaning of different operators such as gradient, curl and divergence .
	CO4	Estimate the work done against a field, circulation and flux using vector calculus .
Engineering chemistry	CO1	Differentiate between hard water and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially
	CO2	Understand the electrochemical sources of energy
	CO3	Demonstrate the corrosion prevention methods and factors affecting corrosion
	CO4	explain the preparation, properties, and applications of thermoplastics & thermosettings, elastomers & conducting polymers.
	CO5	Explain calorific values, octane number, refining of petroleum and cracking of oils
	CO6	Explain the manufacturing of portland cement and concrete formation
	CO7	Summarize the application of SEM, TEM and X-ray diffraction in surface characterization
	CO8	Explain the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures
Basics of Electrical & Electronics Engineering-I	CO1	Apply concepts of KVL/KCL in solving DC circuits
	CO2	Illustrate working principles of induction motor - DC Motor
	CO3	Identify type of electrical machine based on their operation
	CO4	Describe operation and characteristics of diodes and transistors.
	CO5	Make use of diodes and transistors in simple, typical circuit applications.
	CO6	Understand operation of basic op-amp circuits.
	CO1	Understand the importance of AI and concepts of Machine Learning algorithms and their limitations.
	CO2	Develop Chatbots based on the requirements.

Data Structures	CO3	Analyse complex problems involving image processing, such as quality control, visual surveillance, multimodal human-machine interfaces, and image compression.
	CO4	Understand the application of Reinforcement Learning
	CO5	Understand smart solutions for various domains
Engineering Graphics and Design	CO1	Select Appropriate Data Structure for solving a real world problem (L4)
	CO2	Select appropriate file organization technique depending on the processing to be done (L4)
	CO3	Construct Indexes for Databases (L6)
	CO4	Analyse the Algorithms (L4)
	CO5	Develop Algorithm for Sorting large files of data (L3)
ENGINEERING CHEMISTRY LAB	CO1	Determine the cell constant and conductance of solutions
	CO2	Prepare advanced polymer materials
	CO3	Determine the physical properties like surface tension, adsorption and viscosity
	CO4	Estimate the Iron and Calcium in cement
	CO5	Calculate the hardness of water
Basics of Electrical & Electronics Engineering Lab – I	CO1	Verify Kirchoff's Laws & Superposition theorem for dc supply
	CO2	Analyze the performance of AC and DC Machines by testing.
	CO3	Study I – V Characteristics of PV Cell & Perform speed control of dc shunt motor
	CO4	Ability to operate diodes for finding V-I Characteristics.
	CO5	Ability to construct and operate rectifiers without & with filters
	CO6	Ability to construct and operate BJT & FET Characteristics.
Data Structures Lab	CO1	Understand the importance of AI and concepts of Machine Learning algorithms and their limitations.
	CO2	Develop Chatbots based on the requirements.
	CO3	Analyse complex problems involving image processing, such as quality control, visual surveillance, multimodal human-machine interfaces, and image compression.

Civil Engineering Workshop	CO1	Able to determine Setting out of a building
	CO2	Understand the concept of Construct a wall of height 50 cm
	CO3	Determine the Computation of Centre of gravity and Moment of inertia
	CO4	Determine the Plastering and Finishing of wall
	CO5	Examine the Casting and testing of Fly ash Blocks
Probability & Statistics, PDE, Complex Variables	CO1	Apply discrete and continuous probability distributions
	CO2	Design the components of a classical hypothesis test
	CO3	Infer the statistical inferential methods based on small and large sampling tests
	CO4	Find the general solution of the PDEs bearing applications
	CO5	Differentiation and integration of complex functions used in engineering problems To equip the students to solve application problems in their disciplines.
	Communicative English II	CO1
CO2		Paraphrase short academic texts using suitable strategies and conventions
CO3		Make formal structured presentations on academic topics using PPT slides with relevant graphical elements
CO4		Participate in group discussions using appropriate conventions and language strategies
CO5		Prepare a CV with a cover letter to seek internship/ job
CO6		Collaborate with a partner to make presentations and Project Reports
Mechanics of Materials	CO1	Understand the system of forces on bodies.
	CO2	Determine the centroid and moment of inertia for different cross-sections.
	CO3	Understand the concepts of stress, strain, generalized Hooke's law, elastic moduli
	CO4	Develop shear force and bending moment diagrams for different load cases.
	CO5	Compute the slope and deflection of simple beams
	CO1	Understand basic principles of surveying, Prismatic compass

Surveying	CO2	Understand basic concepts of leveling and contouring and Theodolite survey
	CO3	Understand Computation of Areas and Volumes
	CO4	Understand and able to set the curves on field.
	CO5	Understand modern techniques in the survey systems.
Fluid Mechanics	CO1	Understand basic characteristics and behavior of fluids
	CO2	Understand concepts of fluid statics, different equipment and their applications stability of floating bodies
	CO3	Understand fundamentals of fluid kinematics and Differentiate types of fluid flows
	CO4	Understand and apply experiments with different equipments under fluid flow
	CO5	Estimate Energy losses in pipelines and Determine flow characteristics Through closed conduits.
Building Materials & Construction	CO1	To understand the basics conventional construction materials, properties and their uses
	CO2	To know the modern building materials, properties and their uses
	CO3	To understand the different metals and metal alloys used in construction
	CO4	To understand the construction techniques such as masonry, plastering and formwork
	CO5	To know the various building components and building finishes used in construction
Biology for Engineers	CO1	Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
	CO2	Explain about biomolecules, their structure, function and their role in the living organisms. How biomolecules are useful in Industry.
	CO3	Brief about human physiology.
	CO4	Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
	CO5	Know about application of biological principles in different technologies for the production of medicines and pharmaceutical molecules through transgenic microbes, plants and animals.

Communicative English II Lab	CO1	Prioritize information from reading texts after selecting relevant and useful points.
	CO2	Make formal structured presentations on academic topics using PPT slides with relevant graphical elements.
	CO3	Participate in Group discussions using appropriate conventions and language strategies.
	CO4	Paraphrase short academic text using suitable strategies and conventions.
	CO5	Collaborate with a partner to make presentations and Project
Strength of Materials Lab	CO1	Determine the properties of material
	CO2	Determine the compressive strength of wood or concrete
	CO3	Examine the Polygon law of Co-planar forces and principle of moments
	CO4	Solve the Reactions at the supports.
	CO5	Determine the bending and deflection of beam
Surveying Lab	CO1	Understand basic principles of plane table surveying and fly leveling.
	CO2	Understand basic concepts of theodolite survey and trigonometric leveling
	CO3	Understand basic concepts of total station
	CO4	Understand the components of simple curve and able to set the curve on field.
	CO5	Understand modern techniques in the survey systems.
Transform Techniques and Numerical Methods	CO1	Apply the Laplace transform for solving differential equations (continuous systems)
	CO2	Find the Fourier series of periodic signals
	CO3	Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms
	CO4	Solve linear/nonlinear algebraic and transcendental equations using numerical methods
	CO5	Solve ordinary differential equations by Euler's method, modified Euler's method, Runge Kutta method, Predictor Corrector method and Milne's method
	CO1	To learn the fundamentals of Python
	CO2	To elucidate problem-solving using a Python programming language

Basics of Python Programming	CO3	To introduce a function-oriented programming paradigm through python
	CO4	To get training in the development of solutions using modular concepts
	CO5	To introduce the programming constructs of python
Strength of Materials	CO1	Identify critical planes in two dimensional stress systems
	CO2	Compute slopes and deflections of beams with different boundary conditions
	CO3	Determine shear stresses for different shapes.
	CO4	Analyze members under torsion, combined torsion and bending moment for determination of energy absorption
	CO5	Determine the Load carrying capacity of column by using different approaches
Hydraulic Engineering	CO1	Understand Laminar Flow and Turbulent flow through plates
	CO2	Understand different formulae on open channel flow and design open-channel flow systems.
	CO3	Understand the concepts of varying flow in pipes and Measure discharge and velocity
	CO4	Understand hydrodynamic force of jets different vanes and design Pelton wheel, Francis and Kaplan turbine
	CO5	Understand principles of centrifugal pumps and Calculate losses and efficiencies of centrifugal pumps
Structural Analysis-I	CO1	Apply energy theorems for analysis of indeterminate structures
	CO2	Analyze indeterminate structures with yielding of supports
	CO3	Analyze beams using slope deflection distribution method
	CO4	Analyze beams using moment distribution methods
	CO5	Analyze the Determinate and Indeterminate trusses
	CO1	Understand various ingredients of concrete and their role.
	CO2	Examine knowledge on the fresh and hardened properties of concrete.
	CO3	Design concrete mixes using various methods.
	CO4	Understand the durability problems and remedial measure in the concrete.

Concrete Technology	CO5	Perform mix design and engineering properties of normal concrete.
Environmental Studies	CO1	Students get sufficient information that clarifies modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.
	CO2	Students realize the need to change their approach, so as to perceive our own environmental issues correctly, using practical approach based on observation and self learning.
	CO3	Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.
	CO4	. Interpretation of different types of environmental pollution problems and designing of new solid waste management techniques usage
	CO5	To get knowledge on various environmental acts and to engage all the students life - long learning of rain water harvesting
Basics of Python Programming Lab	CO1	Design solutions to mathematical problems.
	CO2	Organize the data for solving the problem.
	CO3	Develop Python programs for numerical and text based problems.
	CO4	Select appropriate programming construct for solving the problem.
	CO5	Illustrate object oriented concepts.
Fluid Mechanics and Hydraulic Machinery Lab	CO1	Calibrate flow measuring devices such as Venturimeter, orifice meter and notch
	CO2	Verify Bernoulli's theorem
	CO3	Analyze a variety of practical fluid-flow devices and utilize fluid mechanics principles in design
	CO4	Conduct experiments (in teams) in pipe flows and open-channel flows and interpreting data from model studies to prototype cases, as well as documenting them in engineering reports
	CO5	To provide the students knowledge in calculating performance analysis in turbines and pumps and can be used in power plants
Concrete Technology Lab	CO1	Determine the properties of cement as per IS specifications.
	CO2	Determine the properties of aggregates as per IS specifications.
	CO3	Determine the properties of fresh concrete as per IS specifications.
	CO4	Determine the properties of hardened concrete as per IS specifications.
	CO5	Determine the strength of concrete using Rebound hammer method.

Soil Mechanics	CO1	Understand soil formation and determine the index properties of soil
	CO2	Determine the coefficient of permeability and effective stress
	CO3	Estimate stresses under various loading conditions and compaction characteristics.
	CO4	Analyze the compressibility of the soils
	CO5	Understand the strength of soils under various drainage conditions
Design of Reinforced Concrete Structures	CO1	Understand the basic concepts of reinforced concrete analysis and design.
	CO2	Understand the behaviour of beams.
	CO3	Analyze and design of slabs and staircase
	CO4	Analyze and design of columns
	CO5	Analyze and design of footings
Engineering Geology	CO1	Understand principles of engineering geology.
	CO2	Understand properties of various rocks and minerals
	CO3	Understand the suitability of sites for various civil engineering structures.
	CO4	Understand geological strata in the analysis and design the civil engineering structures.
	CO5	Understand the suitability of water and soil conservation projects.
Structural Analysis - II	CO1	Analyse the behaviour of arches through different methods of analysis
	CO2	Analyze the frames using slope deflection and moment distribution method
	CO3	Analyze the beams and frames using Kani's method
	CO4	Analyze the beams using Matrix method
	CO5	Analyze the beams using plastic analysis
	CO1	Understand the Principles of Building Planning
	CO2	Understand the Building Bye-Laws and Regulations
	CO3	Understand the Planning of Residential Buildings Public Buildings

Building Planning and bye-laws	CO4	Understand the Buildings Safety And Comfort
	CO5	Understand the sign conventions and bonds doors and windows
Water Harvesting and Conservation	CO1	Appreciate the importance of movement of ground water
	CO2	Understand the methods of Water Harvesting
	CO3	Understand water recovery and reuse
	CO4	Understand the principles of Watershed Management and its importance in sustainability
	CO5	Understand soil and water conservation
Cost Effective Housing Techniques	CO1	Apply the concept of housing techniques.
	CO2	Understand housing programmes and projects.
	CO3	Understand development and adoption of low cost housing technology
	CO4	Understand low cost housing in rural areas
	CO5	Understand housing in disaster prone areas
Green Buildings	CO1	Understand the concepts of green buildings
	CO2	Understand the overview of materials used for green buildings.
	CO3	Understand the concept of energy and resource conservation
	CO4	Understand the interaction between building physics and climatic elements and their impact on occupant comfort and environment
	CO5	Understand the concept of rating system for various types of buildings
	CO1	Understands the concept of photogrammetric surveying.
	CO2	Understand applications of LIDAR.
	CO3	Understand functions of Remote Sensing & GIS.
	CO4	Understand field astronomy.

Photogrammetric surveying	CO5	Understand various surveying instrument and their functions
Sensor Networks	CO1	Understand the concepts of Converters and Sensor data acquisition systems
	CO2	Understand the concepts of Sensor Measurements in Structural Monitoring
	CO3	Understand the concepts of commonly used sensing technologies and algorithms
	CO4	Understand the concepts of Piezoelectric transducers for assessing and monitoring infrastructures
	CO5	Understand the concepts of Fiber optic sensors for assessing and monitoring infrastructures
ARTIFICIAL INTELLIGENCE	CO1	Apply searching techniques for solving a problem
	CO2	Design Intelligent Agents
	CO3	Develop Natural Language Interface for Machines
	CO4	Design mini robots
	CO5	Summarize past, present and future of Artificial Intelligence
Operations Research	CO1	Able to create mathematical models of the real-life situations and capable of obtaining best solution using Graphical Method and Simplex Method
	CO2	To implement the theory of duality for simplifying the solution procedure for certain LPPs, and solve the special cases of LPP and Assignment problems
	CO3	Knowledge of choosing the best strategy out of the available strategies which is an essential skill for any business manager to successfully face the competition
	CO4	Able to represent any project in the form of a network and estimate the parameters like Project Completion Time
	CO5	Applying Dynamic Programming technique to solve the complex problems by breaking them into a series of sub-problems
Professional Ethics & Human Values	CO1	It ensures students sustained happiness through identifying the essentials of human values and skills.
	CO2	The students will understand the importance of Values and Ethics in their personal lives and professional careers.
	CO3	The students will learn the rights and responsibilities as an employee, team member and a global citizen.
	CO4	Students understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature.
	CO5	Students can able to develop appropriate technologies and management patterns to create harmony in professional and personal life.
	CO1	Classify the soil based on IS Code.
	CO2	Determine the index properties of soil.
	CO3	Determine the engineering properties of soil

Soil Mechanics Lab		
Computer- aided Civil Engineering Drawing Lab	CO1	Understand the concepts and basics of CAD
	CO2	Understand the building plan elevation and section drawings
	CO3	Understand the building components drawings
Engineering Geology Lab	CO1	Study of physical properties and identification of minerals referred under theory.
	CO2	Megascopic description and identification of rocks referred under theory.
	CO3	Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
	CO4	Simple Structural Geology problems.
Foundation Engineering	CO1	Understand the principles and methods of Soil Exploration
	CO2	Decide the suitability of soils and check the stability of slopes
	CO3	Calculate lateral earth pressures and check the stability of retaining walls
	CO4	Determine the bearing capacity of soil

	CO5	Analyze and design the shallow and deep foundations
Transportation Engineering	CO1	Understand the highway development and planning.
	CO2	Understand the geometric design of highway.
	CO3	Understand traffic studies and regulations.
	CO4	Understanding the concept of intersections, interchanges.
	CO5	Understanding the various pavement types and design.
Remote Sensing and GIS	CO1	Understand principles of aerial photography
	CO2	Understand the concept of remote sensing
	CO3	Understand the concept of GIS
	CO4	Analyze the GIS spatial data
	CO5	Apply the concepts of GIS in water resources
Subsurface Investigation and Instrumentation	CO1	Understand the exploration and geophysical methods
	CO2	Understand the exploration techniques
	CO3	Understand the sampling of soil
	CO4	Understand field testing of soil
	CO5	Understand the usage of instrumentation in subsurface investigation
Prestressed Concrete	CO1	Understand the methods of prestressing.
	CO2	Understand the prestress losses
	CO3	Analyze and design of sections to withstand flexure and shear.
	CO4	Analyze and design of composite sections.
	CO5	Understand the concepts of deflections
Advanced Structural Analysis	CO1	Understand indeterminate structures
	CO2	Analyze the structures using stiffness matrix method
	CO3	Analyze the trusses and frames using flexibility matrix method
	CO4	Analyze the trusses and frames using stiffness matrix method
	CO5	Understand the shear wall analysis
RAILWAYS, AIRPORT, DOCKS AND HARBOUR ENGINEERING	CO1	Know various components and their functions in a railway track
	CO2	Acquire design principles of geometrics in a railway track.
	CO3	Know basic concepts of airport engineering and its layouts
	CO4	Acquire design principles of airport geometrics design
	CO5	Know the planning, construction and maintenance of Docks and Harbours.
	CO1	Solve simple boundary value problems using Numerical technique of Finite element method.
	CO2	Demonstrate the differential equilibrium equations and their relationship.
	CO3	Develop finite element formulation of one and two dimensional problems and solve them.

Finite Element Methods	CO4	Demonstrate the displacement models and load vectors
	CO5	Analyze plane stress and plane strain problems
Managerial Economics and Financial Analysis	CO1	Understand the fundamentals of Economics and Managerial economics viz., Demand, Production, cost, revenue and markets.
	CO2	Apply the Concept of Production cost and revenues for effective Business decision
	CO3	Analyze how to invest their capital and maximize returns.
	CO4	Evaluate the capital budgeting techniques.
	CO5	Define the concepts related to financial accounting and management and able to develop the accounting statements and evaluate the financial performance of business entity.
Management Science	CO1	Understand the concepts & principles of management and designs of organization in a practical world.
	CO2	Apply the knowledge of Work-study principles & Quality Control techniques in industry.
	CO3	Analyze the concepts of HRM in Recruitment, Selection and Training & Development.
	CO4	Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.
	CO5	Create Modern technology in management science
ENTREPRENEURSHIP DEVELOPMENT	CO1	Understand the concept of Entrepreneurship and challenges in the world of Competition.
	CO2	Apply the Knowledge in generating ideas for New Ventures and design business plan structure.
	CO3	Analyze various sources of finance and subsidies to entrepreneurs.
	CO4	Evaluate the role of central government and state government in promoting women
	CO5	Entrepreneurship. Study the role of incubations in fostering startups.
English For Research Paper Writing	CO1	Improve writing skills and level of readability.
	CO2	Learn what to write in each section, avoiding plagiarism.
	CO3	Understand the review of research literature
	CO4	Apply skills in writing a Title, abstract and literature
	CO5	Learn the skills of drafting Summations

Environmental Waste Management	CO1	To examine the various types of solid waste and methods to categorize it
	CO2	To find out methods to reduce solid waste at the source
	CO3	To carry out analysis and audit of waste
	CO4	To understand people's responsibility in reducing and managing waste
	CO5	To examine the various types of solid waste and methods to categorize it
Principles of Effective Public Speaking	CO1	Gain and demonstrate the basic skills of effective oral communication, for use throughout your academic career and beyond.
	CO2	Learn and develop the skills necessary to maximize public speaking effectiveness, including effective research and organization of information, how to make the most of presentation aids (and not become reliant on them!), and understanding the speaker- audience relationship.
	CO3	Develop critical thinking and listening skills, enabling you to maximize your own understanding as an audience member, and offer considered and constructive critiques of others' speeches.
	CO4	Become more confident in public speaking arenas, whether as a formal speech giver or as a participant in group settings. Improvement will be valued over perfection
CONSTITUTION OF INDIA	CO1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
	CO2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
	CO3	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.
	CO4	Discuss the Powers and functions of Governor, President, Judiciary.
	CO5	Discuss the functions of local administration bodies.
Remote Sensing and GIS Lab	CO1	To understand spatial technologies, mapping the field problems and solution convergence through GIS.
Transportation Engineering lab		Asses properties of highway construction materials
ESTIMATION, COSTING AND VALUATION	CO1	Apply different types of estimates for different building elements
	CO2	Carry out analysis of rates and bill preparation different building elements
	CO3	Carry out estimation of earthwork and reinforcement
	CO4	Understand the contracts and tenders
	CO5	Carry out rate analysis and valuation of building items

DESIGN & DRAWING OF STEEL STRUCTURES	CO1	Understand the basic concepts of Steel structures and design of Tension members
	CO2	Analyze and Design of compression members
	CO3	Analyze and design of beams
	CO4	Analyze and design of Plate girder
	CO5	Analyze and design of Gantry Girder and simple roof truss
ENVIRONMENTAL ENGINEERING	CO1	Identify the water demand and water characteristics.
	CO2	Apply the water treatment concept, methods, water distribution processes and operation.
	CO3	Carry out municipal water and wastewater treatment system operations and determine the sewage characteristics
	CO4	Prepare basic processes of designs of wastewater treatment plants.
	CO5	Design various sewage treatment plants and usage of solid wastes.
HYDROLOGY & WATER RESOURCES ENGINEERING	CO1	Understand the concept of hydrology and components of hydrologic cycle such as precipitation, infiltration, evaporation and transpiration
	CO2	2. Quantify runoff and use concept of unit hydrograph
	CO3	3. Demonstrate different methods of irrigation, methods of application of water and irrigation procedure
	CO4	4. The fundamental idea behind this course is to make student aware of canal regulation works and cross drainage works
	CO5	5. The course also targeted to teach students the concepts of major irrigation structures such as gravity dams, earthen dams and its prerequisites namely reservoir planning
GROUND IMPROVEMENT TECHNIQUES	CO1	Understand the grouting techniques and their applications
	CO2	Understand the densification methods used in granular soils and Cohesive soils
	CO3	Understand the ground Improvement methods used to stabilize soil
	CO4	Understand the reinforcement design principles and geosynthetic materials, functions and applications
	CO5	Identify the problems in Expansive soils
Water shed and River Basin Management	CO1	Know the basic principles of watershed management.
	CO2	Know the river basin management practices.

	CO3	Understand better different approaches for conservation of water.
	CO4	Identify sustainable watershed approach for resources management, prevention of soil erosion etc.,
	CO5	Different methods of rainwater harvesting management systems and role of GIS.
ENGINEERING MATERIALS FOR SUSTAINABILITY	CO1	Understand the concept of sustainability and its importance in construction.
	CO2	Understand the properties of sustainable construction materials.
	CO3	Understand the properties and applications of miscellaneous engineering materials.
	CO4	Understand the properties and applications of recycled materials.
	CO5	Development of new materials for sustainable development.
AIR POLLUTION AND QUALITY CONTROL	CO1	Describe the main chemical components and reactions in the atmosphere and examine the factors responsible for perturbing these
	CO2	Implement the methods for monitoring and modelling spatial and temporal patterns of pollution
	CO3	Explore air pollution issues at a range spatial scales and how these are relaxed.
	CO4	Assess the environmental impacts of atmospheric pollution
BRIDGE ENGINEERING	CO1	Design the basic components of bridge structures like bridge deck slabs longitudinal girders transverse girders, piers and well foundations.
	CO2	Understand the IRC classes of loading and railway bridge rules for detailed calculation of loadings and design of various components.
	CO3	Know the methods of design of structural components of different types of Bridges
Repairs and Rehabilitation of structures	CO1	Know the causes of deterioration of structures and distress in structures
	CO2	Assesses the damaged structures using different NDT methods
	CO3	Materials and methods to rehabilitate and strengthen the structures with economical applications.
INTELLIGENT TRANSPORTATION SYSTEMS	CO1	Understand the sensor technologies
	CO2	Understand the communication techniques
	CO3	Apply the various ITS methodologies
	CO4	Understand the user needs

	CO5	Define the significance of ITS under Indian conditions
HYDRO POWER ENGINEERING	CO1	Estimate and assess the water power potential
	CO2	Understand the Basic Concepts of Power plants
	CO3	Analyze the efficiency of various types of power plants
	CO4	Understand the Basic concepts Water Conducting Systems
	CO5	Select suitable type of turbine for power stations
CONSTRUCTION TECHNOLOGY & PROJECT MANAGEMENT	CO1	Upon the successful completion of this course, the students will be able to:
	CO2	Appreciate the importance of construction planning.
	CO3	Understand the functioning of various earths moving equipment.
	CO4	Know the methods of production of aggregate products and concreting.
	CO5	Apply the gained knowledge to project management and construction techniques.
STRUCTURAL DESIGN AND DRAWING LAB	CO1	Understand basic commands used in STAAD Pro and their applications
	CO2	Analyse the structure for various loading conditions
	CO3	Analyse and design of structural elements for various loading conditions
ENVIRONMENTAL ENGINEERING LAB	CO1	Determine physical, chemical and biological characteristics of water and wastewater
	CO2	Determine optimum dosage of coagulant
	CO3	Assess the quality of water and wastewater