GPCET
Pioneering Innovative Education

G PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

(Approved by AICTE | NAAC Accreditation with 'A' Grade |
Accredited by NBA (CIV, CSE, ECE & EEE) | Affiliated to JNTUA)
Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

DEPARTMENT OF CIVIL ENGINEERING

The following are the Course Outcomes of all the courses for the Academic Year 2018-19 from I-B.Tech to IV B.Tech

R18 REGULATION

I B. Tech I Sem

Course Name: **FUNCTIONAL ENGLISH**

#	COURSE OUTCOME
CO1	Have improved communication in listening, speaking, reading and writing skills in general.
CO2	Have developed their oral communication and fluency in group discussions and interviews.
CO3	Have improved awareness of English in science and technology context.
CO4	Have achieved familiarity with a variety of technical reports.
CO5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

Course Name:**MATHEMATICS – I**

#	COURSE OUTCOME
CO1	The students become familiar with the application of differential and integral calculus, ordinary differential equations and vector calculus to engineering problems.
CO2	The students attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineering applications.
CO3	Develop the use of matrix algebra techniques that is needed by engineers for practical Applications.
CO4	Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem.
CO5	Utilize mean value theorems to real life problems.

Course Name: **COMPUTER PROGRAMMING**

#	COURSE OUTCOME
CO1	Apply problem solving techniques in designing the solutions for a wide-range of problems
CO2	Choose appropriate control structure depending on the problem to be solved
CO3	Modularize the problem and also solution
CO4	Interpret the importance of functions in programming.
CO5	Analyze and modularize the problem and its solution by using functions.

Course Name: **ENGINEERING PHYSICS**

#	COURSE OUTCOME
CO1	The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fibre optics.
CO2	The important properties of crystals like the presence of long- range order and periodicity, structure determination using X- ray diffraction are focused along with defects in crystals and ultrasonic non-destructive techniques.
CO3	The discrepancies between the classical estimates and laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomic world.
CO4	The electronic and magnetic properties of materials were successfully explained by free electron theory and the bases for the band theory are focused.
CO5	The properties and device applications of semiconducting and magnetic materials are illustrated.
CO6	The importance of superconducting materials and nanomaterials along with their engineering applications are well elucidated.

Course Name: **ENGINEERING DRAWING**

#	COURSE OUTCOME
CO1	Drawing 2D and 3D diagrams of various object
CO2	Learning conventions of Drawing, which is an Universal Language of Engineers
CO3	Drafting projections of points, planes and solids
CO4	Construct various curves like ellipse, parabola, hyperbola etc which are used in Engineering drawing.
CO5	Apply orthographic projection concepts to draw projections of points, lines, planes and solids
CO6	Apply development concepts to draw development of surfaces of simple solids

Course Name: **ENGLISH LANGUAGE COMMUNICATION SKILLS (ELCS) LAB**

#	COURSE OUTCOME
CO1	Become active participants in the learning process and acquire proficiency in spoken English.
CO2	Speak with clarity and confidence thereby enhance employability skills.
CO3	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO4	Apply orthographic projection concepts to convert isometric view to orthographic views
CO5	Make use of AutoCAD Software to draw 2D diagrams of various objects

Course Name: **ENGINEERING PHYSICS LABORATORY**

#	COURSE OUTCOME
CO1	Would recognize the important of optical phenomenon like Interference and diffraction.
CO2	Would have acquired the practical application knowledge of optical fiber, semiconductor, dieclectric and magnetic materials, crystal structure and lasers by the study of their relative parameters.
CO3	Would recognize the significant importance of nanomaterials in various engineering fields.
CO4	Determine the wavelength of laser, particle size, numerical aperture and acceptance angle by applying the principles of lasers and optical fibres
CO5	Measure the elastic constants, Poisson's ratio of the material
CO6	Measure the strain of the metal bar by using strain gauge.

Course Name: **COMPUTER PROGRAMMING LAB**

#	COURSE OUTCOME
CO1	Apply problem solving techniques to find solutions to problems
CO2	Able to use C language features effectively and implement solutions using C language.
CO3	Improve logical skills.
CO4	Understands about files and its applications.
CO5	Develop real-world applications, files and exception handling provided by python

I B. Tech II Sem

Course Name: **ENGLISH FOR PROFESSIONAL COMMUNICATION**

#	COURSE OUTCOME
CO1	Have acquired ability to participate effectively in group discussions.
CO2	Have developed ability in writing in various contexts.
CO3	Have acquired a proper level of competence for employability.
CO4	Constructnecessaryskillstodeliverpresentationconfidentlyforimprovingin respectivedomains
CO5	Applylanguagestructurestoconstructgoodrelations

Course Name: **MATHEMATICS – II**

#	COURSE OUTCOME
CO1	The student gains the knowledge to tackle the engineering problems using the concepts of Fourier series, various transforms and partial differential equations.
CO2	Analyze the non- homogeneous linear differential equations along with method of variation of parameters.
CO3	Apply the concept of higher order differential equations to the various streams like Mass spring system and L-C-R Circuit problems.
CO4	Apply a range of techniques to find solutions of standard PDEs and basic properties of standard PDEs.
CO5	Analyze the vector calculus involving divergence, curl and their properties along with vector identities.

Course Name: **ENGINEERING MECHANICS**

#	COURSE OUTCOME
CO1	Develop students to acquire knowledge of static and dynamic behavior of the bodies.
CO2	Develop students to acquire the knowledge, so that they can understand physical phenomenon with thehelp of various theories.
CO3	Develop students, who will be able to explain the physical phenomenon with help of diagrams.
CO4	Develop students with a broad vision with the skills of visualizing and developing their own ideas, and to convert those ideas in to engineering problems and solving those problems with the acquired knowledge of the Engineering Mechanics.
CO5	Analyze the perfect frames using different methods and concepts of Mechanical vibrations.

Course Name: **ENGINEERING CHEMISTRY**

#	COURSE OUTCOME
CO1	Differentiate between hard 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	Understand industrially based polymers, various engineering materials.
CO4	Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers..
CO5	Understand the principles of different analytical instruments and explain their applications.

Course Name: **ENVIRONMENTAL STUDIES**

#	COURSE OUTCOME
CO1	Students will get the sufficient information that will clarify modern environmental concepts like equitable use of natural resources, more sustainable life styles etc
CO2	Students will 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	By studying environmental sciences, students is exposed to the environment that enables one to find out solution of various environmental problems encountered on and often. At the end of the course, it is expected that students will be able to identify and analyze environmental problems as well as the risks associated with these problems and efforts to be taken to protect the environment from getting polluted. This will enable every human being to live in a more sustainable manner.
CO5	Solve environmental problems through higher level of personal involvement and interest

Course Name: **APPLIED MECHANICS LAB**

#	COURSE OUTCOME
CO1	Acquire knowledge of static and dynamic behavior of the bodies.
CO2	Acquire the knowledge, so that they can understand physical phenomenon with the help of various theories.
CO3	Explain the physical phenomenon with help of diagrams.
CO4	with broad vision with the skills of visualizing and developing their own ideas, and to convert those ideas in to engineering problems and solving those problems with the acquired knowledge of the Engineering mechanics
CO5	Apply the principles of mechanics to analyze structural and machine elements.
CO6	Identify the different types of beams and the types of loading. Derive expressions to determine the bending stress, deflection and shear stress in beams subjected to various types loading.

Course Name: **ENGINEERING CHEMISTRY LAB**

#	COURSE OUTCOME
CO1	Would be confident in handling energy storage systems and would be able combat chemical corrosion
CO2	Would have acquired the practical skill to handle the analytical methods with confidence.
CO3	Would feel comfortable to think of design materials with the requisite properties
CO4	Would be in a position to technically address the water related problems.
CO5	Calculate the hardness of water and calculation of dissolved oxygen percentages

Course Name: **ENGINEERING & I.T. WORKSHOP**

#	COURSE OUTCOME
CO1	To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
CO2	To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
CO3	To learn about Networking of computers and use Internet facility for Browsing and Searching.

CO4	Apply wood working skills in real world applications. Build different parts with metal sheets in real world applications
CO5	Apply fitting operations in various applications
CO6	Apply different types of basic electric circuit connections

II B. Tech I Sem

Course Name: **MATHEMATICS-III**

#	COURSE OUTCOME
CO1	Demonstrate knowledge of matrix calculation as an elegant and powerful mathematical language in connection with rank of a matrix, linear system of equations, linear dependence and independence
CO2	Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem. Define a quadratic form and determine its nature using Eigen values
CO3	Perform the solutions of algebraic and transcendental equations employing bisection method, false position method and Newton-Raphson method
CO4	Understand the technique of interpolation along with Lagrange's formula and Newton's interpolation formulae.
CO5	Understand and apply the concepts of curve fitting, numerical differentiation and integration.
CO6	Interpret the numerical solutions of ordinary differential equations Employing Taylor series, Euler's, Picard's and Runga-kutta methods.

Course Name: **STRENGTH OF MATERIALS - I**

#	COURSE OUTCOME
CO1	Learn the behaviour of materials under different stress & strain conditions
CO2	Draw the bending moment diagrams and shear force diagrams
CO3	Understand the concept of flexural stresses on beams
CO4	Draw the shear stress distribution for beams under different loading conditions
CO5	Compute the deflection of beams for various loading
CO6	Analyze the direct and bending stresses on various structural elements

Course Name: **SURVEYING – I**

#	COURSE OUTCOME
CO1	Learn the basics of surveying, units of measurement and duties of surveyor
CO2	Compute bearings and angles
CO3	Learn the fundamentals of levelling and contouring
CO4	Measure angles using theodolite

CO5	Compute areas and volumes
CO6	Undertake measurement and plotting in civil engineering

Course Name: **MECHANICS OF FLUIDS**

#	COURSE OUTCOME
CO1	Learn the concepts of fluid mechanics useful in Civil Engineering applications
CO2	Determine the properties of fluid like pressure and their measurement.
CO3	Compute forces on immersed plane and curved plates.
CO4	Apply continuity equation and energy equation in solving problems on flow through conduits.
CO5	Compute the frictional loss in laminar and turbulent flows.
CO6	Compute the minor losses in laminar and turbulent flows

Course Name: **BUILDING MATERIALS AND CONSTRUCTION**

#	COURSE OUTCOME
CO1	Understand the quality of various construction materials
CO2	Learn the intelligent use of plastics and glass
CO3	Analyse the smart way of allocation of insulating material
CO4	Identify the various construction activities at the time of actual execution.
CO5	Recognise the internal elements of a building technically
CO6	Select the materials for construction activities

Course Name: **GEOMATICS LAB – I**

#	COURSE OUTCOME
CO1	Apply the principle of surveying for civil Engineering Applications
CO2	Calculate areas, draw plans and contour maps using different measuring equipment at field level

CO3	Plot the area by using Plane table Method
CO4	Calculate the levels using Levelling Instrument
CO5	Analyse the Geographical Maps
CO6	Write a technical laboratory report

Course Name: **STRENGTH OF MATERIALS LABORATORY**

#	COURSE OUTCOME
CO1	Understand the basics of material properties, stress and strain
CO2	Know the basic concepts of different kind of materials which are subjected to various loading conditions
CO3	Learn the concept of beams and springs its deflections
CO4	Know the concepts of Compressive behavior of materials
CO5	Facilitate the concept of bending and its theoretical analysis

Course Name: **BASIC MATERIAL TESTING LAB**

#	COURSE OUTCOME
CO1	Learn the properties of cement
CO2	Understand the quality of various construction materials
CO3	Identify and select the materials for construction activities
CO4	Classify bricks and stones
CO5	Recommend the materials for construction

Course Name: **QUANTITATIVE APTITUDE -1**

#	COURSE OUTCOME
CO1	Identify the problems by applying mathematical fundamentals
CO2	Apply the suitable logical methods to solve the problems
CO3	Solve the various problems by using quantitative mathematical fundamentals
CO4	Analyse the comprehensive data with logical ability
CO5	Shortcut methodology problems analysis by applying mathematical fundamentals

II B. Tech II Sem

Course Name: **MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

#	COURSE OUTCOME
CO1	Analyze fundamentals of Economics such as Demand, Elasticity & Forecasting methods
CO2	Apply production, pricing & supply concepts for effective business administration
CO3	Identify the influence of various markets, the forms of business Organization and its International Economic Environment.
CO4	Analyze how to invest adequate amount of capital in order to get maximum return from Selected business activity.
CO5	Prepare accounting statements like income & expenditure statement, balance Sheet
CO6	Understand financial performance of the Business and to initiate the appropriate decisions to run the business profitably.

Course Name: **STRENGTH OF MATERIALS – II**

#	COURSE OUTCOME
CO1	Calculate the principal stresses and strains
CO2	Design shafts using theories of failure
CO3	Calculate load on columns using Euler's formula, Secant formula – Empirical formulae — Rankine – Gordon formula- Straight line formula – Prof. Perry's formula
CO4	Understand the design considerations to prevent the failure
CO5	Learn the concepts of longitudinal and circumferential stresses in thin cylinders
CO6	Apply Lames theory for thick cylinders

Course Name: **HYDRAULICS AND HYRAULIC MACHINERY**

#	COURSE OUTCOME
CO1	Learn and classify the types of flow
CO2	Compute and locate hydraulic jump
CO3	Calculate forces and work done by a jet on fixed or moving plate and curved plates
CO4	Learn about working principles of various types of turbines
CO5	Learn the characteristics of centrifugal pumps
CO6	Remember boundary layer theory

Course Name: **GEOMATICS – II**

#	COURSE OUTCOME
CO1	Determine the Elevation by using trigonometric levelling
CO2	Measure horizontal and vertical- distances and angles Recording of observation accurately and Calculate Instrumental Constants
CO3	Know the Calculation of area by using Triangulation Method
CO4	Perform Setting out of Building, Culverts and piers etc.
CO5	Apply surveying principles to setting out curves by using different Methods
CO6	Know the different models of EDM Instruments and Information about RIS & GIS

Course Name: **STRUCTURAL ANALYSIS – I**

#	COURSE OUTCOME
CO1	Apply knowledge of various energy theorems
CO2	Apply knowledge to analyse the concept of deflection, bending moment and shear force diagrams
CO3	Apply knowledge to analyse columns under various loading conditions
CO4	Gain knowledge on slope and deflection of various members
CO5	Analyze continuous beams
CO6	Analyze the statically indeterminate members such as fixed bars, continuous beams and for various types of loading.

Course Name: **FLUID MECHANICS AND HYDRAULIC MACHINERY LABORATORY**

#	COURSE OUTCOME
CO1	Learn the behaviour of water current in rivers, canal and drains.
CO2	Use important practical results in common fluid flows
CO3	Determine metacentre of a floating vessel.
CO4	Calibrate various flow measuring devices in pipe and open channel flow
CO5	Determine various losses and velocity in pipe flow in field
CO6	Learn the concepts of centrifugal and reciprocating pumps

Course Name: **GEOMATICS LAB –II**

#	COURSE OUTCOME
CO1	Find the inaccessible point by using theodolite
CO2	Find the constants of tachometric surveying
CO3	Carry out of various curve alignment
CO4	Use of various advanced instruments involved in surveying with respect to utility and precision
CO5	Perform area calculation by total station
CO6	Write a technical laboratory report

Course Name: **AUTO CAD LAB**

#	COURSE OUTCOME
CO1	Use the AutoCAD commands for drawing 2D & 3D building drawings required for different Civil Engineering applications
CO2	Plan and draw Civil Engineering Buildings as per aspect and orientation
CO3	Present drawings as per user requirements and preparation of technical report
CO4	Learn Basic concepts of Metric geometry
CO5	Learn Engineering and Drawing-related applications

Course Name: **VERBAL ABILITY AND LOGICAL REASONING**

#	COURSE OUTCOME
CO1	This course builds to improve the vocabulary, verbal reasoning, abstract and spatial reasoning
CO2	Identify the problems by applying mathematical fundamentals
CO3	Apply the suitable logical methods to solve the problems
CO4	Solve the various problems by using quantitative mathematical fundamentals
CO5	Analyse the comprehensive data with logical ability

III B. Tech I Sem

Course Name: **WATER RESOURCES ENGINEERING-I**

#	COURSE OUTCOME
CO1	Interpret rainfall data using different methods
CO2	Apply various methods to estimate surface and ground water hydrology components
CO3	Build the knowledge to connect hydrology with respect to field requirement
CO4	Design irrigation channels using silt theories
CO5	Classify various hydraulic structures involved in cross drainage works

Course Name: **DESIGN OF REINFORCED CONCRETE STRUCTURES**

#	COURSE OUTCOME
CO1	Make use of Indian Standard code provisions in designing reinforced concrete structures
CO2	Apply limit state design for serviceability, deflection and cracking
CO3	Justify the various modes of failure in reinforced concrete members
CO4	Design various reinforced concrete members to meet different loading conditions
CO5	Develop the reinforcement detailing drawings of concrete members to implement

Course Name: **STRUCTURAL ANALYSIS – II**

#	COURSE OUTCOME
CO1	Interpret structural actions in statically determinate and indeterminate structures
CO2	Analyzethreehingedarches,continuousbeamsandportalframesusing displacement method of analysis
CO3	Apply flexibility and stiffness method of analysis for two span continuous beams subjected to sinking of supports
CO4	Determine support reactions, shear forces and bending moments in beams and frames subjected to vertical and lateralloads
CO5	Draw SFD and BMD.
CO6	Assess the collapse mechanism and energy absorption capacity of fixed and continuous beams

Course Name: **GEOTECHNICAL ENGINEERING – I**

#	COURSE OUTCOME
CO1	Evaluate the index and engineering properties of the soil
CO2	Determine the stress distributions in the founded soil
CO3	Analyze the compressibility of soils to obtain the coefficients
CO4	Assess the shear strength of the soils under different drainage conditions
CO5	Assess the soils for its bearing capacity

Course Name: **ENGINEERING GEOLOGY LABORATORY**

#	COURSE OUTCOME
CO1	Identify various minerals and rocks by their origin and properties.
CO2	Apply geological features influencing rock masses and discontinuities.
CO3	Measure strike and dip of the bedding planes
CO4	Interpret geological maps to represent the distribution of rocks and minerals.
CO5	Analysestrength and distribution of rocks and minerals

Course Name: **GEOTECHNICAL ENGINEERING LABORATORY**

#	COURSE OUTCOME
CO1	Determine the index properties of the soil.
CO2	Evaluate the engineering properties of the soil
CO3	Assess the sub grade strength of roads and pavements
CO4	Measure the co efficient of permeability for cohesive and non-cohesive soils
CO5	Estimate the shear strength under controlled drainage conditions

Course Name: **COMPUTER AIDED DESIGN LABORATORY – I**

#	COURSE OUTCOME
CO1	Evaluate beams with different loading conditions
CO2	Analyze trusses and portal frames
CO3	Develop building componentmodels

CO4	Design footings for residential and commercial structures
CO5	Analyze and design cantilever retaining wall

Course Name: **HUMAN VALUES AND PROFESSIONAL ETHICS**

#	**COURSE OUTCOME**
CO1	Apply human values and ethics in professional life
CO2	Develop the moral ideals to maintain good relationships with people
CO3	Solve environmental related problems by keeping health of human being into consideration
CO4	Make use of the fundamental rights and human rights in life for individual dignity
CO5	Build the sound health system both physically and mentally by practicing yoga,karate, sports etc.

III B. Tech II Sem

Course Name: **GEOTECHNICAL ENGINEERING – II**

#	COURSE OUTCOME
CO1	Determine the depth of foundation for various soil conditions
CO2	Assess the failure of slopes under different conditions
CO3	Evaluate the earth pressures acting on retaining walls.
CO4	Calculate the bearing capacity of soils and foundation settlements
CO5	Estimate load carrying capacity of pile and pile group

Course Name: **CONCRETE TECHNOLOGY**

#	COURSE OUTCOME
CO1	Evaluate various properties of cement and aggregate
CO2	Measure the fresh and hardened properties of concrete
CO3	Classify various special concretes based on their performance
CO4	Assess the mechanical properties of concrete
CO5	Design concrete mixes for various field applications

Course Name: **TRANSPORTATION ENGINEERING – I**

#	COURSE OUTCOME
CO1	Develop a strong analytical and practical knowledge of highway
CO2	Apply theories of transportation engineering to design
CO3	Classify various highway geometrical designelements
CO4	Apply traffic regulations for intersectiondesign
CO5	Design flexible and rigid pavements as per irc

Course Name: **ENVIRONMENTAL ENGINEERING**

#	COURSE OUTCOME
CO1	Distinguish the physical, chemical and biological properties of the water samples
CO2	Interpret various treatments for drinking water, waste water and solid waste
CO3	Design treatment plants by forecasting population for drinking water, wastewater and solid waste
CO4	Select appropriate distribution layout for municipal watersupply
CO5	Measure and propose control measures for noise and air pollution in the environment

Course Name: **CONCRETE TECHONOLOGY LABORATORY**

#	COURSE OUTCOME
CO1	Evaluate various properties of cement and aggregate
CO2	Determine compressive strength of concrete by using non-destructive tests
CO3	Design concrete mix as per the site conditions and specifications of materials available
CO4	Assess the mechanical properties of concrete
CO5	Determine shear strength of concrete by using non-destructive tests

Course Name: **TRANSPORTATION ENGINEERING LABORATORY**

#	COURSE OUTCOME
CO1	Identify basic engineering properties of various materials
CO2	Determine the grade and properties of bitumen
CO3	Conduct traffic studies for estimating traffic flow characteristics
CO4	Design traffic signals using Webster method
CO5	Evaluate longitudinal and cross-section details of roads

Course Name: **ENVIRONMENTAL ENGINEERINGLABORATORY**

#	COURSE OUTCOME
CO1	Discuss about importance of water and its quality analysis
CO2	Analyze various physico-chemical parameters of water in case of quality requirements
CO3	Assess complete water quality for domestic supplies
CO4	Suggest various types of treatment methods required to purify raw water with different contaminants
CO5	Analyze biological parameters of water in case of quality requirements

Course Name: **ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS**

#	COURSE OUTCOME
CO1	Recall vocabulary and enhance accuracy in grammar
CO2	Understand and communicate effectively in speaking and in writing
CO3	Apply language structures to construct good relations
CO4	Identify and develop effective technical writing skills
CO5	Determine and develop personal presentation techniques
CO6	Design necessary skills to deliver presentation confidently for improving in respective domains.

IV B. Tech I Sem

Course Name: **TRANSPORTATION ENGINEERING – II**

#	COURSE OUTCOME
CO1	Develop a strong analytical and practical knowledge in air, waterways
CO2	Apply theories of transportation engineering to design railway tracks
CO3	Classify various airport geometrical design elements
CO4	Apply traffic regulations for Signaling and interlocking
CO5	Acquire knowledge on types of Docks, Ports and Harbors

Course Name: **ESTIMATION COSTING AND VALUATION**

#	COURSE OUTCOME
CO1	Develop knowledge on various Building items, their standard units and principles
CO2	Apply quantity of each item for RCC buildings by different methods of estimation
CO3	Evaluate various types of contracts, valuations, tenders and specifications
CO4	Apply rates and bill preparation for different building elements
CO5	Acquire valuation of assets

Course Name: **WATER RESOURCES ENGINEERING – II**

#	COURSE OUTCOME
CO1	Apply concepts of systems analysis for planning of water resources systems
CO2	Perform basic economic analysis to evaluate the economic feasibility of water resources and environmental engineering projects
CO3	Formulate and solve stochastic and fuzzy optimization problems for decision making under

	uncertainty
CO4	Formulate and solve deterministic optimization models for design and operation of water resources systems
CO5	Understand different aspects of design of hydraulic structures

Course Name: **DESIGN OF STEEL STRUCTURES**

#	COURSE OUTCOME
CO1	Estimate strength of welds and bolts to find the efficiency of various connections
CO2	Design and detail tension and compression members under different conditions adopting IS Code
CO3	Analyze and design flexural members as per code provisions
CO4	Design built-up compression members and slab bases with necessary connections
CO5	Apply IS code of practice to design various components of welded steel plate girder

Course Name: **COMPUTER AIDED DESIGN LABORATORY –II**

#	COURSE OUTCOME
CO1	Evaluate beams with different loading conditions
CO2	Analyze trusses and portal frames
CO3	Develop building component models
CO4	Design footings for residential and commercial structures
CO5	Analyze and design cantilever retaining wall

Course Name: **HIGHWAY MATERIALS TESTING LABORATORY**

#	COURSE OUTCOME
CO1	Identify engineering properties of various materials

CO2	Determine elongation, flash point for various grades of bitumen
CO3	Conduct traffic studies for estimating traffic flow characteristics
CO4	Determine hardness for various aggregates
CO5	Evaluate longitudinal and cross-section details of railways

IV B. Tech II Sem

Course Name: **URBAN TRANSPORTATION PLANNING**

#	**COURSE OUTCOME**
CO1	Develop a strong analytical and practical knowledge in urban mobility
CO2	Apply theories of transportation planning to design urban roads
CO3	Classify economic impacts of new transportation plans
CO4	Apply traffic assignment regulations to urban modes
CO5	Acquire knowledge on trip generation and distribution

Course Name: **FUNDAMENTALS OF DBMS**

#	**COURSE OUTCOME**
CO1	Apply suitable data models for givenapplication
CO2	Design database using integrity constraints and ACID properties
CO3	Construct optimized SQL queries to solve real time problems
CO4	Apply suitable normal form to eliminate data redundancy
CO5	Choose appropriate index structure to improve performance

PROFESSIONAL ELECTIVE-I

Course Name: **COST EFFECTIVE HOUSING TECHNIQUES**

#	COURSE OUTCOME
CO1	Categorize the various types of housing levels like low income group (LIG), Middle-income group (MIG) and high-income group (HIG) based on densitynorms
CO2	Choose housing policies and programs using concepts of GIS and MIS system in slums
CO3	Adopt innovative construction techniques for low costhousing
CO4	Make use of alternative building materials to condense overall cost of construction
CO5	Apply appropriate techniques and safety measures for housing in disaster prone areas

Course Name: **DISASTER MANAGEMENT AND MITIGATION**

#	COURSE OUTCOME
CO1	Classify different kind of hazards/disasters and their effects on environment
CO2	Analyze the causes of hazards/disasters which effects human life
CO3	Apply disaster management strategies through engineeringapplications
CO4	Apply emerging approaches in disaster management to reduce effect ofdisasters
CO5	Apply emerging approaches in present day problems

PROFESSIONAL ELECTIVE-II

Course Name: **CONSTRUCTION PLANNING AND PROJECT MANAGEMENT**

#	COURSE OUTCOME
CO1	Build knowledge on roles and responsibilities of a project manager
CO2	Plan the construction facilities to expedite project activities
CO3	Develop schedule of activities to complete the construction project on time
CO4	Analyze and implement safety practices in constructionindustry
CO5	Create tender and contract document for a construction project

Course Name: **AIR POLLUTION AND CONTROL**

#	COURSE OUTCOME
CO1	Classify various sources and effects of air pollution
CO2	Analyze plume dispersion needs to control the pollutants
CO3	Interpret atmospheric properties with air quality-wind rose diagrams
CO4	Apply various methods for the control of particulates
CO5	Design sampling methods of air pollution with emission qualitystandards

PROFESSIONAL ELECTIVE-III

Course Name: **BRIDGE ENGINEERING**

#	COURSE OUTCOME
CO1	Conduct site investigations to find the suitability of ground conditions for proposed bridge structure
CO2	Interpret the IRC regulations and railway bridge rules for detailed calculation of loadings
CO3	Design various types of bridges as per Indian Standard code provisions
CO4	Perform stability analysis of piers and abutments to find resistance against sliding and overturning
CO5	Estimate the unknown quantities of resistance, inductance and capacitance using bridges

Course Name: **INDUSTRIAL WASTE AND WASTE MANAGEMENT**

#	COURSE OUTCOME
CO1	Analyze the characteristics of industrial wastewaters
CO2	Select appropriate cleaner production method for industries.
CO3	Analyze the effects of disposal of industrial wastes.
CO4	Design treatment options for handling industrial wastewater.
CO5	Identify various treatment methods for hazardous wastes.

OPEN ELECTIVES

Course Name: **FUNDAMENTALS OF IOT**

#	COURSE OUTCOME
CO1	Analyze IoT applications using IoT enablers and connectivity layers, components.
CO2	Distinguish sensors and actuators in terms of their functions andapplications
CO3	Interface I/O devices, Sensors using ArduinoUNO
CO4	Develop Raspberry Pi Interfacing programs using pythonconcepts
CO5	Apply Raspberry Pi and Arduino Uno programming for IoT bases projects

Course Name: **PYTHON FOR EVERYONE**

#	COURSE OUTCOME
CO1	Apply the basic constructs of Python to solveproblems
CO2	Organize lists, tuples and dictionaries appropriately to solve complex problems
CO3	Build functions to increase codereusability
CO4	Implement modular programming for organized software development
CO5	Make use of exception handling for robustprogramming