



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

Kakinada-533003, Andhra Pradesh, India

B. Tech in Civil Engineering

Vision of the Department

To produce competent civil engineers with the capacity to handle challenges in the field of civil engineering and also to perform innovative research for societal needs with professional ethics.

Mission of the Department

M1: To produce high-quality learners who are globally competent and professionally skilful in the field of civil.

M2: To offer educational programs that impart inventive knowledge with high levels of ethics and human.

M3: Provide a platform to acquire and implement innovative ideas in research and development.

M4: To build up state-of-the-art laboratories and centres of excellence in different areas of civil engineering.

M5: To train the students and faculty to update their knowledge in emerging technologies to meet industrial requirements.

Program Educational Objectives (PEO)

PEO1: Impart basic technical knowledge and skills for specialized careers in Civil Engineering related fields that cater to global needs.

PEO2: Provide expertise in carrying out project works by using state-of-the-art basic computing and experimental techniques and preparing them to take up Masters and jobs.



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PEO3: Train the student to possess good communication and presentation skills with the ability to work in teams contributing significantly to the technological development of responsible Civil Engineers.

Program Outcomes (PO'S)

PO 1: Engineering Knowledge: Apply the knowledge of mathematics, science, and engineering fundamentals for the solution of complex engineering problems

PO 2: Problem analysis: Identity, formulate and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, nature

PO 3: Design and Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified

PO 4: Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis, and interpreted information to provide valid conclusions

PO 5: Modern Tool Usage: Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complete understanding of the limitations.

PO 6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequences of engineering practice

PO 7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the

PO 8: Ethics: Apply ethical principles to commit to professional ethics, responsibilities, and norms of the engineering practice.

PO 9: Individual and Teamwork: Function effectively as an individual or leader in diverse teams and multidisciplinary settings.



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PO 10: Communications: Communicate effectively on complex engineering activities with the Engineering community and with the society at large such as being able to give and receive clear instructions.

PO 11: Project Management and Finance: Demonstrate knowledge and understanding of the Engineering and Management principles and apply these to once own manage projects and in multidisciplinary environments.

PO 12: Lifelong Learning: Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technology.

PSO'S: Programme Specific Outcomes

PSO 1: Plan, Analyse, and Design in the construction industry and execute all kinds of Civil Engineering Projects.

PSO 2: Characterize and assess materials to utilize in Construction Projects.

PSO 3: Provide sustainable solutions to the Civil Engineering Problems.

Course Code	
BS1101	Mathematics-I

Course Outcomes:

At the end of the course, the student will be able to



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- CO1 Utilize mean value theorems to real life problems (L3).
- CO2 Solve the differential equations related to various engineering fields (L3).
- CO3 Familiarize with functions of several variables which is useful in optimization (L3).
- CO4 Double integration techniques in evaluating areas bounded by region (L3).
- CO5 Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems (L5).

Course Code	COMMUNICATIVE ENGLISH
HS1101	

Course Outcomes:

At the end of the module, the student will be able to

- CO1 Understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information.
- CO2 Ask and answer general questions on familiar topics and introduce oneself/others.
- CO3 Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.
- CO4 Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs.
- CO5 Form sentences using proper grammatical structures and correct word forms.

Course Code	ENGINEERING CHEMISTRY
BS1102	

Course Outcomes:



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At the end of the module, the student will be able to

- CO1 Apply the basic concept of physical chemistry in developing batteries.
- CO2 Synthesize and characterize nanomaterials for engineering applications.
- CO3 Summarize the concepts of spectroscopy and characterize the materials.
- CO4 Apply the knowledge to protect different metals from corrosion.
- CO5 Develop greener methods to replace non-eco-friendly processes for industrial production of materials.

Course Code	ESSENTIALS OF ELECTRICAL AND ELECTRONICS ENGINEERING
ES1101	

Course Outcomes:

The student should be able to:

- CO1 Analyze various electrical networks.
- CO2 Understand operation of DC generators, 3-point starter and DC machine testing by Swinburne's Test.
- CO3 Analyze performance of single-phase transformer.
- CO4 Explain operation of 3-phase alternator and 3-phase induction motors.
- CO5 Analyze operation of half wave, full wave bridge rectifiers and OP-AMPs and the explanation of single stage CE amplifier and concept of feedback amplifier.

Course Code	ENGINEERING DRAWING
ES1103	

Course Outcome:



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The student will learn how to visualize 2D & 3D objects.

Course Code	ENGLISH COMMUNICATION SKILLS LAB
HS1102	

Course Outcomes:

At the end of the course, the student will be able to

- CO1 Explain basic grammar principles.
- CO2 Write clear and coherent passages.
- CO3 Write effective letters for job application and complaints.
- CO4 Prepare technical reports and interpret graphs.
- CO5 Enhance reading comprehension.
- CO6 Comprehend English speech sounds, stress and intonation.

Course Code	ENGINEERING CHEMISTRY LAB
BS1103	

Course Outcomes:

- CO1 Select a suitable methodology for the estimation of metal content, iodine content, active chlorine or hardness of water.
- CO2 Analyze acids, bases, redox compounds, etc. using instrumental methods.
- CO3 Determine the corrosion inhibitor efficiency of selective compounds and processes.
- CO4 Verify the adsorption isotherms.

Course Code	WORKSHOP PRACTICE LAB
ES1104	



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Course Outcomes:

At the end of the course, the student will be able to

- CO1 Acquiring skills in basic engineering practice: to identify the hand tools and instruments to acquire measuring skills and to acquire practical skills in the trades.
- CO2 Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
- CO3 Identify and apply suitable tools for machining process including turning, facing, thread cutting and tapping.
- CO4 Apply basic electrical engineering knowledge for house wiring practice.

Course Code	ENVIRONMENTAL SCIENCE
MC1101	

Course Outcomes:

At the end of the course, the student will be able to

- CO1 Analyze characteristics of water, air and noise and interpret their importance.
- CO2 Asses water demand and design components of water distribution systems.
- CO3 Plan and design water treatment units.
- CO4 Assess sources and effects of air and noise pollution and identify appropriate control devices.

Course Code	MATHEMATICS-II
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BS1201	
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Course Outcomes:

At the end of the course, the student will be able to

- CO1 Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6).
- CO2 Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel (L3).
- CO3 Evaluate approximating the roots of polynomial and transcendental equations by different algorithms (L5).
- CO4 Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3).
- CO5 Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations (L3).

Course Code	MATHEMATICS-III
BS1202	

Course Outcomes:

At the end of the course, the student will be able to

- CO1 Interpret the physical meaning of different operators such as gradient, curl and divergence (L5).
- CO2 Estimate the work done against a field, circulation and flux using vector calculus (L5).
- CO3 Apply the Laplace transform for solving differential equations (L3).



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- CO4 Find or compute the Fourier series of periodic signals (L3).
- CO5 Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms (L3).
- CO6 Identify solution methods for partial differential equations that model physical processes (L3).

Course Code	ENGINEERING PHYSICS
BS1203	

Course Outcomes:

The students will be able to

- CO1 Identify forces and moments in mechanical systems using scalar and vector techniques. Extend Newton's second law for inertial and non-inertial frame of reference. Explain simple harmonic motion and damped harmonic motions.
- CO2 Understand the elasticity and plasticity concepts. Understand the elasticity and plasticity concepts. Analyze the concepts of shearing force and moment of inertia.
- CO3 Understand the basic concepts of LASER light Sources. Study Different types of laser systems. Identify different types of sensors and their working principles.
- CO4 Explain the concept of dielectric constant and polarization in dielectric materials. Summarize various types of polarization of dielectrics. Interpret Lorentz field and Clausius Myosotis relation in dielectrics. Classify the magnetic materials based on susceptibility and their temperature dependence. Explain the applications of dielectric and magnetic materials. Apply the concept of magnetism to magnetic devices.



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Course Code	PROBLEM SOLVING & PROGRAMMING USING C
ES1201	

Course Outcomes:

Upon the completion of the course the student will learn

- CO1 To write algorithms and to draw flowcharts for solving problems.
- CO2 To convert flowcharts/algorithms to C Programs, compile and debug programs.
- CO3 To use different operators, data types and write programs that use two-way/ multi-way selection.
- CO4 To select the best loop construct for a given problem.
- CO5 To design and implement programs to analyze the different pointer applications.
- CO6 To decompose a problem into functions and to develop modular reusable code.
- CO7 To apply File Input and Output operations.

Course Code	ENGINEERING MECHANICS
ES1202	

Course Outcomes:

After completion of course, students would be able to:

- CO1 To Learn the principles (Axioms) of statics, able to find resultant & resolution of system of forces and resultant force.
- CO2 Explore the concepts of constraints, free body diagram and action-reaction.



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- CO3 Estimate the geometric parameters like centroid, center of gravity and moment of inertia
- CO4 and identify their application.
- CO5 Learn the analysis of frames and trusses and know the importance of friction.
- CO6 Able to determine solution to dynamic problems through D'Alembert equilibrium equations, Impulse-Momentum and work- energy method.

Course Code	ENGINEERING PHYSICS LAB
BS1204	

Course Outcomes:

After completion of course, students would be able to:

- CO1 Impart concepts of Optical Interference, Diffraction and Polarization required to design instruments with higher resolution - Concepts of coherent sources, its realization and utility optical instrumentation. Explore the concepts of constraints, free body diagram and action-reaction.
- CO2 Study the Structure-property relationship exhibited by solid crystal materials for their utility and identify their application.
- CO3 Tap the Simple harmonic motion and its adaptability for improved acoustic quality of concert halls.
- CO4 To explore the Nuclear Power as a reliable source required to run industries.



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Course Code	PROBLEM SOLVING & PROGRAMMING USING C LAB
ES1203	

Course Outcome:

The student will be able to

- CO1 Gains Knowledge on various concepts of a C language.
- CO2 Able to draw flowcharts and write algorithms.
- CO3 Able design and development of C problem solving skills.
- CO4 Able to design and develop modular programming skills.
- CO5 Able to trace and debug a program.

Course Code	Complex Variables and Statistical Methods /PROBABILITY AND STATISTICS
BS2101	

Course Outcomes:

The student will be able to

- CO1 Apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic(L3)
- CO2 Find the differentiation and integration of complex functions used in engineering problems (L5)
- CO3 Make use of the Cauchy residue theorem to evaluate certain integrals(L3)
- CO4 Apply discrete and continuous probability distributions(L3)
- CO5 Design the components of a classical hypothesis test(L6)
- CO6 Infer the statistical inferential methods based on small and large sampling tests(L4)



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Course Code	STRENGTH OF MATERIALS
PC2101	

Course Outcomes:

- CO1 The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions.
- CO2 The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces.
- CO3 The student will have knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions.
- CO4 The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using Lamé's equation.

Course Code	FLUID MECHANICS
PC2102	

Course Outcomes;

Upon successful completion of this course the students will be able to:

- CO1 Understand the various properties of fluids and their influence on fluid motion and analyze a variety of problems in fluid statics and dynamics.
- CO2 Calculate the forces that act on submerged planes and curves.
- CO3 Analyze various types of flow problems through closed conduits.



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CO4 Measure the quantities of fluid flowing in pipes and channels.

CO5 Understand the concepts of Boundary layer and solve problems on boundary layer.

Course Code	SURVEYING AND GEOMATICS
ES2101	

Course Outcomes:

Course will enable the student to:

CO1 Apply the knowledge to calculate angles, distances and levels

CO2 Identify data collection methods and prepare fieldnotes

CO3 Understand the working principles of survey instruments, measurement errors and corrective measures

CO4 Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies

Course Code	ENGINEERING GEOLOGY
ES2102	

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

CO1 Identify and classify the geological minerals.

CO2 Measure the rock strengths of various rocks.

CO3 Classify and measure the earthquake prone areas to practice the hazard zonation.



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- CO4 Classify, monitor, and measure the Landslides and subsidence.
- CO5 Prepares, analyses and interpret the Engineering Geologic maps
- CO6 Analyses the ground conditions through geophysical surveys.
- CO7 Test the geological material and ground to check the suitability of civil engineering project construction.
- CO8 Investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc.

Course Code	BUILDING METERIALS AND CONSTRUCTION
PC2103	

Course Outcomes:

Upon the successful completion of the course:

- CO1 The student should be able to identify different building materials and their importance in building construction.
- CO2 The student is expected to differentiate brick masonry, stone masonry construction and use of lime and cement in various constructions.
- CO3 The student should have learnt the importance of building components and finishings.
- CO4 The student is expected to know the classification of aggregates, sieve analysis and moisture content usually required in building construction.

Course Code	STRENGTH OF MATERIALS LAB
PC2104	



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Course Outcomes:

Course will enable the student to:

- CO1 Know practical knowledge of stress strain relationship.
- CO2 Get acquainted with deflections and flexural behavior of different beams.
- CO3 Attain the practical knowledge of torsional behavior of specimen.
- CO4 Get acquainted with various material properties.
- CO5 Get acquainted with various moduli.
- CO6 Student will attain the practical knowledge of compressive nature of specimen.

Course Code	SURVEYING FILED WORK
PC2105	

Course Outcomes:

Course will enable the student to:

- CO1 Compute the road widening by chain survey.
- CO2 Survey the given area by compass.
- CO3 Sketch the given area by plane table.
- CO4 Prepare maps for given land by plane table.
- CO5 Differentiate various levels for specified area.
- CO6 Design given road profile by auto level.

Course Code	ENGINEERING GEOLOGY LAB
ES2103	

Course Outcomes:

Upon the successful completion of this course, the students will be able to:



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- CO1 Identify Megascopic minerals & their properties.
- CO2 Identify Megascopic rocks & their properties.
- CO3 Identify the site parameters such as contour, slope & aspect for topography.
- CO4 Know the occurrence of materials using the strike & dip problems.

Course Code	TRANSPORTATION ENGINEERING-I
PC2201	

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- CO1 Plan the Highway network for a given area.
- CO2 Determine Highway alignment and design highway geometrics.
- CO3 Design Intersections and prepare traffic management plans
- CO4 Judge suitability of pavement materials and construct highways
- CO5 Design flexible and rigid pavements and Maintain highways

Course Code	HYDRAULICS AND HYDRAULIC MACHINERY
PC2202	

Course Outcomes:

Upon the successful completion of this course the students will be able to:

- CO1 Solve uniform and non-uniform open channel flow problems.
- CO2 Apply the principals of dimensional analysis and similitude in hydraulic model testing.
- CO3 Select suitable pumps and turbines.

Course Code	STRUCTURALANALYSIS-I
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ES2201	
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Course Outcomes:

Upon successful completion of this course the student will be able to,

CO1 Distinguish between the determinate and indeterminate structures.

CO2 Identify the behavior of structures due to the expected loads, including the moving loads, acting on the structure.

CO3 Estimate the bending moment and shear forces in beams for different fixity conditions

CO4 Analyze the continuous beams using various methods, three moment method, slope deflection method, energy theorems.

CO5 Draw the influence line diagrams for various types of moving loads on beams/bridges. Analyze the loads in Pratt and Warren trusses when loads of different types and spans are passing over the truss.

Course Code	BUILDING PLANNING AND DRAWING
PC2203	

Course outcome:

Upon successful completion of the course:

CO1 Students should be able to plan various buildings as per the building by-laws.

CO2 The student should be able to distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.

CO3 The student is expected to learn the skills of drawing building elements and plan the buildings as per the requirements

Course Code	CONCRETE TECHNOLOGY
PC2204	



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Course Outcomes:

Upon the successful completion of this course, student will be able to

- CO1 Understand the basic concepts of concrete.
- CO2 Realize the importance of quality of concrete.
- CO3 Familiarize the basic ingredients of concrete and their role in the production of concrete and its behavior in the field.
- CO4 Test the fresh concrete properties and the hardened concrete properties.
- CO5 Evaluate the ingredients of concrete through lab test results. Design the concrete mix by BIS method.
- CO6 Familiarize the basic concepts of special concrete and their production and applications. Understand the behavior of concrete in various environments.

Course Code	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
PC2205	

Course Outcome:

- CO1 The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
- CO2 One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
- CO3 The Learner is able to prepare Financial Statements and the usage of various accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.



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Course Code	SURVEYINGFIELDWORK-II
PC2206	

Course Outcomes:

At the end of the course, the student will be able to

- CO1 Understand fundamentals about theodolite instrument.
- CO2 Identify the distance between two inaccessible points.
- CO3 Calculating vertical distance problems by tachometric principles.
- CO4 Explain modern instruments in surveying.
- CO5 Find errors in the field by using total station.
- CO6 Prepare drawings by doing these exercises.

Course Code	Fluid Mechanics Lab
PC2207	

Course Outcomes:

At the end of the course, the student will be able to

- CO1 Student will attain the knowledge on various flow measuring devices.
- CO2 Student will understand the importance the friction factors in the in pipes.
- CO3 Student will attain the knowledge on impact of jets.
- CO4 Student will understand the importance of various characteristic curves of turbines.
- CO5 Student will attain the knowledge on application Bernoulli's equation.
- CO6 Student will understand the importance of various characteristic curves of pumps.



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Course Code	Socially Relevant Project
MC2201	

Outcomes

The students are be able

- CO1 To provide the solutions for the technological problems of society
- CO2 To suggest technological changes which suits current needs of society
- CO3 To explain new technologies available for problems of the society.

Course Code	Essence of Indian Traditional Knowledge / Professional Ethics and Human Values
MC2202	

Course Outcome of Essence of Indian Traditional knowledge:

After successful completion of the course the students will be able to

- CO1 Understand philosophy of Indian culture.
- CO2 Distinguish among the Indian languages and literature among difference traditions.
- CO3 Learn the philosophy of ancient, medieval and modern India.
- CO4 Acquire the information about the fine arts in India.
- CO5 Know the contribution of scientists of different eras.
- CO6 The essence of Yogic Science for Inclusiveness of society.

Course Outcome of Professional Ethics and Human Values:

After successful completion of the course the students will be able to

- CO1 It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.
- CO2 It provides the student the sensitivity and global outlook in the contemporary



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world to fulfill the professional obligations effectively.

Course Code	STRUCTURAL ANALYSIS – II
PC3101	

Course Outcomes:

At the end of this course; the student will be able to

- CO1 Differentiate Determinate and Indeterminate Structures
- CO2 Carryout lateral Load analysis of structures
- CO3 Analyze Cable and Suspension Bridge structures
- CO4 Analyze structures using Moment Distribution, Kani's Method and Matrix methods.

Course Code	DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES
PC3102	

Course Outcomes:

At the end of this course the student will be able to

- CO1 Work on different types of design philosophies.
- CO2 Carryout analysis and design of flexural members and detailing.
- CO3 Design structures subjected to shear, bond and torsion.
- CO4 Design different type of compression members and footings.



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Course Code	ENVIRONMENTAL ENGINEERING – I
PC3103	

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- CO1 Plan and design the water and distribution networks and sewerage systems
- CO2 Identify the water source and select proper intake structure
- CO3 Design & estimation of water supply system of an apartment
- CO4 Select the appropriate appurtenances in the water supply
- CO5 Selection of suitable treatment flow for raw water treatments

Course Code	GEOTECHNICAL ENGINEERING – I
PC3104	

Course Outcomes:

Upon the successful completion of this course:

- CO1 Able to understand Soil exploration methods and field tests.
- CO2 Able to understand earth pressure theories.
- CO3 Able to understand stability of slopes.
- CO4 Able to analyze the shallow foundations.
- CO5 Able to analyze the deep foundations.



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Course Code	WATER RESOURCES ENGINEERING-I
PC3105	

Course Outcomes

At the end of the course the students are expected to

- CO1 Have a thorough understanding of the theories and principles governing the hydrologic processes
- CO2 Be able to quantify hydrologic components and apply concepts in hydrologic design of water resources projects
- CO3 Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures
- CO4 Develop design storms and carry out frequency analysis
- CO5 Develop flow mass curve and flow duration curve, apply hydrograph analysis in the design of water resources projects
- CO6 Develop unit hydrograph and synthetic hydrograph
- CO7 Estimate flood magnitude and carry out flood routing
- CO8 Determine aquifer parameters and yield of wells.

Course Code	GEOTECHNICAL ENGINEERING LAB
PC3106	

Course Outcomes:

Upon successful completion of this course, student will be able to

- CO1 Determine index properties of soil and classify them.
- CO2 Determine permeability of soils.
- CO3 Determine Compaction, Consolidation and shear strength characteristics.



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Course Code	CONCRETE TECHNOLOGY LAB
PC3107	

Outcomes:

Upon successful completion of this Laboratory experiments, the student will be able to understand and determine

- CO1 The consistency and fineness of cement.
- CO2 The setting times of cement.
- CO3 The specific gravity and soundness of cement.
- CO4 The compressive strength of cement.
- CO5 The workability of cement concrete by compaction factor, slump and Vee – Bee tests
- CO6 The specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
- CO7 The flakiness and elongation index of aggregates.
- CO8 The bulking of sand.
- CO9 Non-destructive testing procedures on concrete.

Course Code	Hydraulic Machinery Lab
PC3108	

Course Outcomes:

At the end of the course, the student will be able to

- CO1 Student will attain the knowledge on various flow measuring devices.
- CO2 Student will understand the importance the friction factors in the in pipes.
- CO3 Student will attain the knowledge on impact of jets.
- CO4 Student will understand the importance of various characteristic curves of turbines.



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- CO5 Student will attain the knowledge on application Bernoulli's equation.
CO6 Student will understand the importance of various characteristic curves of pumps.

Course Code	Socially Relevant Project
SR3101	

Course Outcomes:

The students will be able to

- CO1 Provide a solution the technological problems of society.
CO2 Suggest technological changes which suits current needs of society
CO3 Explain new technologies available for problems of the society.

Course Code	DESIGN AND DRAWING OF STEEL STRUCTURES
PC3201	

Course Outcomes:

At the end of this course the student will be able to

- CO1 Analyze and design steel structural members with relevant IS codes
CO2 Carryout analysis and design of flexural members and detailing
CO3 Design compression members of different types with connection detailing
CO4 Design Plate Girder and Gantry Girder with connection detailing
CO5 Produce the drawings pertaining to different components of steel structures



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Course Code	GEOTECHNICAL ENGINEERING – II
PC3202	

Course Outcomes:

Upon the successful completion of this course:

CO1 Able to understand Soil exploration methods and field tests.

CO2 Able to understand earth pressure theories.

CO3 Able to understand stability of slopes.

CO4 Able to analyze the shallow foundations.

CO5 Able to analyze the deep foundations.

Course Code	TRANSPORTATION ENGINEERING – II
PC3203	

Course Outcomes:

At the end of course, Student will be able to

CO1 Design geometrics in a railway track.

CO2 Plan track layouts and control movement of trains

CO3 Design airport geometrics and airfield pavements.

CO4 Plan, construct and maintain Docks and Harbors.

Course Code	CONSTRUCTION TECHNOLOGY & MANAGEMENT
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PE3201	
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Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- CO1 Appreciate the importance of construction planning
- CO2 Understand the functioning of various earth moving equipment
- CO3 Know the methods of production of aggregate products and concreting and usage of machinery required for the works.
- CO4 Apply the gained knowledge to project management and construction techniques.

Course Code	ENVIRONMENTAL IMPACT ASSESSMENT
PE3201	

Course Outcomes:

Upon successful completion of this course, the students will be able to:

- CO1 Prepare EMP, EIS and EIA report, estimate cost benefit ratio of a project
- CO2 Selection of an appropriate EIA methodology
- CO3 Evaluation of impacts on environment
- CO4 Evaluation of risk assessment
- CO5 Know the latest acts and guidelines of MOEF & CC

Course Code	Industrial Wastewater Treatment
PE3201	

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- CO1 Know the quality and quantity of water for various industries and Advanced water treatment methods
- CO2 Learn the common methods of treatment of wastewaters and biological treatment methods



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CO3 Study of methods to reduce impacts of disposal of wasters into environment and CETPs.

CO4 Study of methods of treatment of wastewaters from specific industries like steel plants, refineries, and power plants, that imply biological treatment methods

CO5 Study of methods of treatment of wastewaters from industries like Aqua, dairy, sugar plants, and distilleries that imply biological treatment methods.

Course Code	ENVIRONMENTAL ENGINEERING – II
PE3204	

Course Outcomes:

By the end of successful completion of this course, the students will be able to:

CO1 Plan and design the sewerage systems

CO2 Characterization of Sewage

CO3 Select the appropriate appurtenances in the sewerage systems

CO4 Selection of suitable treatment flow for sewage treatment

CO5 Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river

Course Code	DISASTER MANAGEMENT
OE3201	

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

CO1 Affirm the usefulness of integrating management principles in disaster mitigation work

CO2 Distinguish between the different approaches needed to manage pre-



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during and post- disaster periods

CO3 Explain the process of risk management

CO4 Relate to risk transfer

Course Code	ENVIRONMENTAL POLLUTION & CONTROL
OE3201	

Course Learning Outcomes:

By the end of successful completion of this course, the students will be able to:

CO1 Identify the air pollutant control devices.

CO2 Have knowledge on the NAAQ standards and air emission standards.

CO3 Differentiate the treatment techniques used for sewage and industrial wastewater treatment methods.

CO4 Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.

CO5 Appreciate the methods of environmental sanitation and the management of community facilities without spread of epidemics.

CO6 Appreciate the importance of sustainable development while planning a project or executing an activity

Course Code	ELEMENTS OF CIVIL ENGINEERING
OE3201	

Course Outcomes:

Student will be able to

CO1 basics of Civil Engineering concepts

CO2 the surveying the elevations and mapping

CO3 the construction materials and elements

CO4 water resource development and overall infrastructure development



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Course Code	GREEN TECHNOLOGY
OE3201	

Course Learning Outcomes:

Upon successful completion of this course, the students will be able to:

- CO1 Enlist different concepts of green technologies in a project
- CO2 Understand the principles of Energy efficient technologies
- CO3 Estimate the carbon credits of various activities
- CO4 Identify the importance of life cycle assessment
- CO5 Recognize the benefits of green fuels with respect to sustainable development.

Course Code	SMART CITIES
OE3201	

Course Outcomes:

Upon successful completion of this course, the students should be able to:

- CO1 Understand the importance.
- CO2 Practicing the concept of inclusive urban planning.
- CO3 Will have sensitization towards implementing contributions in sustainable development.



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Course Code	PROJECT MANAGEMENT
OE3201	

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- CO1 appreciate the importance of construction planning
- CO2 understand the functioning of various earth moving equipment
- CO3 know the methods of production of aggregate products and concreting
- CO4 apply the gained knowledge to project management and construction techniques.

Course Code	TRAFFIC SAFETY
OE3201	

Course Outcomes:

The student is able to

- CO1 To understand fundamentals of Traffic Engineering.
- CO2 To investigate and determine the collective factors & remedies of accidents involved.
- CO3 To design and plan various road geometrics.
- CO4 To manage the traffic system from road safety point of view.

Course Code	WASTEWATER TREATMENT
OE3201	

Course Outcomes:

Upon the successful completion of this course, the students will be able to:



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- CO1 Know the quality and quantity of water for various industries and Advanced water treatment methods
- CO2 Learn the common methods of treatment of wastewaters and biological treatment methods
- CO3 Study of methods to reduce impacts of disposal of wasters into environment and CETPs.
- CO4 Study of methods of treatment of wastewaters from specific industries like steel plants, refineries, and power plants, that imply biological treatment methods
- CO5 Study of methods of treatment of wastewaters from industries like Aqua, dairy, sugar plants, and distilleries that imply biological treatment methods.

Course Code	ENVIRONMENTAL ENGINEERING LAB
PC3205	

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- CO1 Estimate some important characteristics of water and wastewater in the laboratory
- CO2 Draw some conclusion and decide whether the water is suitable for construction or not, drinking or not; ultimate disposal as per effluent standards or not.
- CO3 Decide whether the water body is polluted or not with reference to the state parameters in the list of experiments
- CO4 Estimate and study the strength of the raw and treated effluents in terms of BOD, COD, pH, TDS and chloride of the neutralization tank treating effluents from Chemistry lab or Environmental Engineering Laboratory.

Course Code	TRANSPORTATION ENGINEERING LAB
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PC3206	
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Course outcomes:

At the end of the course, the student will be able to

- CO1 Test aggregates and judge the suitability of materials for the road construction
- CO2 Test the given bitumen samples and judge their suitability for the road construction
- CO3 Obtain the optimum bitumen content for Bituminous Concrete
- CO4 Determine the traffic volume, speed and parking characteristics.
- CO5 Draw highway cross sections and intersections.

Course Code	Essence of Indian Traditional Knowledge / Professional Ethics and Human Values
MC3201	

Course Outcomes:

It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties. It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.

Course Code	WATER RESOURCES ENGINEERING–II
PC4101	



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Course Outcomes:

At the end of the course the student will be able to

- CO1 Estimate irrigation water requirements
- CO2 Design irrigation canals
- CO3 Design irrigation canal structures
- CO4 Plan and design diversion head works
- CO5 Analyze stability of gravity and earth dams
- CO6 Design hydraulic ogee spillways

Course Code	ESTIMATING, SPECIFICATIONS & CONTRACTS
PE4101	

Course Outcomes:

Upon the successful completion of this course:

- CO1 The student should be able to determine the quantities of different components of buildings.
- CO2 The student should be in a position to find the cost of various building components.
- CO3 The student should be capable of finalizing the value of structures

Course Code	REMOTE SENSING AND GIS APPLICATIONS
PE4102	

Course outcomes

At the end of the course the student will be able to



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- CO1 Be familiar with ground, air and satellite-based sensor platforms.
- CO2 Interpret the aerial photographs and satellite imageries
- CO3 Create and input spatial data for GIS application
- CO4 Apply RS and GIS concepts for application in Civil Engineering.

Course Code	GEO-SPATIAL TECHNOLOGIES
PE4102	

Course Outcomes:

At the end of the course the student will be able to:

- CO1 Understand the geospatial technology relating to the data acquiring and processing that is associated with geographic locations
- CO2 Apply Geospatial techniques in the decision support systems useful for decision makers and community services.
- CO3 Ability to solve the problems related to the natural resource management, environment, urban planning and Infrastructure development, etc.
- CO4 Able to generate the thematic maps using Geospatial techniques
- CO5 Apply the concept of Geospatial Techniques to the Civil Engineering problems

Course Code	GROUND IMPROVEMENT TECHNIQUES
MSFI	

Course Outcomes:

After the completion of course, the student will be able to:

- CO1 Understand the principles of various ground improvement techniques.
- CO2 Prefer suitable ground improvement techniques based on the Soil conditions and local available materials.
- CO3 Understand the principles and suitability of various stabilization techniques.
- CO4 Select suitable stabilization techniques based on the Soil conditions and local available materials.
- CO5 Understand the Principles of dewatering techniques and to apply suitable dewatering technique in the field depending on the requirement.
- CO6 Understand the grouting technology and its applications by selecting the suitable grout based on the field conditions.



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Course Code	REINFORCED SOIL STRUCTURES
PE3201	

Course Outcomes:

The students will be able to:

- CO1 Understand the history and mechanism of reinforced soil
- CO2 Become aware about situations where geo-synthetics can be used.
- CO3 Know about various types of geo-synthetics and their functions
- CO4 Be able to do simple design of reinforced soil retaining walls and reinforced earth beds.

Course Code	DESIGN & DRAWING OF IRRIGATION STRUCTURES
PE4201	

Course Outcomes:

At the end of the course the student will be able to design various irrigation structures.

Course Code	WATERSHED MANAGEMENT
PE3201	

Course outcomes:

At the end of the course the student will be able to



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- CO1 Calculate watershed parameters and analyze watershed characteristics to take appropriate management action.
- CO2 Quantify soil erosion and design control measures.
- CO3 Apply land grading techniques for proper land management.
- CO4 Suggest suitable harvesting techniques for better watershed management.
- CO5 Apply appropriate models for watershed management.

Course Code	ROAD SAFETY MANAGEMENT
PE3201	

Course Outcomes:

The student is able to

- CO1 To understand fundamental of Traffic Engineering.
- CO2 To investigate & determine the collective factors & remedies of accident involved.
- CO3 To design & planning various road geometrics.
- CO4 To massage the traffic system from road safety point of view.

Course Code	DISASTER MANAGEMENT & MITIGATION
PE3201	

Course Outcomes:

The student will develop competencies in

- CO1 The application of Disaster Concepts to Management
- CO2 Analyzing Relationship between Development and Disasters.
- CO3 Ability to understand Categories of Disasters and realization of the responsibilities.



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Course Code	DISASTER MANAGEMENT
PC3106a R20	

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- CO1 Affirm the usefulness of integrating management principles in disaster mitigation work
- CO2 Distinguish between the different approaches needed to manage pre-during and post- disaster periods
- CO3 Explain the process of risk management
- CO4 Relate to risk transfer

Course Code	ENVIRONMENTAL POLLUTION & CONTROL
R19 OE4101b	

Course Outcomes:

By the end of successful completion of this course, the students will be able to:

- CO1 Identify the air pollutant control devices
- CO2 Have knowledge on the NAAQ standards and air emission standards
- CO3 Differentiate the treatment techniques used for sewage and industrial wastewater treatment methods.
- CO4 Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.
- CO5 Appreciate the methods of environmental sanitation and the management of community facilities without spread of epidemics.
- CO6 Appreciate the importance of sustainable development while planning a project or executing an activity.



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Course Code	ELEMENTS OF CIVIL ENGINEERING
R19 OE4101c	

Course Outcomes:

At the end of the course the student is familiar

- CO1 basics of Civil Engineering concepts
- CO2 the surveying the elevations and mapping
- CO3 the construction materials and elements
- CO4 water resource development and overall infrastructure development

Course Code	GREEN TECHNOLOGY
R19 OE4101d	

Course Outcomes:

Upon successful completion of this course, the students will be able to:

- CO1 Enlist different concepts of green technologies in a project
- CO2 Understand the principles of Energy efficient technologies
- CO3 Estimate the carbon credits of various activities
- CO4 Identify the importance of life cycle assessment
- CO5 Recognize the benefits of green fuels with respect to sustainable development.

Course Code	SMART CITIES
R19 OE4101e	



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Course Outcome:

After learning the course, the students are be able to:

- CO1 Understand the importance
- CO2 practicing the concept of inclusive urban planning
- CO3 will have sensitization towards implementing contributions in sustainable development.

Course Code	PROJECT MANAGEMENT
R19 OE4101f	

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- CO1 appreciate the importance of construction planning
- CO2 understand the functioning of various earth moving equipment
- CO3 know the methods of production of aggregate products and concreting
- CO4 apply the gained knowledge to project management and construction techniques

Course Code	TRAFFIC SAFETY
R19 OE4101g	

Course Outcomes:

The student is able to



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- CO1 To understand fundamentals of Traffic Engineering.
- CO2 To investigate and determine the collective factors & remedies of accident involved.
- CO3 To design and plan various road geometrics.
- CO4 To manage the traffic system from road safety point of view.

Course Code	GEO-SPATIAL TECHNOLOGIES
R19 OE4101h	

Course Outcomes:

At the end of the course the student will be able to:

- CO1 Understand the geospatial technology relating to the data acquiring and processing that is associated with geographic locations
- CO2 Apply Geospatial techniques in the decision support systems useful for decision makers and community services.
- CO3 Ability to solve the problems related to the natural resource management, environment, urban planning and Infrastructure development, etc.
- CO4 Able to generate the thematic maps using Geospatial techniques
- CO5 Apply the concept of Geospatial Techniques to the Civil Engineering problems.

Course Code	WASTE WATER TREATMENT
R19 OE4101i	

Course Outcomes:

Upon the successful completion of this course, the students will be able to:



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- CO1 Know the quality and quantity of water for various industries and Advanced water treatment methods.
- CO2 Learn the common methods of treatment of wastewaters and biological treatment methods.
- CO3 Study of methods to reduce impacts of disposal of wasters into environment and CETPs.
- CO4 Study of methods of treatment of wastewaters from specific industries like steel plants, refineries, and power plants, that imply biological treatment methods
- CO5 Study of methods of treatment of wastewaters from industries like Aqua, dairy, sugar plants, and distilleries that imply biological treatment methods

Course Code	GIS & CAD LAB
R19 OE4102	

Course Outcomes:

At the end of the course the student will be able to

- CO1 Work comfortably on GIS software
- CO2 Digitize and create thematic map and extract important features
- CO3 Develop digital elevation model
- CO4 Use structural analysis software to analyze and design 2D and 3D frames
- CO5 Design and analyze retaining wall and simple towers using CADD software.

Course Code	Design & Drawing of Steel Structures
R19 OE4103	



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Course Outcomes:

At the end of this course the student will be able to

- CO1 Work with relevant IS codes.
- CO2 Carryout analysis and design of flexural members and detailing.
- CO3 Design compression members of different types with connection detailing
- CO4 Design Plate Girder and Gantry Girder with connection detailing
- CO5 Produce the drawings pertaining to different components of steel structures.

Course Code	DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES
R19 PC3102	

Course Outcomes:

At the end of this course the student will be able to

- CO1 Work on different types of design methods
- CO2 Carryout analysis and design of flexural members and detailing
- CO3 Design structures subjected to shear, bond and torsion
- CO4 Design different type of compression members and footings

Course Code	DESIGN AND DRAWING OF IRRIGATION STRUCTURES
R19 PC4103	

Course Outcomes:

At the end of the course the student will be able to understand, design and draw hydraulic structures of



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- CO1 Surplus weir
- CO2 Tank sluice with a tower head
- CO3 Canal drop-Notch type
- CO4 Canal regulator
- CO5 Syphon aqueduct type III

Course Code	BRIDGE ENGINEERING
R19 PE4202	

Course Outcomes:

At the end of the course, the student will be able to

- CO1 Design theories for super structure and substructure of bridges
- CO2 Design Culvert, R.C.C T Beam Bridge.
- CO3 Understand the behavior of continuous bridges, box girder bridges
- CO4 Possess the knowledge to design prestressed concrete bridge

Course Code	PRE-STRESSED CONCRETE
R19 PE4203	

Course Outcomes:

At the end of this course the student will be able to

- CO1 Understand different methods of pre stressing
- CO2 Estimate effective prestress including short- and long-term losses



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CO3 Analyze and design prestressed concrete beams under flexure and shear

CO4 Understand the relevant IS Code provisions for pre stressed concrete

Course Code	Advanced Structural Analysis

Course Outcomes:

At the end of this course; the student will be able to

CO1 Differentiate Determinate and Indeterminate Structures

CO2 Carryout lateral Load analysis of structures

CO3 Analyze Cable and Suspension Bridge structures

CO4 Analyze structures using Moment Distribution, Kani's Method and Matrix methods

Course Code	Project Work
R19 PR4201	

Course Outcomes of the Project work.

Upon completion of the Project work, the student will be able to

CO1 Apply all levels of Engineering knowledge in solving the Engineering problems.

CO2 Work together with team spirit.

CO3 Use Civil Engineering software at least one.

CO4 Document the projects