**COURSE OBJECTIVES & OUTCOMES**

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| **Year** | **Course Name** | **Objectives** | **Outcomes** |
| **I/IV B.Tech** |
| **I** | **Mathematics-I** | * The course will present the methods of solving first order and higher order differential equations along with some physical applications.
* It will also presents curve fitting techniques for the given data and the study of co-relation and regression between two variables.
* To present the concepts of Laplace transforms and their properties and use them for solving initial and boundary value problems.
* It will present the concept of Fourier series representation of periodic functions and calculating the Fourier coefficients of continuous and discontinuous functions of a periodic nature, using Euler’s formulae.
 | * By the end of the course Mathematics-I, the students will be able to:
* Solve first order & higher order differential equations.
* Understand their engineering applications.
* Study the relation between two variables for the given data.
* Solve the initial and boundary value problems by applying Laplace transforms.
* Write the Fourier expansions of continuous and discontinuous periodic functions.
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| **I** | **Mathematics-II** | * Understand to distinguish between continuous and discontinuous functions.
* Distinguish between scalar and vectors
* Evaluate scalar and vector product, giving geometrical interpretation.
* Reduce engineering problems to equations involving matrices
* To solve simultaneous linear equations
* To emphasize how integral over curves, surfaces and volumes are define.
 | * An ability to apply knowledge of engineering, information technology, mathematics and science.
* An ability to identify, formulate and solving engineering problems.
* Distinguish between a solenoid and irrigational vectors.
* To solve linear equations.
* Calculate Taylor’s and Maclaurin’s expansions of a given function.
* The analogies between curves and surfaces can be more readily studied.
* The relationship between Green’s theorem and Stoke’s theorem is easy to establish.
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| **I** | **Physics** | * Student acquire knowledge on basic wave phenomenon such as interference and diffraction and identification of various vibration modes of atoms of molecules in materials.
* The students gains an insight in the physical nature of electrical and magnetic phenomena and also obtain mastering methods like calculations and solving practical problems
* Knows about the quantum concepts of physics, dual nature of matter and the physical interpretation of the wave function
* It is made to acquaint with the super conductivity property and their related phenomena, optoelectronics (optical phenomena, LED, LCD and photo diode)
 | After going through the course the students will be able to understand:* That Sound waves are characterized by frequency and inaudible to the human ears have many applications, especially in industries and in medical field.
* Knows that a particle may be subjected to two forces or two velocities simultaneously and also also have a particle under the action of two SHM’s at the same time.
* The principle of interference and its applications in thin films.
* Concepts of polarization, producing two refracted rays by a crystal due to double refraction (optical activity).
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| **I** | **Chemistry** | * To know methods of determining hardness, softening and desalination of water
* To acquire knowledge on types of polymerizations and their mechanisms.
* To acquire knowledge on compositions and calorific values of solid fuels, liquid fuels and gaseous fuels.
* To know factors influencing corrosion and the protection methods are developed basing on factors influencing and mechanisms.
* To know role of lubricants in reducing wear and friction.
 | * Students acquire knowledge on quality and utility of water
* Students know suitable replacements of metal after knowing about composite materials
* Students know the utility of plastics in automobile, electronics, electrical and other fields.
* Students can relate corrosion and environment and suggest methods to prevent corrosion.
* Knowledge acquired on fuels and phase rule gives good foundation
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| **I** | **Technical English Communication Skills** | * To enable the learners to access a variety of background information like vocabulary gloves and also alerts learners to some of the common pitfalls in the use of vocabulary and attempts to enrich their powers of communication.
* To develop the skills of technical writing relevant to their academic setup: writing reports, formal letters etc., and enable them to carryout their official and professional duties efficiently.
* Presents valuable corporate information that will help learners enter the professional world and perform efficiently.
* To help students use grammar for communication and relate grammatical structures to meaning, use and situation.
* To develop communication skills in a professional context which enable students to complete for an engineering or technical career and also perform efficiently in their chosen profession.
 | * Students gain sound knowledge of vocabulary, which covers different areas like one word substitutes, idioms and phrases etc., and will be able to embellish their language while communicating.
* It enables the students to use the medium of technical writing which is highly essential for every engineer to function effectively in a professional environment.
* He / she will be able to get awareness of multiple corporate sectors and their status which is helpful to reach heights of excellence in their career.
* They get familiarized with Basic English grammar, the knowledge acquired is exploited to help students use grammar for communicative purposes.
* Overall outcome aims to develop students ability to use English accurately, appropriately and fluently, both in oral and written communication.
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| **I** | **Computer Programming with C** | * Effectively apply scientific and engineering methodologies to the analysis of problems and the design, implementation and evaluation of computer-based solutions.
* Utilize their breadth and depth of theoretical computer science, engineering sciences, basic sciences and mathematics to adapt to emerging technologies and the ever changing needs of industry or in pursuing higher studies.
* Exploit their awareness of persistent concepts in computer science and interrelated subjects to understand and be able to effectively utilize current platforms and tools.
* Display competence and efficiency when working on individual or team projects.
* Continue to enhance their technical skills and their development as mature computing professionals through life-long learning.
 | * An ability to design and conduct experiments and to analyze and interpret data related to software and hardware design solutions. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
* An ability to identify, formulate, and solve engineering problems based on a fundamental understanding of concepts of computer engineering topics.
* Recognition of the need for, and an ability to engage in life-long learning.
* Knowledge of contemporary issues in computer engineering.
* An ability to use the techniques, skills and modern engineering tools necessary for computer engineering practice.
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| **I** | **Engineering Mechanics** | * To study and know Physical quantities and terms
* To study various types of force systems
* To teach students the basic principles of mechanics of rigid bodies and to analyze problems in a simple and logical manner
* To teach students to draw free body diagrams and equilibrium methods in problem solving
* To study and determine centroids of various standard geometrical plane figures
* To study and know the application of various trussed members
* To teach the students to analyze simple trusses using method of joints under equilibrium
* To study and analyze the static friction and its applications
* To study and Able to apply the principle of Virtual Work for solving the equilibrium of ideal systems
* To study Rectilinear and Curvilinear translation of a particle
* To study principle of dynamics and apply it to impulse and momentum , Work and Energy which is useful to analyze turbo machineries
* To study the principle of conservation of energy and direct central impact
* To teach the area moments if inertia and radius of gyration of mathematically definable areas as well as composite areas of standard geometric shapes.
* To study and know the kinematics of Curvilinear motion of a particle
* To study and to analyze moments of inertia of material bodies.
* To study and know the kinematics of rotation of a rigid body about a fixed axis.
 | * Able to apply principles of mechanics to determine the resultant of several concurrent forces acting on a particle
* Simplify a system of forces and couples applied to a rigid body into a single resultant force and couple
* Able to apply the principle of rigid body equilibrium and to determine unknown forces and moments acing on a static rigid body
* Determine the centriods and center of gravity of mathematically definable areas as well as composite areas of standard geometrical shapes
* Perform Basic structural analysis of trusses using Method of Joints
* Able to apply the basic concepts of dry friction on inclined planes and wedges
* Able to apply principle of virtual work for Equilibrium of ideal systems
* To determine velocity and acceleration of a particle under rectilinear translation
* Able to apply dynamic Equilibrium Equation for rigid bodies under rectilinear translation in the fields of Railways, Ships, Aircrafts, guns, rockets..etc.,
* To determine the area moments of inertia and radius of gyration of mathematically definable areas as well as composite areas of standard geometric shapes.
* Able to apply dynamic Equilibrium Equation for rigid bodies under curvilinear translation in the fields of Railways, Ships, guns, automobiles, projectiles..etc.,
* To determine the velocity and acceleration (both tangential and radial) of a particle under curvilinear translation.
* To determine the mass moments of inertia and radius of gyration of mathematically definable 3D bodies of standard solid shapes.
* Able to understand the rotation of a rigid body about a fixed axis.
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| **I** | **Engineering graphics** | * Comprehend general projection theory with emphasis on orthographic projection to represent three dimensional objects in two dimensional views.
* Construct letters & Numerals in a legible freehand form
* To be able to plan and prepare neat orthographic drawings of points, Straight lines, Regular planes and solids
* Draw and identify various types of section and Auxiliary views
* To enable the students the aspects of development of surfaces in sheet metal working
* Introduce Auto CAD software for the creation of basic entities and usage of different tool bars
 | * Acquire basic skills in Technical graphic communication
* The students will be able to visualize and communicate with 2D as well as three dimensional shapes.
* Understands the application of Industry standards and best practices applied in Engineering Graphics
* The student is able to apply the knowledge of development of surfaces in real life situations
* Student is introduced to modern CAD system using Auto CAD.
* The students will be able to draw simple 2D Engineering Drawings using Auto Cad.
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| **I** | **Physics Lab** | * Engineering is a practical discipline. where the function of manipulating materials, energy, and information, thereby creating benefit for humankind.
* To do this successfully, engineers must have acknowledge of nature that goes beyond mere theory—knowledge that is traditionally gained in educational laboratories**.**
* Thus, from the earliest days of engineering education, instructional laboratories have been an essential part of undergraduate.
* Any scientific discovery or an invention is done through various research and experiments. A physics lab may also have more sophisticated equipment, such as telescopes, microscopes, spectroscopes and electromagnets,.
 | * For further studies of the subject, to come up with new results related to the subject, it is necessary to follow a proper scientific method, which involves performing experiments to prove a certain hypothesis.
* Laboratory work plays a very vital role in the teaching of emerging subjects. words, scientific experiments related to physics are performed in a physics laboratory, more commonly referred as a physics lab.
* The undergraduate engineering laboratory, have identified three roles: First, the student should learn how to be an experimenter. Second, the laboratory can be a place for the student to learn new and developing subject matter. Third, laboratory courses help the student to gain insight and understanding of the real world.”
* The purpose of laboratory work analyze the experimental data and explain the significance of the results and to introduce the student to the practical world where he requiring skills in performing the experiment & also train him in the correct use of instruments.
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| **I** | **Chemistry Lab** | * Some of the experiments are utilized for determination of quality of samples like determination of percentage of available chlorine in Bleaching power to prevent the excess Chlorine in municipal water, so that it helps the hazards of people in Society.
 | * Some of the experiments are utilized in determination of various parameters in water sample like determination of total dissolved solids, chloride, fluoride contents, calcium and mansion contents etc., in the health grounds of the society
* A few experiments are helpful for the study of oxidation and reductions reactions of microbiological activities
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| **I** | **Workshop Practice** | * To involve the students in the aspects of carpentry work, metal joinery work, house wiring and development and preparation of sheet metals which enables students to gain basic knowledge of selection of materials, tools and its applicability in their profession.
* The students will be able to identify various equipment and carpentry tools and to perform various operations related to it for making wooden joints.
* The students will be familiar with equipment, tools, technical specifications and nomenclature related to electric arc welding process and able to perform the welding joints.
* The students to understand various electrical circuits & power connections and terminology related to house wiring and able to perform various electrical connections such as series, parallel and stair case.
 | * Applicability of various carpentry tools in making different types of wooden joints for basic Engineering practice
* To apply the principles of arc welding process to weld MS Flat plates for making Different Joints
* To Optimize the material Planning While in the development of Sheet metal.
* To Analyse Electrical Circuits for domestic usage.
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| **I** | **Computer Programming Lab** | * To understand the ANSI C/Turbo C compilers.
* To understand the conditional statements, control flow statements.
* To understand the arrays, strings and pointers.
* To understand the structures, unions and files.
* To develop ‘C’ programs for various applications.
 | * Able to understand ANSI C/ Turbo C.
* Able to write C programs using conditional statements and control loops.
* Able to write C programs using 1D, 2D and Multi Dimensional arrays.
* Able to write various programs on strings and pointers.
* Able to write C programs to develop various applications using structures, unions and Files.
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| **II/IV B.Tech** |
| **II** | **Mathematics-III** | * To provide a basic knowledge of numerical methods including solving system of linear equations, numerical quadrature and numerical solution to ordinary and partial differential equations.
* To develop and implement a prototype of a mathematical assignment to connect Fourier transforms to real world applications.
 | * Work with mathematical models of technology and systems.
* Perform manual iterations of bisection method, Newton-Raphson method etc.,
* Solve linear system of equations numerically
* Manually apply Euler’s method, forth order Runge-Kutta Method to advance a single ordinary differential equation for one or two steps of the independent variable.
* Improve capabilities in differential and difference equations of interest to electrical, electronic, communications and computer systems engineers
* Make the students learn certain important methods used for solving partial differential equations exactly and approximately.
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| **II** | **Building Materials, Planning & Construction**  | * The course starts with the basics involved in selection of a good brick, stone and timber for construction works
* The course later presents detailed knowledge regarding the types of masonry works including the types of bonds used in masonry work
* It also exhibits various types of walls, floors and roofs for residential and commercial buildings
* It also presents a detail knowledge about dampness, damp proofing course and acoustics inside a building
* Effectively deals with the types of form work, scaffolding, and shoring used for various rehabilitation of the buildings
* Presents the basics of architecture and building bye laws which are followed in the construction of a building
 | * Students can thus able to select a suitable brick, stone and timber for various types of building
* Students can select required masonry work and the type of bond involved for the construction
* Students are able to select the type of roof, staircase based upon the specifications and the requirement
* Students will gain knowledge regarding the dampness and damp proofing inside a building
* Students can effectively know how to use the form wok, scaffolding and shoring before and after the construction of building
* They can also gain the detail knowledge for the design of the building according the building bye laws and aesthetics
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| **II** | **Surveying-I** | * To take measurements to determine the relative positions of the existing features on the ground.
* To train various theoretical aspects of the surveying principles.
* To familiarize the simple surveying techniques.
* To give adequate knowledge on chain surveying, compass surveying.
* To acquaint with procedures of leveling by dump level & auto level.
* To layout or to mark the positions of the proposed structures on the ground.
 | By the end of the course surveying-I, the students will be able to* To know the relative positions of the existing ground by conducting the survey.
* To know the how to take the levels of existing ground.
* To layout the existing structures on the ground
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| **II** | **Solid Mechanics-I** | * To understand the internal resistances against the applied loads on different shaped materials.
* To know the stress, strains and different engineering properties of materials.
* To introduce concept of shear force and bending moment.
* To introduce concept of torsion and design for torsion for materials.
 | * Able to understand the engineering properties of materials.
* Able to draw bending moment and shearing force diagrams for beams.
* Able to know and design for torsion problems.
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| **II** | **Fluid Mechanics** | * To explain the units of measurement, properties of fluids and types of fluids.
* To introduce concepts, principles, laws, observations, and models of fluids at rest and in motion.
* To determine the pressure variation in static fluid on different surfaces.
* To understand the stability criteria of submerged and floating bodies.
* To derive basic equations and their applications.
* To analyze flow rates, velocities, energy losses, and momentum fluxes for fluid systems.
* To Learn nature of rotation, circulation, resistance(viscous, turbulent),boundary layers, and separation with applications to drag and lift on objects
* To learn methods for computing head losses and flows in simple pipes.
* To estimate the efficiency of power transmission by pipe line.
* To estimate the friction factor for smooth and rough pipes
 | By the end of the course fluid mechanics, the students will be able to:* To understand the basic principles governing the dynamics of non-viscous fluids
* To be able solve kinematics problems such as finding particle paths and stream lines.
* To be able to apply Bernoulli's theorem and the momentum integral to simple problems.
* To provide capabilities in estimating discharge and to find forces for design of hydraulic structures.
* To estimate lift and drag on submerged bodies.
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| **II** | **Engineering Geology** | * utilizing their backgrounds in engineering and earth science to provide solutions to engineering problems within the context of the natural world
* To learn the fundamentals of the engineering properties of Earth materials
* To develop the quantitative skills for solving basic engineering geology problems
* To learn about fluid flow and contaminant transport in the subsurface
* To geo-mechanics (i.e. the behavior of earth materials)
* To geo-engineering (i.e. design with earth materials)
* To Study of the rocks main properties and their application as construction and foundation materials.
* To Study of the geotechnical and geological characteristics of massifs towards the resolution of engineering and environment problems resulting from the interaction between human works and activities and the forecast and development of preventive or repairing measures of geological accidents
 | At the end of the course the student will be* Able to learn how to approach various situations related to engineering geology.
* Can improve the knowledge of geological and geo-morphological processes, developing skills in the analysis of their effects on civil engineering design.
* Enhance the knowledge and understanding of geology, and apply this knowledge to engineering projects such as dams, landfills, rock quarries, roads, tunnels and slopes.
* Able to construct a map of the surface geology and a cross section of the subsurface.
* Have knowledge of the physical, hydrological, mechanical and chemical properties of common rocks.
* Have knowledge of investigation methods, primarily geophysical methods, for determining the rock mass properties underground, their strengths and weaknesses.
* Able to assess the opening of a rock quarry based the rock’s suitability for usage in asphalt and concrete;
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| **II** | **Engineering Geology Laboratory** | * Develops the ability to understand the importance of geology in civil engineering
* To study the topographical maps, satellite imageries and utilize them for planning
* Study and identification of minerals and rocks for better utilization
* Study of folds, faults and joints to ascertain the tectonic nature of a region
* Study of various engineering properties of rocks such as compressive strength, durability, porosity etc to ascertain the engineering behavior of earth materials as site rocks and building materials
* To study the various geophysical methods such as seismic refraction and electrical resistivity methods for exploring the sub surface at faster, cheaper and reliable manner
 | * Students able to understand the importance of geology in civil engineering
* Student can understand how to plan the exploration of natural resources
* Identification of minerals helps in the identification of rocks. The minerals will tell the various engineering properties of the rocks and their suitability
* Student can assess the stability of slopes and possible seismic hazards of the region
* Able to select suitable sites which are less problematic and building materials that give the best appearance , durability and life at competitive price
* Able to use geophysical methods to solve geological and geotechnical problems that are fool proof
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| **II** | **Surveying Field work-I** | * To chaining of a line using tape and chain and recording of details along the chain line.
* To measure the area of irregular boundaries.
* To prepare a plan of residential building by making use of a chain.
* To find the included angles and local attraction of traverse by using compass surveying.
* To determine the distance between two inaccessible points by using different surveying instruments.
* To measure the elevation difference between Points at short measured intervals along a fixed line.
* To determine the elevation difference between two points-based by reciprocal leveling method.
* To prepare a contouring of a small area by method of blocks
* To plotting of a building by using plane table surveying
* To measure the horizontal and vertical angles of various points by theodolite
 | By the end of the course the students will be able to* To prepare the plan or map showing the ground features from the data obtained by surveying.
* To analyze and compute traverse adjustment and section break downs.
* To perform basic field surveys.
* To convert field data to record data in the form of drawings, sketches and field book files.
* To know about the how to take the levels of existing ground..
 |
| **II** | **Building Drawing** | * The main objective of this laboratory course is to discuss the procedure involved in drawing the basic structural components of a building
* This course presents how to draw the building components both manually using a engineer’s drafter and also using a soft tool, for example AutoCAD
* This course later presents the basics of AutoCAD and procedure for drawing the various views of a building for example, plan, section, and elevation views
 | * Students can draw the components of the building using both the engineer’s drafter and also by using AutoCAD
* Student can make plans out of the given plot sizes and draw the section, elevations views of the building
* Students are effectively trained in using the AutoCAD software which is a best drafting tool for engineers
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| **II** | **Concrete Technology** | * To know about the composition, manufacturing process, types and testing of cement.
* To know the properties of materials used for making concrete i.e cement, Fine aggregate, coarse aggregate and water etc
* To study the properties and behaviour of concrete during fresh state and hardened state by various theories, concepts and tests
* To understand the composition and effects of admixtures and construction chemicals used to improve the properties of concrete
* To know about special concretes and concreting methods
* Studying the design mix procedure using different codes.
 | By the end of this course students will have the capability/knowledge of * The materials used for the concrete and manufacturing procedure
* The chemistry involved and behaviour of the concrete during fresh and hardened state
* using the concrete effectively in the field
* Designing the concrete mix as per IS 10262 code
* special concretes and concreting methods
* using different admixtures and construction chemicals in the concrete
* Durability aspects like corrosion of reinforcement in concrete, sulphate attack etc
 |
| **II** | **Environmental Studies** | * To create an awareness on the various environmental pollution aspects and issues.
* To give a comprehensive insight into natural resources, ecosystem and biodiversity.
* To educate the ways and means to protect the environment from various types of pollution.
* To impart some fundamental knowledge on human welfare measures and environmental acts.
* Demonstrate the environmental problems like global warming. Ozone layer depletion and acid rains
 | Student will be able to* Define and explain the basic issues concerning the ability of the human community to interact in a sustainable way with the environment.
* Describe and discuss the environmental implications of the cycles of biologically important materials through the ecosystem.
* Explain why the size of the human population presents an environmental problem. Discuss the factors for the rise of population worldwide.
* Discuss the benefits of sustaining each of the following types of resources; food, health, habitats, energy, water, air, soil and minerals
* Understand the causes, effects and controlling measures of different types of environmental pollutions with some case studies
* Demonstrate environmental problems like global warming, ozone layer depletion and acid rains
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| **II** | **Surveying-II** | * To introduce the EDM methods and to study about total station and working
* To study the different methods of theodolite traversing and necessary computations and checks to be made for the traverse.
* To deal with various methods employed for the measurement of areas and volumes.
* To determine distances and relative positions using tachometric surveying and trigonometric leveling.
* To study different methods of setting out simple, compound and reverse curves.
* To study the design of simple circular curves.
* To study the positioning of structure, setting out foundation, setting out a sewer and setting out culvert.
* To study different methods of measurement and necessary corrections to be made for base line.
 | * The students will be able to:
* To know about the total station.
* He gains enough knowledge about theodolite traverse & tachometric survey.
* To find out the reduced level of different structures base is inaccessible and accessible.
* To know about how to provide the curves for a roads.
* To know about the positioning of structure from plan to the ground.
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| **II** | **Solid Mechanics-II** | * To develop equations for transformation of plane stress.
* To study the behaviour of columns subjected to different end conditions for different loadings.
* To study the behaviour of thin and thick shells for external and internal loadings.
 | * Able to understand and application to several number of stresses on a plane.
* Able to understand problems on columns.
* Becoming strong in applying mathematics to deflection of beams along with other methods of finding the deflections of beams.
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| **II** | **Hydraulics & Hydraulic Machines** | * To introduce the importance of study of open channel flow, to give brief description on different types of flows and channels and hydraulic design principles of channels.
* To learn the fundamentals of Uniform and Non-Uniform flow in open channels.
* To understand about the concepts of specific energy, critical flow and their applications.
* To give an idea about the gradually varied flow and rapidly varied flow and their equations and computations.
* To introduce the concepts of momentum principles.
* To impart the knowledge on pumps and turbines
* .
 | By the end of the course hydraulics and hydraulic machines, the students will be able to* To know the different types of flows and channels.
* To understand the performance of turbines and pumps.
* To know the applications of momentum principles.
* To make the student is expected to prepare models for prototypes of hydraulic structures.
* To make the student is expected to have thorough knowledge on the selection of turbines and pumps for practical purposes.
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| **II** | **Elements of electrical and Mechanical Engineering** | * The course will present how the power is being transmitted using belt drives with many factors effecting in the process
* Presents the concepts of manufacturing processes and the study of their techniques and usage in the industry.
* To present the concepts of thermal prime movers and their principles and operation.
* To present the applications and working operation of air-compressors in thermal engineering stream.
 | Student will be able to* Know how the power is transmitted by using belt dives and also the relation between the ratios of tensions in belts and how the factors affect the maximum power transmission and their solutions.
* Know the principles, application and their techniques of the manufacturing processes in engineering science and also the wielding and soldering processes and their differences & purpose of usage of the processes.
* Know technically how the boilers, steam turbines, gas turbines and internal combustion engines function & their working principles and operation and also the basic variation in their use in thermal power plants and automobiles.
* Learn the operation and the applications of Single – Stage and multi-stage reciprocating air compressors and also of the rotary air compressors and their differences in practical application
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| **II** | **Hydraulics & Hydraulic Machines Laboratory** | * To determine the Darcy's friction factor for the pipes.
* To determine the coefficient of discharge of venturimeter, orifice, orifice meter, mouth piece and v-notch.
* To determine the efficiency of jet of vane.
* To determine the loss of head in pipes due to sudden expansion and contraction.
* To determine the manning’s and chezy’s constant for open channel.
* To study the performance and determine the efficiencies of pelton turbine and Francis turbine.
* To study the performance characteristics and efficiency of centrifugal pump.
 | * By the end of the course the students will be able
* To understand the determination of discharge for hydraulic equipments.
* To understand the minor and major losses in pipes.
* To understand the performance of turbines and pumps with varying speed and heads.
* To know the efficiency of turbines and pump
 |
| **II** | **Material Testing Laboratory** | * To study the behavior of materials like steel, wood, concrete etc under direct tension, compression, shear, torsion and bending by conducting relevant tests
* To find young’s modulus, modulus of rigidity, hardness, impact resistance of the given materials like steel, wood by conducting relevant tests
* To determine the modulus of rigidity of the spring
* To conduct tests like Normal consistency and fineness of cement, Initial setting and final setting time of cement, Specific gravity, soundness, Compressive strength of Cement to find the quality of cement
* To determine the workability of fresh concrete using Slump cone, Compaction factor, Vee-Bee consistometer tests
* To study the Bulking characteristics of fine aggregate and to determine the Specific gravity of fine and coarse aggregates and fineness modulus of fine aggregate and coarse aggregate.
* To demonstrate the Non-destructive testing on concrete and concrete mix design (IS method)
 | By the end of this course students will have the capability/ knowledge of * behavior of materials like steel, wood, concrete etc under direct tension, compression, shear, torsion and bending
* finding properties of materials like young’s modulus, modulus of rigidity, hardness, impact resistance
* finding the quality of cement
* fresh concrete workability properties to judge the suitability of concrete for the field conditions
* physical properties of concrete making materials like cement, fine aggregate and coarse aggregate to judge suitability for making concrete
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| **II** | **Communication Skills Laboratory** | **II** | **Communication Skills Laboratory** |
| **III/IV B.Tech** |
| **III** | **Environmental Engineering-I** | * To emphasize the importance of protected water supply, understand the design period concept and to estimate future population and to determine water requirement to satisfy various water demands.
* To learn about various sources of water and to select a suitable source based on quality and quantity criteria.
* To design required pipe diameter by using various hydraulic formulae and to discuss the method of laying and testing of pipes.
* To discuss methods for determining the physical, chemical and biological characteristics of water and to ascertain suitability for drinking based on BIS standards for drinking water.
* To design water treatment facilities-sedimentation, coagulation, filtration.
* To discuss various methods of disinfection with special emphasis on chlorination and types of chlorination.
* To introduce methods for water softening, defloridation and removal of color, odour and taste.
* To learn about various layouts of distribution networks and analyse distribution systems by various methods.
 | * At the end of the course the student will be able to:
* Determine the future population at the end of design period and per capita water requirement.
* Choose a suitable source of water supply based on required quantity and available quality.
* Conduct various test to ascertain physical, chemical and biological quality of water.
* Ascertain the suitability of water for drinking based on water quality standards.
* Design various water treatment facilities.
* Select a suitable method of disinfection depending on the situation.
* Suggest suitable treatment method for removal of hardness, excess fluorides and color, odour and taste.
* analyze and design complex water distribution networks.
* At the end of the course the student will be able to design complete water treatment plant for given population and per capita consumption
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| **III** | **Structural Analysis-I** | * Students will learn about establishing different types of structures and degree of determinacy, calculating reactions and internal forces (axial force, shear, and bending moment) for determinate and indeterminate structures and its components.
* Students will learn about calculating deflections for beams and frames using energy methods.
* Students will learn about constructing influence lines for beams
* To analyze the statically indeterminate structures like fixed beams and propped cantilevers by energy methods and consistent deformation method
* student will be able to learn the methods of joints and sections to analyze truss structures and Determine the forces acting between members of frames composed of pin-connected members.
 | * Students will have an ability to formulate questions and develop analytical answers for analysis of structures, and solve broad-based structural analysis problems.
* Student can make qualitatively correct sketches of deflections and moment diagrams for statically determinate beams and frames.
* Student will develop an basic ability to analyze various statically indeterminate structures in terms of forces and deformations.
* Students will be able to Use the method of sections to determine internal forces and internal shear and bending moments using loading equations and draw shear / bending moment diagrams.
* Students will able to use MATLAB(R) to compute forces and moments and solve systems of equations in statics problems
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| **III** | **Water Resources Engineering-I** | * The main objectives of the course are:
* To steady hydrologic cycle, measure precipitation and compute average rainfall over a basin
* To steady evaporation and infiltration and to determine infiltration indices and to compute runoff from a basin.
* To introduce concept of Unit Hydrograph and to construct Unit Hydrograph and S-curve and to discuss their applications.
* To steady well hydraulics and to discuss Dupit's theory for steady radial flow into a well and to determine yield from open well by constant pumping and recuperation tests.
* To introduce scope, benefits and ill-effects of irrigation and to steady various types and methods of irrigation.
* To discuss duty, delta and their relation, consumptive use and frequency and depth of application of irrigation water.
* To discuss Kennedy's silt theory and Lacey's regime theory and the comparison of the two theories and to discuss the design aspects of channels based on these two theories.
* To discuss the causes and remedial measures of water logging and to design lined canals.
* To study component parts of diversion head works and their functions and to discuss Bligh's creep theory and Khosla's theory and their applications in the design of weirs on permeable foundations.
 | * At the end of the course the student will be able to:
* Compute average rainfall over a basin and to distinguish between recording and non-recording rain gauges.
* Determine the infiltration indices and run off from a basin.
* Construct unit hydrograph and S-curves and determine the peak flood discharge.
* Determine the discharge from tube wells and open wells.
* Estimate consumptive use and determine the depth and frequency of irrigation water required for the given crop.
* Ascertain the discharge required in the irrigation canal.
* Design unlined canals by using Kennedy's and Lacey's theories and able to distinguish between these two theories.
* Use Garrot's diagrams and Lacey's diagrams for design of unlined canals.
* Suggest suitable methods to control water logging of irrigation lands.
* Design lined irrigation canals for varying discharges.
* Design weirs on permeable foundations based on Bligh's creep theory and Khosla's theory
 |
| **III** | **Design of Concrete Structures-I** | * Course is designed to shape the concrete and use the steel bars for external loads on different building elements.
* To understand the codal recommendations for methods of design
* To understand the analysis and design of singly, doubly and flanged beams
* To understand the design for slab and dog legged stair case
* To understand the design for shear, development length, deflection and cracking.
 | * Students can handle the isolated design of individual elements independently
* Indian Standards of approach can be practiced by the student.
 |
| **III** | **Design of Steel Structures-I** | * To introduce steel structures and its basic components
* To introduce structural steel fasteners like welding, bolting and riveting
* To design tension members, compression members, beams and beam-columns
* To design bracket and beam to column end connections using welding and bolting.
 | * Learn the basic elements of a steel structure
* Learn the fundamentals of structural steel fasteners
* Able to design basic elements of steel structure like tension members, compression members, beams and beam-columns
* Able to design bracket and beam to column end connections using welding and bolting.
 |
| **III** | **Geotechnical Engineering-1** | * To introduce the subject including genesis and historical aspect to the student.
* To understand the significance of the basic principles of soil mechanics and their applications.
* To go through basic definitions, simple tests, plasticity characteristics, flow of water through soils, permeability, seepage and effective stress principle.
* To bring out the importance of concepts of stresses due to vertical loads, compression, consolidation and shear strength of soil and their applications.
 | Students will be able to:* Classify the soil.
* Assess engineering properties of soils like permeability, compaction, consolidation, shear strength and their importance.
* Calculate vertical stresses increase due to applied loads, useful to determine settlement of structures
 |
| **III** | **Environmental Engineering Laboratory** | * The main objectives of the course are:
* To determine the physical characteristics of drinking water/sewage – turbidity.
* To determine chemical characteristics of drinking water/sewage – pH, various types of solids, acidity, alkalinity, D.O etc.
* To determine the chlorine dosage and residual chlorine in treated water sample.
* To determine the Bio-chemical and Chemical Oxygen Demands of sewage.
* To estimate Most Probable Number of given water sample.
* To train the student for using instruments like pH meter, turbid meter etc.
* To estimate optimum dosage of coagulant (Alum).
 | At the end of the course the student will be able to:* Conduct tests for physical, chemical, biological quality of water/sewage.
* Use the instruments with appropriate precautions to obtain maximum precision in the readings.
* Conduct jar test to determine the exact quantity of alum needed at treatment plant based on the turbidity of the given sample.
* Ascertain whether the given water sample contain pathogens or not.
* conclude whether the given water is fit for drinking or not by comparing the quality parameters with BIS standards (IS 10500 – 1991)
* Infer whether the given sewage can be directly disposed off into a stream or to be treated.
 |
| **III** | **Geotechnical Engineering Laboratory** | * To determine physical properties like water content, specific gravity, bulk unit weight, Atterberg limits and gradation analysis.
* To determine engineering properties of soils like permeability, compaction, consolidation and shear strength of soils.
 | Students will be able to:* Classify the soil.
* Based on classification plan for suitability of soil for various civil engineering projects.
* Determine engineering properties of soils which are required design of retaining walls, foundations, checking settlements and stability of slopes.
 |
| **III** | **Computer application in civil engineering laboratory** | * To learn the reinforcement and other details of various reinforced concrete and steel structural elements like beams, footings, slabs, retaining walls, steel structures connections, welded plate girder and steel and reinforced concrete buildings.
* To understand the code requirements and provisions for reinforcement detailing
* To draw the reinforcement and other details of various structural elements using computer software packages like Auto CAD,RIVET etc
 | By the end of this course students will have the capability / knowledge of * Reinforcement and details of various structural elements
* presenting various structural elements details for the purpose of field execution as per code requirements
* drawing each and every details of various structural elements using computer software packages
 |
| **III** | **Professional Ethics and Human Values** | * Creating awareness to deal their own inner nature for staying peacefully, utilizing energies in balanced manner, dealing activities in ethical manner and giving respect to their neighbours for making peaceful, prosperous and happier surroundings.
* Giving subject information such a way that students can be able to discriminate what is moral and what is immoral in engineering aspects. Through that students can be able to perform their knowledge time and energies for well being of people.
* Giving information regarding safety and risk and their consequences in industry and day to day life.
* Creating awareness regarding environmental loss, standards and codes fixed by professionals for smooth running of industries and meeting national and international interests.
 | * Able to understand how to prospective engineer should behave in his field, society etc.
* Able to differentiate how an engineer should live in moral and immoral in his/her profession.
* Able to deal product design processes and services by incorporating safety/risk aspects.
* Able to know regarding various aspects of environmental standard codes.
 |
| **III** | **Structural Analysis-II** | * To develop a technical competence in the fundamental concepts and application of displacement methods of statically indeterminate, structures.
* Awareness of the Displacement methods for solving statically indeterminate beams and frames by using slope deflection ,moment distribution and kanis method
* Students will learn to analyze multistoried frames by using portal and cantilever methods.
* Students will learn to analyze three hinged and two hinged, circular arches for static and moving loads.
* Let the students understand the behavior of various buildings, bridges, and catenary cable systems so that they can reasonably select and analyze a type of building, bridge, or catenary cable system in structural design.
 | * Students will have an ability identify, formulate, and determine stability of structures; external reactions, internal forces, and deflection for determinate and up to three-degree of freedom indeterminate structures.
* Student can make qualitatively correct sketches of deflections and moment diagrams for statically in determinate beams and frames
* Student will be able to develop a computer program by Staad Pro, Sap and various software’s and also Solve problems similar to problems done “by hand.”
* Students will develop an ability to analyze various multi storied buildings .
* Students will learn to analyze determinate arches subjected to different loading which in turn helps them to resole forces of certain type of circular and arched structures
* Students will be able to Determine the stresses in anchors, cables and suspension bridges and also calculate shear and bending in stiffening girders
 |
| **III** | **Water Resources Engineering-II** | * The main objectives of the course are:
* To measure stage, velocity and discharge of a stream at a given location.
* To study functions, types and suitable locations for canal outlets, canal falls, canal regulators and canal escapes.
* To discuss different types of cross-drainage works and the criteria for selection of suitable type.
* To discuss the selection criteria for a reservoir and to determine its storage capacity by mass curve method.
* To study about reservoir sedimentation and to estimate the life of reservoir and to discuss the flood routing methods.
* To study forces on gravity dam, modes of failure of gravity dam and to analyse the stability of gravity dam.
* To discuss criteria for high and low gravity dam and to design a gravity dam.
* To steady types of earth dams and discuss causes of failure of earth dams and seepage control measures.
* To explain various types of spillways and their suitability, energy dissipation under spillways and types of spillway gates.
* To study about component parts and their function of hydel project and estimation of load factor, capacity factor, utilization factor etc.
 | * At the end of the course the student will be able to:
* Understand the methods for measuring stage, velocity and discharge of a stream at a given location.
* Understand the functions and suitable locations of canal outlets, canal falls and canal regulators.
* Suggest suitable type of cross drainage work based on existing levels and discharge conditions of canal and drainage.
* Suggest suitable type of aqueducts for the existing condition.
* Calculate the storage capacity of a reservoir.
* Estimate the life of a reservoir based on sediment inflow.
* Analyze stability of gravity dam under various conditions (including seismic forces).
* Design an earth dam based on the locally available materials and carry out stability analysis of earth dam under various conditions.
* Suggest a suitable spillway at a dam site and understand the criteria for design of stilling basin for energy dissipation under spillway.
* Understand the functions of component parts of a hydro electric power scheme and determine load, capacity, utilization factors for a hydel project
 |
| **III** | **Design of Concrete Structures-II** | * To understand the design of columns and continuous slabs, continuous beams , two way slabs , flat slabs and retaining walls and foundations
 | * Students can handle the isolated design of individual elements independently
* Indian Standards of approach can be practiced by the student.
 |
| **III** | **Design of Steel Structures-II** | * To design welded plate girder and gantry girder
* To design pressed steel tanks
* To design roof trusses
* To design railway plate girder bridge
* To design structural steel and concrete composite beam
 | * Learn the design of welded plate girder and gantry girder
* Able to design pressed steel tanks
* Able to design roof trusses
* Can design railway plate girder bridge
* Can design structural steel and concrete composite beam
 |
| **III** | **Geotechnical Engineering-II** | * To introduce the soil exploration, field testing of soil to know soil strata, strength and water table location.
* The civil engineering structures like retaining wall which are to resist lateral stresses are also introduced.
* To introduce concepts of stability of slopes, bearing capacity, pile capacity and its determination.
 | * Equip the student with knowledge of how to explore the soil, design the foundations for different conditions and check the stability of structures.
 |
| **III** | **Environmental Engineering-II** | The main objectives of the course are:* To introduce water carriage systems of sanitation and their relative merits.
* To estimate quantities of sewage and drainage and to learn procedure for sewer design and to discuss the importance of various sewer appurtenances like manholes etc.
* To discuss cycles of decomposition and methods for determining the quality and characteristics of waste water.
* To discuss theoretical aspects and design procedures for primary and secondary wastewater treatment units – grit chambers, sedimentation tanks, Trickling Filters and Activated Sludge Process.
* To design wastewater treatment and disposal in un-sewered areas – septic tanks.
* To learn methods of ultimate sewage disposal.
* To discuss various stages and factors affecting anaerobic sludge digestion and to design anaerobic sludge digester and to learn methods of sludge handling and disposal.
* To introduce various functional elements of urban solid waste management and to introduce various methods of solid waste treatment methods with special emphasis on recovery and reuse of solid waste.
* To introduce sanitary fittings and plumbing systems of drainage and to discuss principles governing house drainage.
 | At the end of the course the student will be able to:* Select a suitable type of water carriage system based on relative merits.
* Determine the quantity of drainage and sewage produced from a community.
* Design sewers and to select suitable locations for various sewer appurtenances.
* Ascertain the quality and characteristics of wastewater.
* Design primary treatment units like grit chambers, sedimentation tanks etc.
* Design conventional biological treatment units – Trickling Filters and Activated Sludge Process with all its component parts.
* Design septic tanks and its effluent disposal methods like cess pools and soak pits.
* Select suitable method for disposal of sewage treated or untreated.
* Design anaerobic digester for primary and secondary sludge and to select suitable method for disposal of wet or conditioned sludge
* Suggest suitable methods for collection, transport, recovery, reuse and treatment of urban solid waste.
* Plan plumbing system for various residential buildings
 |
| **III** | **Surveying Field work-II** | The main objective of this laboratory course is to introduce Total Station instrument for regular field survey purpose* All of the experiments which are done by mechanical instruments before are now dealt with Total station
* Each and every design/plot related to field survey is carried out by Total Station and required computations are directly made at the site itself
* This course will also present a survey camp after completing the regular lab sessions
 | * Every student can gain required excellence in using the Total Station Instrument
* Students can make accurate designs/plots thus by avoiding any manual errors
* Every student can meet the requirement of knowing the Total Station instrument which is vital for any construction firm
* Not only he/she can work out the experiments inside the institution but also they are trained for the on-site works outside the institution
 |
| **III** | **Computer Aided Analysis and Design in Civil Engineering Laboratory** | * This course enables every student to analyze the structural component directly by creating a model in the computer and design it according to the specified codes of practice in the computer itself
* This course highlights the ease of procedure in analyzing and designing a structural component by using a structural analysis and design program, for example Staad-Pro, SAP, STRUDS, etc.,
 | * Students can gain the expertise in using the soft tool effectively
* Students can meet the requirement of knowing any of these soft tools which is a must for analysis and design of structural components in any construction firm
* Students can cross check their manual analysis and design results with those of the soft tool and examine the variations
 |
| **IV/IV B.Tech** |
| **IV** | **Transportation Engineering-I** | * To emphasize on highway development planning and various surveys to be conducted.
* To understand material properties and performances and limits of various tests
* Introduction to the design concepts, vehicle loading criteria and to demonstrate how they are combined to design and construct road pavements.
* To understand the principles of geometric design, both vertical and horizontal
* Emphasize on various traffic control operations and regulations.
 | * For proper planning of a road network by linking of various surveys and to evaluate and develop master plans for a better road network.
* Selecting the appropriate materials for use in different road layers for different types of pavements.
* Perform road pavement design and analysis by various IRC and other methods.
* Interpret geometric design fundamentals, in relation to safety and driver comfort, focusing on horizontal and vertical alignment.
* An ability to develop traffic signals and help to properly regulate the traffic and better use of road network.
 |
| **IV** | **Structural Analysis-III** | To draw the influence lines diagrams for indeterminate structures* To analyze the beams which are curved in plan for the given loading and support conditions
* To understand the plastic behavior of structures and collapse load analysis of the structures
* To understand the concept of stiffness and flexibility in matrix form
* To know how to analyze the structures like beams and simple frames using stiffness and flexibility matrix methods
 | * By the end of this course students will have the capability/knowledge of
* Drawing influence lines for indeterminate structures like fixed beams and continuous beams by using Muller-Breslau’s principle
* Analyzing for internal forces like bending moments and twisting moments etc for beams curved in plan
* Behavior of structures beyond yield load, finding shape factors, length of plastic hinge etc
* Collapse load analysis
* Analyzing the structures like continuous beams and single bay, storey rigid jointed frames for internal forces using stiffness and flexibility matrix methods
* Analyzing the structures like pin jointed frames for internal forces using stiffness matrix method
 |
| **IV** | **Water Resources Engineering-III (design and Drawing)** | The main objective of the course is to study the theory, design and drawing of the following irrigation structures:* Irrigation canal
* Notch type canal drop
* Canal regulator
* Vertical drop weir on permeable foundations
* Direct sluice
* Surplus weir of a tank
* Type III Aqueduct and
* Ogee spillway profile
 | At the end of the course the student will be able to Design and draw the following irrigation structures with the given data:* Irrigation canal
* Notch type canal drop
* Canal regulator
* Vertical drop weir on permeable foundations
* Direct sluice
* Surplus weir of a tank
* Type III Aqueduct and
* Ogee spillway profile
 |
| **IV** | **Estimation and Quantity Surveying** | * To make the student know about detailed estimation and degree of accuracy.
* To develop skills of detailed estimation of residential buildings from drawings to students.
* To make student practice estimation of components of framed structure like R.C.C slab, R.C.C beam, R.C.C T-beam and R.C.C column with foundation.
* To make student practice estimation of earth work for roads in plain areas and irrigation canals.
* To make student thorough in preparing analysis of rates of all major items of work.
* To make student thorough in valuation of building.
* To introduce about tenders, tender notice, contracts and other PWD accounts.
* To discuss various methods of fixing of standard rent.
 | * To make the student is expected to have thorough knowledge in detailed estimation of buildings from the given drawings both load bearing and framing structures.
* To make the student is expected to have good knowledge in preparation of earth work estimation to road works and irrigation canal works.
* To make the student is expected to basic ideas about the valuation of building, PWD accounts and procedures like tender, tender notice, contractor etc.
 |
| **IV** | **Earthquake resistant design of structures** | * To teach the basic concepts of vibration of single degree of freedom systems
* To explain the elements of earthquake ground motion characteristics
* To calculate the lateral forces on a building using equivalent static method
* To analyze and design single storey, single bay RC framed building subjected to an earthquake
* To explain the possible damages and strengthening of masonry structures
* To introduce Geo-technical earthquake engineering.
 | * Learn the fundamentals vibration of single degree freedom systems
* Learn the earthquake ground motion characteristics
* Able to calculate the lateral forces on a building using equivalent static method
* Can analyze and design a single storey and single bay RC framed building
* Able to visualize the possible damages in masonry structures and able to strengthen such structures
* Understand the behavior of soil beneath a foundation during an earthquake
 |
| **IV** | **Pre stressed Concrete (Elective-1)** | * To introduce pre-stressed concrete and its materials
* To explain the various pre-stressing techniques
* To analyze a pre-stressed concrete beam
* To study the losses in pre-stress
* To determine the deflection of a pre-stressed concrete beams
* To design pre-stressed concrete beam for bending moment and shear force
* To determine bond and anchorage stresses and to design end block
 | * Learn the basic concept of pre-stressing of concrete and various pre-stressing systems
* Able to analyse and design pre-stressed concrete beams
* Able to estimate the losses in pre-stressing
* Able to design pre-stressed concrete beams including the end block
 |
| **IV** | **Remote sensing and GIS (Elective-1)**  | * Develops the fundamental concepts of GIS and remote sending including the electromagnetic spectrum, map projection and nature of geospatial data.
* Develops the ability to understand the various . Applications of remote sensing.
* Develops the familiarity with the GIS based analytical and problem solving techniques for
* sustainable planning and management of civil Engineering projects
* The use of Remote Sensing and GIS Technology has opened the door for immense opportunities in large scale mapping, updating existing maps and practical planning and decision making
 | * By the end of the course the student will be able to:
* To collect the required data from a remote sensing platform as different sensors are capable of collecting spatial and temporal data
* Can organizing and developing a relational database for processing and retrieving the useful data for planning various projects on the surface
* Able to develop different types of thematic maps such as land use ,land cover, vegetation, cloud cover terrain evaluation etc
* Able to use RS & GIS knowledge for watershed development , environmental problems etc.
 |
| **IV** | **Water Resources Systems Analysis (Elective-1)**  | The main objectives of the course are:* To study types of systems and systems approach to water resources planning and management.
* To understand role of optimization in water resource planning, economy and management.
* To study various linear programming models and their applications in water resources.
* To study the concept of dynamic programming and its applications in water resources problems.
* To understand various simulation techniques and to develop simulation models for various water resources problems.
* To study techniques for operation and management of available water resources.
 | * At the end of the course the student will be able to:
* Understand concept of systems approach to water resources planning and management.
* Develop objective function and constraints for various water resources optimization problems.
* Develop linear programming modals for water resources problems by using graphical and simplex and revised simplex techniques.
* Carry out sensitivity analysis and post optimality analysis.
* Develop and solve forward and backward recursive dynamic programming models.
* Apply simulation techniques in water resources problems
* Plan for optimal operation of a single reservoir system.
* Able to develop models for allocation of water resource for optimal crop yields.
 |
| **IV** | **Advanced foundation Engineering (Elective-1)**  | * The course introduces the fundamental concepts, advanced principles and application of foundation analysis and design.
* Assessing bearing capacity of shallow foundations by different methods and checking settlement of soil.
* Introducing design of bulkheads, foundations for machines and expansive soils.
 | * Student able to:
* Design shallow foundations and checking settlements.
* Design well foundations, machine foundations, bulk heads and foundations on expansive soils
 |
| **IV** | **Term paper** | * To identify an area of project work
* To collect and study the literature in the identified area of project work
* To arrive at a problem which can be carried out as project work
* To select a method to solve the problem
* To give a seminar talk
 | * Collect and study the literature in the identified area of project work
* Arrive at problem which can be carried out as project work
* Selects a method to solve the problem
* Gives a seminar talk
 |
| **IV** | **Computer Aided Detailing of Structures** | * To learn the reinforcement and other details of various reinforced concrete and steel structural elements like beams, footings, slabs, retaining walls, steel structures connections, welded plate girder and steel and reinforced concrete buildings.
* To understand the code requirements and provisions for reinforcement detailing
* To draw the reinforcement and other details of various structural elements using computer software packages like Auto CAD,RIVET etc
 | * By the end of this course students will have the capability/knowledge of
* Reinforcement and details of various structural elements
* presenting various structural elements details for the purpose of field execution as per code requirements
* drawing each and every details of various structural elements using computer software packages
 |
| **IV** | **Transportation Engineering Laboratory** | * This course presents the major strength and shape parameters involved in selection of aggregate for various types of construction works
* This course exhibits various tests conducted on aggregate in order to propose it for suitable construction work
* This course later presents the detail investigation on sub-base course (soil) by conducting a laboratory test for evaluation of pavement thickness
* This course also deals with the various properties of bitumen and the tests required to determine them
 | * At the end of the laboratory course every student can thus know the important parameters for selection of aggregate for different construction components
* Student can evaluate and conduct the required tests on the given aggregate and propose the suitable inference
* Student can evaluate the grade of bitumen by conducting the required tests and propose it for suitable region and place of pavement construction
 |
| **IV** | **Transportation Engineering-II** | * To understand the role of railways in transportation.
* To understand various parts of a railway track. and Introduction to geometric design of a railway section.
* To emphasize on various requirements of stations
* It will present the concept airport planning , various obstruction runway and structural design of airport pavement.
* Emphasize on various facilities of a harbor and port and various controlling devices of an harbour
 | * An ability to understand the importance of railway sector
* An ability to judge and select proper material and component for a railway track and to understand and deign various component of a track.
* For basic knowledge of a railway station.
* Better planning of various amenities of an airport and planning and also serves as a basic for air port pavement design and runway design.
* Creates a basic introduction of various features of a harbor and a port to enable for proper design and maintenance of various amenities.
 |
| **IV** | **Construction Management** | * Can able to plan different stages in construction project, project duration and job layout
* Using PERT and CPM able to determine critical path for projects.
* Optimization of project cost using cost control techniques.
* Learn importance of man power, materials and machinery in construction projects.
* Optimization of man power; total quality management, safety measures in construction projects, utilization of Management Information System.
* Learn economic terms like assets, capital, annuity, project profitability useful for planning project.
 | * Student able to:
* Design shallow foundations and checking settlements.
* Student able to :
* Planning for any project and its duration.
* Optimization of men, material and project cost.
* Know the importance of machinery.
* Implementation of quality management, safety measures and best utilization of Management Information system.
* Assessing project profitability.
 |
| **IV** | **Bridge Engineering (Elective-II)** | * To explain various investigations to be conducted before constructing a bridge
* To introduce various types of RC bridges and IRC loadings
* To design slab culvert and T-beam bridge
* To design substructure for bridges
* To explain various types of bearings and design of elastomeric bearing
* To explain various types of foundations and design of well foundation
 | * Learn about the various investigations to be conducted before constructing a bridge
* Know about various types of RC bridges and IRC loadings
* Able to design slab culvert and T-beam bridge
* Able to design substructure like piers and abutments
* Know various types of bearings and able to design elastometric bearing
* Know the various types foundations used for bridges and able to design well foundation
 |
| **IV** | **Finite Element Methods in Civil Engineering (Elective-II)** | * To introduce basic principles of solid mechanics and energy methods
* To explain the properties of one-dimensional and two-dimensional elements
* Evaluation of element stiffness matrix and nodal load vector
* Assemblage of element stiffness matrices and nodal load vectors to obtain global stiffness matrix and global load vector
* To solve the simultaneous equations of equilibrium
* Solution to one – and two- dimensional problems
* To extend the method to soil / rock mechanics and inviscid and incompressible fluid flows
 | * Learn the basic principles of solid mechanics and energy methods
* Know the properties of one-and two- dimensional elements
* Can evaluate element stiffness matrices and element load vectors
* Can obtain global stiffness matrix and nodal load vector
* Able to solve the simultaneous equations of equilibrium
* Able to obtain solutions to one- and two-dimensional problems
* Able to apply the method to soil / rock mechanics and inviscid and incompressible fluid flows
 |
| **IV** | **Ground Improvement Techniques (Elective-II)** | * To introduce engineering properties of soft, weak and compressible deposits, principles of treatment for granular and cohesive soils and various stabilization techniques.
* To bring out concepts of reinforced earth.
* Applications of geotextiles in various civil engineering projects.
 | * Will gain competence in properly devising alternative solutions to difficult and earth construction problems and in evaluating their effectiveness before, during and after construction.
* A study of the many different approaches to the ground modification broadens the mind of any engineer and inspires creativity and innovation in Geotechnical construction and related fields.
 |
| **IV** | **Environmental Impact Assessment & Management****(Elective-II)** | * The main objectives of the course are:
* To introduce concepts, elements and factors affecting EIA
* To discuss criteria for the selection of EIA methodology and various EIA methods.
* To study impact of developmental activity on soil and ground water and identification of mitigation measures
* To study methodologies for assessment of impacts on surface water environment and impact of air pollution.
* To learn the environmental impact of deforestation
* To study the objectives of environmental audit, to discuss types and stages of environmental audit and to prepare audit report.
* To steady about various legislations – water act, air act, wildlife act, environmental pollution act etc.
* To study and prepare Environmental Impact Assessment statement for various industries.
 | * At the end of the course the student will be able to:
* Understand the concepts of EIA and able to select suitable methodology / methodologies for EIA.
* Identify activities that affect soil and ground water and assess the impact.
* Make assessment of impact of developmental activities on surface water environment and air pollution.
* Assess environmental impact of deforestation and suggest suitable measures to mitigate impact.
* conduct environmental audit of a development activity
* prepare environmental audit report
* To understand acts regarding various types of environmental pollutions and their control.
* Prepare Environmental Impact Assessment statement for various industries.
 |
| **IV** | **Advance Reinforced Concrete Design (Elective-III)** | * To analyze and design of various reinforced concrete structures like grid floors, raft foundation, corbels, underground and on ground circular water tanks, intz tank, bunkers and silos
* To understand the concept of yield line theory
* To understand and design of deep beams
 | * By the end of this course students will have the capability/knowledge of
* Analysis and design of various reinforced concrete structures like grid floors, raft foundation, corbels, underground and on ground circular water tanks, intz tank, bunkers and silos
* Analysis and design of intz tank and its staging
* Yield line analysis and design of simply supported rectangular and circular slabs
* Designing of deep beams
 |
| **IV** | **Pavement analysis and Design Elective-III)** | * To understand material properties and performances and limits of various tests.
* Introduction to the design concepts, vehicle loading criteria and to demonstrate how they are combined to design and construct road pavements.
* To understand construction of various pavements like gravel, WBM, Cement concrete roads.
* To emphasize on failures of rigid and flexible pavements
 | * Selecting the appropriate materials for use in different road layers for different types of pavements.
* Perform road pavement design and analysis by various IRC and other methods.
* Understand and implement various construction methodologies for various types of pavements.
* For development of various maintenance principles and helps in planning of various routine maintenance programs and special repairs.
 |
| **IV** | **Advanced Environmental** **Engineering (Elective-III)** | The main objectives of the course are:* To explain the importance of self-purification of streams and to derive Streeter- Phelps equation and to discuss the effects of various pollutants on receiving streams.
* To discuss about concepts of low cost treatment of wastewater and to explain the design methods of various low cost treatment methods.
* To understand the characteristics and the treatment and disposal methods of liquid wastes produced in Dairy industry, Sugar industry and Pulp & paper industry.
* To introduce new concepts in biological treatment like nitrogen and phosphorous removal, anaerobic filters, RBC and U-tube aeration systems, their working principles and suitability.
* To introduce sources, global effects and the effects on human health, plants and materials of air pollution.
* To discuss about the effects of various meteorological parameters on air pollution and to explain various equipment for controlling particulate pollution and their suitability.
* To introduce sources, effects and controlling measures of noise pollution and to discuss noise rating systems and acceptable noise levels for various places.
 | At the end of the course the student will be able to:* Understand the importance of self-purification and the effects of various pollutants on receiving streams.
* To determine the critical D.O. deficit and the degree of treatment required for wastewater at the treatment plant to maintain a minimum D.O. at any point in the stream.
* low cost treatment facilities for small industries which cannot afford conventional treatment.
* Understand characteristics and suggest suitable methods of treatment and disposal of industrial wastewater.
* Update his knowledge in biological treatment with new and more advanced treatment methods.
* Understand global implications of air pollution and suggest suitable methods of control of particulate pollution depending on concentration and size of the particulate matter.
* Acquire knowledge on noise pollution and suggest suitable noise control techniques according to the situation.
 |
| **IV** | **Groundwater development and Management** | * The course will emphasize on the groundwater availability , distribution and exploitation
* It will also present the method of ground water movement with the help of Darcy’s law, flow contours and their applications
* To estimate the availability of ground water , use of pumping tests for different types of flows in different types of aquifers.
* To learn various investigation methods used for ground water exploration- specially geophysical methods
* To about various artificial ground water recharge techniques
* To learn the conditions of salt water intrusion and ground water management techniques
 | * By the end of the course the student will be able to :
* Understand the occurrence and distribution of ground water
* Can predict the ground water movement
* Can estimate the quantity of ground water in different types of aquifers
* Can use various geophysical methods for exploration of ground water
* Able to understand the different artificial recharge techniques
* Can have good idea of ground water management
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| **IV** | **Quantity Estimation and Project management** | * Quantity estimation for different civil engineering works like single storey residential building, BT road, canal etc.
* Cost estimation for different civil engineering works like single storey residential building, BT road, canal etc.
* Rate analysis for different items of work
* Quantity estimation and preparing schedule of bars of different items of RC works using software like MS Excel
* To prepare project management report for different civil engineering projects like residential building, BT road, canal etc using software packages like Primavera/MS Project etc
 | * By the end of this course students will have the capability/knowledge of
* Estimating quantities required for different civil engineering works like single storey residential building, BT road, canal etc.
* Cost estimation of different civil engineering works like single storey residential building, BT road, canal etc.
* of finding the unit rate of different items of work
* prepare schedule of reinforcement bars
* scheduling a project
* analyzing a project and finding critical activities and hence allocate resources as per the schedule
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| **IV** | **Project work** | * To carry out Project Work identified in the Term Paper
* To use appropriate method, viz. theoretical, experimental, use of software package etc.
* To analyse the results and arrive at conclusions
* To design the problem if it involves design
 | * Project work will be carried out
* Appropriate method will be used
* Results will be analyzed and conclusions will be made
* The problem will be designed if it involves design
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