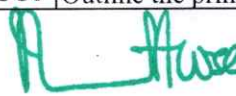


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| Department of Civil Engineering | | |
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| BTech in Civil Engineering Course Outcomes 2019 - Scheme | | |
| Semester I | | |
| Course Code & Course Name | CO No | CO Description |
| MAT 10 I LINEAR ALGEBRA AND CALCULUS | CO1 | Solve the consistent system of linear equations and apply orthogonal to a quadratic form |
| | CO2 | Find the maxima and minima of multivariable functions |
| | CO3 | Find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminae using double and triple integrals |
| | CO4 | Perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent |
| | CO5 | Determine the power series expansion of a given function |
| CYT 100 ENGINEERING CHEMISTRY | CO1 | Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields. |
| | CO2 | Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications. |
| | CO3 | Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials. |
| | CO4 | Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering. |
| | CO5 | Study various types of water treatment methods to develop skills for treating wastewater. |
| EST 110 ENGINEERING GRAPHICS | CO1 | Draw the projection of points and lines located in different quadrants |
| | CO2 | Prepare multiview orthographic projections of objects by visualizing them in different positions |
| | CO3 | Draw sectional views and develop surfaces of a given object |
| | CO4 | Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions. |
| | CO5 | Convert 3D views to orthographic views and vice versa |
| | CO6 | Obtain multiview projections and solid models of objects using CAD tools |
| EST 130 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING | CO1 | Apply fundamental concepts and circuit laws to solve simple DC electric and magnetic circuits |
| | CO2 | Develop and solve models of magnetic circuits |
| | CO3 | Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state |
| | CO4 | Describe working of a voltage amplifier |
| | CO5 | Outline the principle of an electronic instrumentation system |


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| | CO 6 | Explain the principle of radio and cellular communication |
| HUN 101 LIFE SKILLS | CO1 | Define and Identify different life skills required in personal and professional life |
| | CO2 | Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress |
| | CO3 | Explain the basic mechanics of effective communication and demonstrate these through presentations. |
| | CO4 | Take part in group discussions |
| | CO5 | Use appropriate thinking and problem solving techniques to solve new problems |
| | CO 6 | Understand the basics of teamwork and leadership |
| | CYL 120 ENGINEERING CHEMISTRY LAB | CO1 |
| CO2 | | Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs |
| CO3 | | Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds |
| CO4 | | Acquire the ability to understand, explain and use instrumental techniques for chemical analysis |
| CO5 | | Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments |
| CO 6 | | Function as a member of a team, communicate effectively and engage in further learning. Also understand how chemistry addresses social, economical and environmental problems and why it is an integral part of curriculum |
| ESL 130 ELECTRICAL AND ELECTRONICS WORKSHOP | CO1 | Demonstrate safety measures against electric shocks. |
| | CO2 | Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols. |
| | CO3 | Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings. |
| | CO4 | Identify and test various electronic components |
| | CO5 | Draw circuit schematics with EDA tools |
| | CO 6 | Assemble and test electronic circuits on boards |
| | CO 7 | Work in a team with good interpersonal skills |

| Semester II | | |
|--|-------|---|
| Course Code & Course Name | CO No | CO Description |
| MAT 102 VECTOR CALCULUS AND COMPLEX ANALYSIS | CO1 | Compute the derivatives and line integrals of vector functions and learn their applications |
| | CO2 | Evaluate surface and volume integrals and learn their inter-relations and applications. |


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| | CO3 | Solve homogeneous and non-homogeneous linear differential equation with constant coefficients |
| | CO4 | Compute Laplace transform and apply them to solve ODEs arising in engineering |
| | CO5 | Determine the Fourier transforms of functions and apply them to solve problems arising in engineering |
| PHT 110 ENGINEERING PHYSICS | CO1 | Compute the quantitative aspects of waves and oscillations in engineering systems. |
| | CO2 | Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments. |
| | CO3 | Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices. |
| | CO4 | Apply the knowledge of ultrasonics in non-destructive testing and use the principles of acoustics to explain the nature and characterization of acoustic design and to provide a safe and healthy environment |
| | CO5 | Apply the comprehended knowledge about laser and fibre optic communication systems in various engineering applications |
| EST 100 ENGINEERING MECHANICS | CO1 | Recall principles and theorems related to rigid body mechanics |
| | CO2 | Identify and describe the components of system of forces acting on the rigid body |
| | CO3 | Apply the conditions of equilibrium to various practical problems involving different force system. |
| | CO4 | Choose appropriate theorems, principles or formulae to solve problems of mechanics. |
| | CO5 | Solve problems involving rigid bodies, applying the properties of distributed areas and masses |
| EST 120 BASIC CIVIL AND MECHANICAL ENGINEERING | CO1 | Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering. |
| | CO2 | Explain different types of buildings, building components, building materials and building construction |
| | CO3 | Describe the importance, objectives and principles of surveying. |
| | CO4 | Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps |
| | CO5 | Discuss the Materials, energy systems, water management and environment for green buildings. |
| | CO6 | Analyse thermodynamic cycles and calculate its efficiency |
| | CO7 | Illustrate the working and features of IC Engines |
| | CO8 | Explain the basic principles of Refrigeration and Air Conditioning |
| | CO9 | Describe the working of hydraulic machines |
| | CO10 | Explain the working of power transmission elements |
| | CO11 | Describe the basic manufacturing, metal joining and machining processes |
| HUN 102 PROFESSIONAL COMMUNICATION | CO1 | Develop vocabulary and language skills relevant to engineering as a profession |


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| | CO2 | Analyze, interpret and effectively summarize a variety of textual content |
| | CO3 | Create effective technical presentations |
| | CO4 | Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus |
| | CO5 | Identify drawbacks in listening patterns and apply listening techniques for specific needs |
| | CO6 | Create professional and technical documents that are clear and adhering to all the necessary conventions |
| | EST 102 PROGRAMMING IN C | CO1 |
| CO2 | | Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators. |
| CO3 | | Write readable C programs with arrays, structure or union for storing the data to be processed |
| CO4 | | Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem |
| CO5 | | Write readable C programs which use pointers for array processing and parameter passing |
| CO6 | | Develop readable C programs with files for reading input and storing output |
| PHL 120 PHYSICS LAB | CO1 | Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories |
| | CO2 | Understand the need for precise measurement practices for data recording |
| | CO3 | Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations |
| | CO4 | Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics |
| | CO5 | Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results |
| ESL 120 CIVIL AND MECHANICAL WORKSHOP | CO1 | Name different devices and tools used for civil engineering measurements |
| | CO2 | Explain the use of various tools and devices for various field measurements |
| | CO3 | Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work. |
| | CO4 | Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing. |
| | CO5 | Compare different techniques and devices used in civil engineering measurements |
| | CO6 | Identify Basic Mechanical workshop operations in accordance with the material and objects |
| | CO7 | Apply appropriate Tools and Instruments with respect to the mechanical workshop trades |

A. Hussain

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| | CO8 | Apply appropriate safety measures with respect to the mechanical workshop trades |
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| Semester III | | |
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| Course Code & Course Name | CO No | CO Description |
| MAT 201 PARTIAL DIFFERENTIAL EQUATION AND COMPLEX ANALYSIS | CO1 | understand the concept and the solution of partial differential equation |
| | CO2 | Analyse and solve one dimensional wave equation and heat equation |
| | CO3 | Understand complex functions, its continuity differentiability with the use of Cauchy Riemann equation |
| | CO4 | Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula, understand the series expansion of analytic function |
| | CO5 | Understand the series expansion of complex function about a singularity and apply residue theorem to compute several kind of real integrals |
| CET 201 MECHANICS OF SOLIDS | CO1 | Recall the fundamental terms and theorems associated with mechanics of linear elastic deformable bodies |
| | CO2 | Explain the behaviour and response of various structural elements under various loading condition |
| | CO3 | Apply the principles of solid mechanics to calculate internal stress/strain, stress resultants and strain energies in structural elements subjected to axial/traverse loads and bending/twisting moments |
| | CO4 | Choose appropriate principles or formula to find the elastic constants of materials making use of the information available |
| | CO5 | Perform stress transformation, identify principal planes/stresses and maximum shear stress at a point in a structural member |
| | CO6 | Analyse the given structural member to calculate the safe load or proportion the cross section to carry the load safely |
| CET 203 FLUID MECHANICS AND HYDRAULICS | CO1 | Recall the relevant principles of hydrostatics and hydraulics of pipe and open channels |
| | CO2 | Identify or describe the type, characteristics or properties of fluid flow |
| | CO3 | Estimate the fluid pressure, perform the stability check of bodies under hydrostatic condition |
| | CO4 | Compute discharge through pipes or estimate the forces on pipe bends by applying hydraulic principles of continuity, energy and/or momentum |
| | CO5 | Analyze or compute the flow through open channels, perform the design of prismatic channels |
| | CO1 | Apply surveying techniques and principles of leveling for the preparation of contour maps, computation of area-volume and sketching mass diagram |
| | CO2 | Apply the principles of surveying for triangulation |
| | CO3 | Apply different methods of traverse surveying and traverse balancing |


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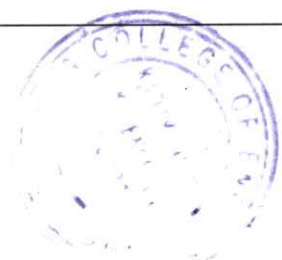
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| | CO4 | Identify the possible errors in surveying and apply the corrections in field measurements |
| | CO5 | Apply the basic knowledge of setting out of different types of curves |
| | CO6 | Employ surveying techniques using advanced surveying equipments |
| HUT 200 DESIGN AND ENGINEERING | CO1 | Explain the different concepts and principles involved in design engineering. |
| | CO2 | Apply design thinking while learning and practicing engineering. |
| | CO3 | Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering. |
| MCN 201 SUSTAINABLE ENGINEERING | CO1 | Understand the relevance and the concept of sustainability and the global initiatives in this direction |
| | CO2 | Explain the different types of environmental pollution problems and their sustainable solutions |
| | CO3 | Discuss the environmental regulations and standards |
| | CO4 | Outline the concepts related to conventional and non-conventional energy |
| | CO5 | Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles |
| CEL 201 CIVIL ENGINEERING PLANNING AND DRAFTING LAB | CO1 | Illustrate ability to organise civil engineering drawings systematically and professionally |
| | CO2 | Prepare building drawings as per the specified guidelines. |
| | CO3 | Assess a complete building drawing to include all necessary information |
| | CO4 | Create a digital form of the building plan using any drafting software |
| CEL 203 SURVEY LAB | CO1 | Use conventional surveying tools such as chain/tape and compass for plotting and area determination |
| | CO2 | Apply levelling principles in field |
| | CO3 | Solve triangulation problems using theodolite |
| | CO4 | Employ total station for field surveying |
| | CO5 | Demonstrate the use of distomat and handheld GPS |

| Semester IV | | |
|---|-------|---|
| Course Code & Course Name | CO No | CO Description |
| MAT 202 PROBABILITY STATISTICS AND NUMERICAL METHOD | CO1 | Understand the concept, properties and important models of discrete random variables |
| | CO2 | Understand the concept, properties and important models of continuous random variables and, using them, analyse suitable random phenomena. |
| | CO3 | Perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population |
| | CO4 | Compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques |


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| | CO5 | Apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations. |
| CET 202 ENGINEERING GEOLOGY | CO1 | Recall the fundamental concepts of surface processes, subsurface process, minerals, rocks, groundwater and geological factors in civil engineering constructions. |
| | CO2 | Identify and describe the surface processes, subsurface process, earth materials, groundwater and geological factors in civil engineering constructions. |
| | CO3 | Apply the basic concepts of surface and subsurface processes, minerals, rocks, groundwater and geological characteristics in civil engineering constructions. |
| | CO4 | Analyze and classify geological processes, earth materials and groundwater. |
| | CO5 | Evaluation of geological factors in civil engineering constructions. |
| CET 204 GEOTECHNICAL ENGINEERING | CO1 | Explain the fundamental concepts of basic and engineering properties of soil |
| | CO2 | Describe the laboratory testing methods for determining soil parameters |
| | CO3 | Solve the basic properties of soil by applying functional relationships |
| | CO4 | Calculate the engineering properties of soil by applying the laboratory test results and the fundamental concepts of soil mechanics |
| | CO5 | Analyze the soil properties to identify and classify the soil |
| MCN 202 CONSTITUTION OF INDIA | CO1 | Explain the background of the present constitution of India and features. |
| | CO2 | Utilize the fundamental rights and duties. |
| | CO3 | Understand the working of the union executive, parliament and judiciary. |
| | CO4 | Understand the working of the state executive, legislature and judiciary. |
| | CO5 | Utilize the special provisions and statutory institutions. |
| | CO6 | Show national and patriotic spirit as responsible citizens of the country |
| CET 206 TRANSPORTATION ENGINEERING | CO1 | Apply the basic principles of Highway planning and design highway geometric elements |
| | CO2 | Apply standard code specifications in judging the quality of highway materials; designing of flexible pavements |
| | CO3 | Explain phenomena in road traffic by collection, analysis and interpretation of traffic data through surveys; creative design of traffic control facilities |
| | CO4 | Understand about railway systems, tunnel, harbour and docks |
| | CO5 | Express basics of airport engineering and design airport elements |
| CEL 202 MATERIAL TESTING LAB | CO1 | The understand the behaviour of engineering materials under various forms and stages of loading. |
| | CO2 | Characterize the elastic properties of various materials. |
| | CO3 | Evaluate the strength and stiffness properties of engineering materials under various loading conditions. |
| CEL 204 FLUID MECHANICS LAB | CO1 | Apply fundamental knowledge of Fluid Mechanics to corresponding experiments |


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| | CO2 | Apply theoretical concepts in Fluid Mechanics to respective experiments |
| | CO3 | Analyse experimental data and interpret the results |
| | CO4 | Document the experimentation in prescribed manner |

| Semester V | | |
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| Course Code & Course Name | CO No | CO Description |
| CET 301 STRUCTURAL ANALYSIS 1 | CO1 | Apply the principles of solid mechanics to analyse trusses. |
| | CO2 | Apply energy principles to analyse statically determinate structures. |
| | CO3 | Identify the problems with static indeterminacy and understand the basic concepts of tackling such problems by means of the method of consistent deformations |
| | CO4 | Apply suitable methods of analysis for various types of structures including cables, suspension bridges and arches. |
| | CO5 | Analyse the effects of moving loads on structures using influence lines. |
| | CO6 | Apply specific methods such as slope deflection and moment distribution methods of structural analysis with different characteristics. |
| CET 303 DESIGN OF CONCRETE STRUCTURES | CO1 | Recall the fundamental concepts of limit state design and code provisions for design of concrete members under bending shear, compression and torsion. |
| | CO2 | Analyse reinforced concrete sections to determine the ultimate capacity in bending, shear and compression. |
| | CO3 | Design and detail beams, slab, stairs and footings using IS code provisions |
| | CO4 | Design and detail columns using IS code and SP 16 design charts. |
| | CO5 | Explain the criteria for earthquake resistant design of structures and ductile detailing of concrete structures subjected to seismic forces. |
| CET 305 GEOTECHNICAL ENGINEERING 2 | CO1 | Understand soil exploration methods |
| | CO2 | Explain the basic concepts, theories and methods of analysis in foundation engineering. |
| | CO3 | Calculate bearing capacity, pile capacity, foundation settlement and earth pressure |
| | CO4 | Analyse shallow and deep foundations |
| | CO5 | Solve the field problems related to geotechnical engineering |
| CET 207 CONSTRUCTION TECHNOLOGY AND MANAGEMENT | CO1 | Describe the properties of materials used in construction |
| | CO2 | Explain the properties of concrete and its determination |
| | CO3 | Describe the various elements of building construction |
| | CO4 | Explain the technologies for construction |
| | CO5 | Describe the procedure for planning and executing public works |
| | CO6 | Apply scheduling techniques in project planning and control |


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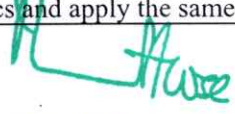


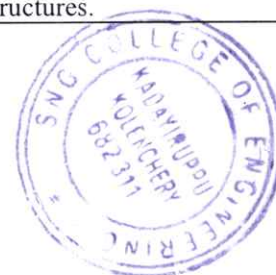
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| MCN 301 DIASTER MANAGEMENT | CO1 | Define and use various terminologies in use in disaster management parlance and organise each of these terms in relation to the disaster management cycle (Cognitive knowledge level: Understand). |
| | CO2 | Distinguish between different hazard types and vulnerability types and do vulnerability assessment (Cognitive knowledge level: Understand). |
| | CO3 | Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk (Cognitive knowledge level: Understand). |
| | CO4 | Explain the core elements and phases of Disaster Risk Management and develop possible measures to reduce disaster risks across sector and community (Cognitive knowledge level: Apply) |
| | CO5 | Identify factors that determine the nature of disaster response and discuss the various disaster response actions (Cognitive knowledge level: Understand). |
| | CO6 | Explain the various legislations and best practices for disaster management and risk reduction at national and international level (Cognitive knowledge level: Understand). |
| CEL 333 GEOTECHNICAL ENGINEERING LAB | CO1 | Identify and classify soil based on standard geotechnical experimental methods |
| | CO2 | Perform and analyze permeability tests. |
| | CO3 | Interpret engineering behavior of soils based on test results |
| | CO4 | Perform laboratory compaction, CBR and in-place density test for fill quality control in the field |
| | CO5 | Evaluate the strength of soil by performing various tests viz. direct shear test, unconfined compressive strength test and triaxial shear test |
| | CO6 | Evaluate settlement characteristics of soils. |
| CEL 331 MATERIAL TESTING LAB II | CO1 | To describe the basic properties of various construction materials |
| | CO2 | Characterize the physical and mechanical properties of various construction materials. |
| | CO3 | Interpret the quality of various construction materials as per IS Codal provisions. |

| Semester VI | | |
|-------------------------------|-------|--|
| Course Code & Course Name | CO No | CO Description |
| CET 302 STRUCTURAL ANALYSIS 2 | CO1 | Understand the principles of plastic theory and its applications in structural analysis. |
| | CO2 | Examine the type of structure and decide on the method of analysis. |
| | CO3 | Apply approximate methods of analysis for framed structures to ascertain stress resultants approximately but quickly. |
| | CO4 | Apply the force method to analyse framed structures. |
| | CO5 | Apply the displacement methods to analyse framed structures. |
| | CO6 | Remember basic dynamics, understand the basic principles of structural dynamics and apply the same to simple structures. |


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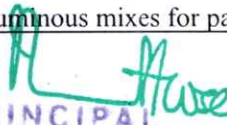
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| CET 304 ENVIRONMENTAL ENGINEERING | CO1 | To appreciate the role of environmental engineering in improving the quality of environment |
| | CO2 | To plan for collection and conveyance of water and waste water |
| | CO3 | To enhance natural water purification processes in an engineered environment |
| | CO4 | To decide on appropriate technology for water and waste water treatment |
| CET 306 DESIGN OF HYDRAULIC STRUCTURES | CO1 | Elucidate the causes of failure, principles of design of different components of hydraulic structures |
| | CO2 | Describe the features of canal structures and perform the design of alluvial canals |
| | CO3 | Perform the hydraulic design of minor irrigation structures such as cross drainage works, canal falls, cross regulator. |
| | CO4 | Prepare the scaled drawings of different minor irrigation structures |
| | CO5 | Describe the design principles and features of dams and perform the stability analysis of gravity dams |
| CET 352 ADVANCED CONCRETE TECHNOLOGY | CO1 | To recall the properties and testing procedure of concrete materials as per IS code |
| | CO2 | To describe the procedure of determining the properties of fresh and hardened concrete |
| | CO3 | To design concrete mix using IS Code Methods. |
| | CO4 | To explain nondestructive testing of concrete |
| | CO5 | To describe the various special types of concretes |
| HUT 300 INDUSTRIAL ECONOMICS AND FOREIGN TRADE MANAGEMENT | CO1 | Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare. (Cognitive knowledge level: Understand) |
| | CO2 | Take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply) |
| | CO3 | Determine the functional requirement of a firm under various competitive conditions. (Cognitive knowledge level: Analyse) |
| | CO4 | Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society. (Cognitive knowledge level: Analyse) |
| | CO5 | Determine the impact of changes in global economic policies on the business opportunities of a firm. (Cognitive knowledge level: Analyse) |
| CET 308 COMPREHENSIVE COURSE WORK | CO1 | Learn to prepare for a competitive examination |
| | CO2 | Comprehend the questions in Civil Engineering field and answer them with confidence |
| | CO3 | Communicate effectively with faculty in scholarly environments |
| | CO4 | Analyze the comprehensive knowledge gained in basic courses in the field of Civil Engineering |
| CEL 332 TRANSPORTATION ENGINEERING LAB | CO1 | Analyse the suitability of soil as a pavement subgrade material |
| | CO2 | Assess the suitability of aggregates as a pavement construction material |
| | CO3 | Characterize bitumen based on its properties so as to recommend it as a pavement construction material. |
| | CO4 | Design bituminous mixes for pavement layers |


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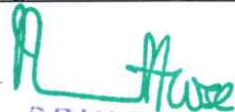


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| | CO5 | Assess functional adequacy of pavements based on roughness of pavement surface. |
| CEL 334 CIVIL ENGINEERING SOFTWARE LAB | CO1 | To undertake analysis and design of multi-storeyed framed structure, schedule a given set of project activities using a software. |
| | CO2 | To prepare design details of different structural components, implementation plan for a project. |
| | CO3 | To prepare a technical document on engineering activities like surveying , structural design and project planning. |

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| Semester VII | | |
| Course Code & Course Name | CO No | CO Description |
| CET 401 DESIGN OF STEEL STRUCTURES | CO1 | Explain the behaviour and properties of structural steel members to resist various structural forces and actions and apply the relevant codes of practice. |
| | CO2 | Analysis the behaviour of structural steel members and undertake design at both serviceability and ultimate limit states. |
| | CO3 | Explain the theoretical and practical aspects of design of composite steel structure along with the planning and design aspects |
| | CO4 | Apply a diverse knowledge of design of steel engineering practices applied to real life problems |
| | CO5 | Demonstrate experience in the implementation of design of structure on engineering concepts which are applied in the field structural engineering |
| PHT 110 ENGINEERING PHYSICS | CO1 | Compute the quantitative aspects of waves and oscillations in engineering systems. |
| | CO2 | Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments. |
| | CO3 | Analyze the behaviour of matter in the atomic and subatomic level through the mechanics to perceive the microscopic processes in electronic devices. |
| CEQ 413 SEMINAR | CO1 | Identify academic documents from the literature which are related to her/his areas of interest (Cognitive knowledge level: Apply) |
| | CO2 | Read and apprehend an academic document from the literature which is related to her/ his areas of interest (Cognitive knowledge level: Analyze). |
| | CO3 | Prepare a presentation about an academic document (Cognitive knowledge level: Create) |


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| | CO4 | Give a presentation about an academic document (Cognitive knowledge level: Apply) |
| | CO5 | Prepare a technical report (Cognitive knowledge level: Create). |
| CED 415 PROJECT PHASE 1 | CO1 | Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply). |
| | CO2 | Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply) |
| | CO3 | Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply) |
| | CO4 | Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply) |
| | CO5 | Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze). |
| | CO6 | Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply). |
| CEL 411 ENVIRONMENTAL ENGINEERING LAB | CO1 | Analyse various physico-chemical and biological parameters of water |
| | CO2 | Compare the quality of water with drinking water standards and recommend its suitability for drinking purposes |
| | CO3 | Demonstrate experience in the implementation of design of structure on engineering concepts which are applied in the field structural engineering |

| Semester VIII | | |
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| Course Code & Course Name | CO No | CO Description |
| CET 402 QUANTITY SURVEYING AND VALUATION | CO1 | Define basic terms related to estimation, quantity surveying and contract document |
| | CO2 | Interpret the item of work from drawings and explain its general specification and unit of measurement. |
| | CO3 | Make use of given data from CPWD DAR/DSR for calculating the unit rate of different items of work associated with building construction |
| | CO4 | Develop detailed measurement (including BBS) and BoQ of a various work like buildings, earthwork for road, sanitary and water supply work |
| | CO5 | Explain various basic terms related to valuation of land and building |
| | CO6 | Develop valuation of buildings using different methods of valuation. |
| | CO7 | Determine the Taylor and Fourier series expansion of functions and learn their applications. |
| CET 464 AIR QUALITY MANAGEMENT | CO1 | Explain the sources of air pollution and different types of air pollutant. |
| | CO2 | Describe the effect of air pollutants on vegetation, animals, materials and human health. |
| | CO3 | Discuss the different methods of ambient air quality monitoring system which supports an air quality management program |

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| | CO4 | Explain the meteorological aspects of air pollutant dispersion. |
| | CO5 | Describe the various air pollution control strategies that can be undertaken to meet the air quality goals. |
| CET 456 REPAIR AND REHABILITATION OF BUILDINGS | CO1 | Recall the basics ideas and theories associated with Concrete technology and Masonry structures. |
| | CO2 | Understand the need and methodology of repair and rehabilitation of structures, the various mechanisms used, and tools for diagnosis of structures |
| | CO3 | Identifying the criterions for repairing / maintenance and the types and properties of repair materials used in site. Learn various techniques for repairing dam- aged and corroded structures |
| | CO4 | Proposing wholesum solutions for maintenance/rehabilitation and applying methodologies for repair- ing structures or demolishing structures. |
| | CO5 | Analyse and asses the damage to structures using various tests |
| CET 438 AIRPORT SEAPORT AND HARBOUR ENGINEERING | CO1 | Explain the basic principles of planning and design for site selection, Airport components based on air traffic characteristics |
| | CO2 | Explain the basic design principles of Runway orientation, basic runway length and corrections required, Geometric design of runways, Design of taxiways and aprons, Terminal area planning, |
| | CO3 | Explain various aspects such as Airport markings, Lighting of runway approaches, taxiways and aprons, Air traffic control methods. |
| | CO4 | Explain the basic principles ,site selection characteristics ,lay out ,break waters, quays, piers, wharves, jetties, transit sheds and warehouses - navigational aids - light houses, signals - types - Moorings |
| | CO5 | Explain the basics of Docks – Functions and types - dry docks, wet docks arrangement of basins and docks |

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