



**MAR ATHANASIOUS COLLEGE OF ENGINEERING**

**KOTHAMANGALAM**

**CIVIL ENGINEERING DEPARTMENT**

**LIST OF COURSE OUTCOME**

**B.TECH 2019 SCHEME**

SEMESTER	COURSE CODE	COURSE NAME	CO NO:	CO DESCRIPTION
S1	MAT 101	LINEAR ALGEBRA AND CALCULUS	1	Solve systems of linear equations, diagonalize matrices and characterise quadratic forms
			2	Compute the partial and total derivatives and maxima and minima of multivariable functions
			3	Compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas
			4	Perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent
			5	Determine the Taylor and Fourier series expansion of functions and learn their applications.
S1	PHT 110	Engineering Physics	1	Compute the quantitative aspects of waves and oscillations in engineering systems.
			2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.
			3	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.

			4	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
S1	EST 110	Engineering Graphics	1	Draw the projection of points and lines located in different quadrants
			2	Prepare multiview orthographic projections of objects by visualizing them in different positions
			3	Draw sectional views and develop surfaces of a given object
			4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.
			5	Convert 3D views to orthographic views , Obtain multiview projections and solid models of objects using CAD tools

S1	EST 130	Basics of Electrical & Electronics Engineering	1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits
			2	Develop and solve models of magnetic circuits
			3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state
			4	Describe working of a voltage amplifier
			5	Outline the principle of an electronic instrumentation system , Explain the principle of radio and cellular communication

S1	HUN 101	Life Skills	1	Define and Identify different life skills required in personal and professional life
			2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
			3	Explain the basic mechanics of effective communication and

				demonstrate these through presentations.
			4	Take part in group discussions
			5	Use appropriate thinking and problem solving techniques to solve new problems, Understand the basics of teamwork and leadership
			6	

S1	PHL 120	Engineering Physics Lab	1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories
			2	Understand the need for precise measurement practices for data recording
			3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations
			4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics
			5	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results

S1	ESL130	Electrical & Electronics Workshop	1	Demonstrate safety measures against electric shocks.
			2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols
			3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings
			4	Identify and test various electronic components
			5	Draw circuit schematics with EDA tools, Assemble and test electronic circuits on boards, Work in a team with good interpersonal skills

S2	MAT 102	VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS	1	Compute the derivatives and line integrals of vector functions and learn their applications
			2	Evaluate surface and volume integrals and learn their inter-relations and applications.
			3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients
			4	Compute Laplace transform and apply them to solve odes arising in engineering
			5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering

S2	CYT 100	Engineering Chemistry	1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.
			2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
			3	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.
			4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.
			5	Study various types of water treatment methods to develop skills for treating wastewater.

S2	EST 100	Engineering Mechanics	1	Recall principles and theorems related to rigid body mechanics
			2	Identify and describe the components of system of forces acting on the rigid body
			3	Apply the conditions of equilibrium to various practical problems involving different force system

			4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
			5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses

S2	HUT 102	Professional Communication	1	Develop vocabulary and language skills relevant to engineering as a profession
			2	Analyze, interpret and effectively summarize a variety of textual content
			3	Create effective technical presentations
			4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus
			5	Identify drawbacks in listening patterns and apply listening techniques for specific needs, Create professional and technical documents that are clear and adhering to all the necessary conventions

S2	EST 102	Programming in C	1	Analyze a computational problem and develop an algorithm/flowchart to find its solution
			2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
			3	Write readable C programs with arrays, structure or union for storing the data to be processed
			4	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
			5	Write readable C programs which use pointers for array processing and parameter passing ,Develop readable

			C programs with files for reading input and storing output

S2	CYL 120	Engineering Chemistry Lab	1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses
			2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs
			3	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
			4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis
			5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments , 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

S3	CEL 201	Civil Engineering Planning & Drafting Lab	1	Illustrate ability to organise civil engineering drawings systematically and professionally
			2	Prepare building drawings as per the specified guidelines.
			3	Assess a complete building drawing to include all necessary information
			4	Create a digital form of the building plan using any drafting software

S3	CEL 203	Survey Lab	1	Use conventional surveying tools such as chain/tape and compass for plotting and area determination.
			2	Apply levelling principles in field
			3	Solve triangulation problems using theodolite
			4	Employ total station for field surveying
			5	Demonstrate the use of distomat and handheld GPS

S3	CET 281	BUILDING CONSTRUCTION AND STRUCTURAL SYSTEMS	1	Explain the properties and testing methods of different materials used for building construction.
			2	Explain the construction details of different components of buildings.
			3	Explain construction practices such as prefabricated, cost effective and sustainable technologies
			4	Explain the details and behavior of structural systems and structural elements used in buildings.

S3	CET 283	Introduction to Geotechnical Engineering	1	Explain the basic concepts, theories and methods of analysis in soil mechanics and foundation engineering
			2	Solve the basic properties of soil by applying functional relationships
			3	Determine the engineering properties of soil by applying the laboratory test results and the fundamental concepts
			4	Estimate the design parameters of footings and retaining walls

S3	CET 285	Informatics for Infrastructure Management	1	To understand the fundamental concepts of data science, informatics & internet of things
			2	To learn the use of geomatics in planning and site selection of infrastructure projects
			3	To apply building informatics in construction, monitoring and project management

			4	To learn the role of iot technology in infrastructure management
--	--	--	---	--

S4	CET 202	Engineering Geology	1	Recall the fundamental concepts of surface processes, subsurface process, minerals, rocks, groundwater and geological factors in civil engineering constructions.
			2	Identify and describe the surface processes, subsurface process, earth materials, groundwater and geological factors in civil engineering constructions.
			3	Apply the basic concepts of surface and subsurface processes, minerals, rocks, groundwater and geological characteristics in civil engineering constructions.
			4	Analyze and classify geological processes, earth materials and groundwater.
			5	Evaluation of geological factors in civil engineering constructions.

S4	CET 204	Geotechnical Engineering -1	1	Explain the fundamental concepts of basic and engineering properties of soil
			2	Describe the laboratory testing methods for determining soil parameters
			3	Solve the basic properties of soil by applying functional relationships
			4	Calculate the engineering properties of soil by applying the laboratory test results and the fundamental concepts of soil mechanics
			5	Analyze the soil properties to identify and classify the soil

S4	CET 206	Transportation Engineering	1	Apply the basic principles of Highway planning and design highway geometric elements
			2	Apply standard code specifications in judging the quality of highway materials; designing of flexible pavements



			3	Explain phenomena in road traffic by collection, analysis and interpretation of traffic data through surveys; creative design of traffic control facilities
			4	Understand about railway systems, tunnel, harbour and docks
			5	Express basics of airport engineering and design airport elements

S4	CEL 202	Material Testing Lab- 1	1	The understand the behaviour of engineering materials under various forms and stages of loading.
			2	Characterize the elastic properties of various materials.
			3	Evaluate the strength and stiffness properties of engineering materials under various loading conditions.

S4	CEL 204	Fluid Mechanics Lab-1	1	Apply fundamental knowledge of Fluid Mechanics to corresponding experiments
			2	Apply theoretical concepts in Fluid Mechanics to respective experiments
			3	Analyse experimental data and interpret the results
			4	Document the experimentation in prescribed manner

S5	CET 301	Structural Analysis - 1	1	Apply the principles of solid mechanics to analyse trusses.
			2	Apply various methods to determine deflections in statically determinate structures.
			3	Identify the problems with static indeterminacy and tackling such problems by means of the method of consistent deformations and energy principles.
			4	Apply specific methods such as slope deflection and moment distribution methods of structural analysis for typical structures with different characteristics.

			5	Apply suitable methods of analysis for various types of structures including cables, suspension bridges and arches. Analyse the effects of moving loads on structures using influence lines.

S5	CET 303	Design of Concrete Structures	1	Recall the fundamental concepts of limit state design and code provisions for design of concrete members under bending, shear, compression and torsion.
			2	Analyse reinforced concrete sections to determine the ultimate capacity in bending, shear and compression.
			3	Design and detail beams, slab, stairs and footings using IS code provisions.
			4	Design and detail columns using IS code and SP 16 design charts.
			5	Explain the criteria for earthquake resistant design of structures and ductile detailing of concrete structures subjected to seismic forces.

S5	CET 305	Geotechnical Engineering - II	1	Understand soil exploration methods
			2	Explain the basic concepts, theories and methods of analysis in foundation engineering
			3	Calculate bearing capacity, pile capacity, foundation settlement and earth pressure
			4	Analyze shallow and deep foundations
			5	Solve the field problems related to geotechnical engineering

S5	CET 307	Hydrology and Water Resources Engineering	1	Describe and estimate the different components of hydrologic cycle by processing hydrometeorological data
			2	Determine the crop water requirements for the design of irrigation canals by recollecting the principles of irrigation engineering

			3	Perform the estimation of streamflow and/or describe the river behaviour and control structures
			4	Describe and apply the principles of reservoir engineering to estimate the capacity of reservoirs and their useful life
			5	Demonstrate the principles of groundwater engineering and apply them for computing the yield of aquifers and wells

S5	CET 309	Construction Technology & Management	1	Describe the properties of materials used in construction
			2	Explain the properties of concrete and its determination
			3	Describe the various elements of building construction
			4	Explain the technologies for construction
			5	Describe the procedure for planning and executing public works, Apply scheduling techniques in project planning and control

S5	CEL 331	Material Testing Lab - II	1	To describe the basic properties of various construction materials
			2	Characterize the physical and mechanical properties of various construction materials.
			3	Interpret the quality of various construction materials as per IS Codal provisions.

S5	CEL 333	Geotechnical Engineering Lab - II	1	Identify and classify soil based on standard geotechnical experimental methods.
			2	Perform and analyze permeability tests.
			3	Interpret engineering behavior of soils based on test results.
			4	Perform laboratory compaction, CBR and in-place density test for fill quality control in the field.
			5	Evaluate the strength of soil by performing various tests viz. Direct shear test, unconfined compressive

				strength test and triaxial shear test, Evaluate settlement characteristics of soils.

S6	CET 302	STRUCTURAL ANALYSIS – II	1	Understand the principles of plastic theory and its applications in structural analysis.
			2	Examine the type of structure and decide on the method of analysis.
			3	Apply approximate methods of analysis for framed structures to ascertain stress resultants approximately but quickly.
			4	Apply the force method to analyse framed structures.
			5	Apply the displacement methods to analyse framed structures. Remember basic dynamics, understand the basic principles of structural dynamics and apply the same to simple structures.

S6	CET 304	ENVIRONMENTAL ENGINEERING	1	To appreciate the role of environmental engineering in improving the quality of environment
			2	To plan for collection and conveyance of water and waste water
			3	To enhance natural water purification processes in an engineered environment
			4	To decide on appropriate technology for water and waste water treatment

S6	CET 306	DESIGN OF HYDRAULIC STRUCTURES	1	Elucidate the causes of failure, principles of design of different components of hydraulic structures
			2	Describe the features of canal structures and perform the design of alluvial canals
			3	Perform the hydraulic design of minor irrigation structures such as cross drainage works, canal falls, cross regulator

			4	Prepare the scaled drawings of different minor irrigation structures
			5	Describe the design principles and features of dams and perform the stability analysis of gravity dams

S6	CET 308	COMPREHENSIVE COURSE WORK	1	Learn to prepare for a competitive examination
			2	Comprehend the questions in Civil Engineering field and answer them with confidence
			3	Communicate effectively with faculty in scholarly environments
			4	Analyze the comprehensive knowledge gained in basic courses in the field of Civil Engineering
			5	

S6	CEL 332	TRANSPORTATION ENGINEERING LAB	1	Analyse the suitability of soil as a pavement subgrade material
			2	Assess the suitability of aggregates as a pavement construction material
			3	Characterize bitumen based on its properties so as to recommend it as a pavement construction material.
			4	Design bituminous mixes for pavement layers
			5	Assess functional adequacy of pavements based on roughness of pavement surface.
			6	

S6	CEL 334	CIVIL ENGINEERING SOFTWARE LAB	1	To undertake analysis and design of multi-storeyed framed structure, schedule a given set of project activities using a software.
			2	To prepare design details of different structural components, implementation plan for a project.
			3	To prepare a technical document on engineering activities like surveying , structural design and project planning.