

Program: B.Tech

19MT1101	Mathematics for Computing	CO1	Model the physical laws and relations mathematically as a first order differential equation, solve by analytical and numerical methods also interpret the solution.
		CO2	Model physical laws and relations mathematically as a second/higher order differential equation, solve by analytical method and interpret the solution.
		CO3	Obtain the Fourier series expansions of periodic functions and use the series to solve ordinary differential equations.
		CO4	Model physical problems mathematically as a system of linear equations and solve them by analytical and numerical methods. Also, determine the nature of Quadratic form using Eigen values.
		CO5	Verify the solution of problems through MATLAB.
19BT1001	Biology For Engineers	CO1	Acquire the Knowledge of basic biology
		CO2	Acquire the Knowledge of Human Biological Systems
		CO3	Acquire Knowledge on Microorganisms and Biosensors
19MT2102	Mathematics For Engineers	CO1	Apply differential and integral calculus to find maxima & minima of functions and evaluate the integrals
		CO2	Model and solve the relevant phenomena as a differential equation
		CO3	Demonstrate Fourier series and Analytic functions
		CO4	Describe probability, Random Variables and Algebraic structures
19MT2007	Probability And Optimization Techniques	CO1	Identify the basic concept of probability theory and types of random variables and also their applications in probability distributions.
		CO2	Apply discrete and Continuous probability distributions to analyse the various real-world situations.
		CO3	Illustrate the bivariate data using correlation and regression analysis and formulate the given phenomena as a linear programming problem and solve it by graphical method. and simplex methods.
		CO4	Demonstrate the Big- M method, dual simplex method and obtain the solutions of non-linear programming problems using Pivot, Wolfe's algorithms and separable programming technique
19UC1101	Basic English	CO1	Understand the concepts of grammar to improve communication, reading, and writing skills
		CO2	Demonstrate required knowledge over Dos and Don'ts of speaking in the corporate context. Demonstrate ability to face formal situations / interactions.
		CO3	Understand the varieties of reading and comprehend the tone and style of the author. Skim and scan effectively and appreciate rhetorical devices
		CO4	Apply the concepts of writing to draft corporate letters, emails, and memos
19UC1202	English Proficiency	CO1	Demonstrating different interpersonal skills for employability
		CO2	Distinguishing business essential skills
		CO3	Classifying social media and corporate communication skills
		CO4	Applying analytical thinking skills
19UC2103	Professional Communication Skills	CO1	Knowledge about Verbal Ability
		CO2	Knowledge about Critical Thinking Skills
		CO3	Knowledge about Quantitative Aptitude:
		CO4	Knowledge about Reasoning
19UC2204	Aptitude Builder-1	CO1	Knowledge about Verbal Ability
		CO2	Knowledge about Soft Skills
		CO4	Knowledge about Quantitative Aptitude
		CO4	Knowledge about Reasoning
19UC3105	Aptitude Builder-2	CO1	Knowledge about Critical Reading
		CO2	Knowledge about Trinity Guild Hall
		CO3	Knowledge about Quantitative Aptitude
		CO4	Knowledge about Reasoning: Number and Letter Series, Number and Letter Analogy, Coding and decoding, Odd man out. Selections
		CO5	Apply the structured programming paradigm with logic building skills on Basic and Linear Data Structures for solving real world problems.
19ME1103	Design Tools Workshop - I	CO1	Practice design thinking by developing artistic skills
		CO2	Visualize and practice innovative design by final drafting using photogrammetric and model the design using prototyping technique
		CO3	Apply the concept of AI & Data analytics & finalize the requirements to design his idea
		CO4	Draft a report of his project from the initial stage & make a report which include scope, time and cost management of his project
19SC1202	Data Structures	CO1	Illustrate solving typical problems using Arrays, Strings and Lists.
		CO2	Demonstrate applications of stacks & queues and solving typical problems using recursion.
		CO3	Demonstrate use of sorting, Heaps and binary tree techniques in problem solving.
		CO4	Examine AVL trees and Hashing techniques.
		CO5	Apply the knowledge obtained by the course to solve real world problems.

19SC1203	Object Oriented Programming	CO1	Understand basic Concepts of OOP, fundamentals of java and apply the concepts of classes and objects through Java Language. Apply constructors, Overloading, parameter passing.
		CO2	Apply access control, Inheritance, Packages
		CO3	Apply Interfaces, Exception Handling, multi- threading, I/o.
		CO4	Apply collection framework and event driven programming.
		CO5	Apply object-oriented programming concepts to write programs and Analyses requirements and design to implement lab-based project with SDLC in a group of students.
19SC1209	Design Tools Workshop - II	CO1	Practice the design ideology by artistic skill
		CO2	Visualize the design ideology by using VR technology
		CO3	Visualize the design ideology by incorporating VR technique
		CO4	Visualize and present his design idea by applying AR technique
19PH1010	Mechanics	CO1	Apply the concept of forces, governing static equations and analyse planer system of forces.
		CO2	Use analytical techniques for analyzing forces in statically determinate structures.
		CO3	Understanding the concepts of planar and non-planar system of parallel forces and analysing them. Estimate moment of inertia of lamina and material bodies.
		CO4	Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.
19CE1002	Engineering Graphics for civil engineers	CO1	Understand the principles of drawing and use of drafting instruments
		CO2	Draw engineering curves and scales.
		CO3	Draw the projections of points, lines, planes and solids
		CO4	Draw the surface sheath of solids by development of surfaces and the sections of Solids.
		CO5	Prepare 2D & 3D drawings of solids and their transformations.
		CO5	Apply the knowledge on structure and properties of materials while executing experiments and develop inter disciplinary projects.
19CE2105	AI&ML Applications in Civil Engineering	CO1	Apply the basic operations and data modifications in python
		CO2	Apply the regression analysis on the given data
		CO3	Apply some basic machine learning techniques on given data
		CO4	Understand the deep learning concepts
		CO5	Apply AI and ML techniques in Python
19CE2102	Mechanics of Fluids	CO1	To understand concept of flow phenomenon and determination of fluid properties.
		CO2	To understand the mechanics pressure and its measurement.
		CO3	To get the concepts of kinematic principles and solutions for simple mathematical equations, to understand the energy principle, continuity equation of fluid in 3-dimensions
		CO4	To know various hydraulic principles of pipe flow and losses in pipe systems. To Understand the Dimensional analysis concept and deriving the relevant equations.
19CE2101	Solid Mechanics	CO1	Associate with the stress-strain diagrams and the relationship between the elastic constants, estimate temperature stresses in compound bars and find the stresses in thin walled pressure vessels
		CO2	Draw Shear force and Bending moment diagrams for statistically determinate beams
		CO3	Calculate the Bending and shear stresses and draw the distribution diagrams for various cross sections.
		CO4	Estimate the transformation of stress in a plane and draw Mohr's circle, estimate stresses due to torsion for circular shafts and find buckling load for centric and eccentric columns
19CE2205	Geology	CO1	Understand various geological processes operate on the surface of the earth, impact of the processes on the construction materials.
		CO2	Understand the formation of different types of rocks and their identification and properties and use in sourcing suitable geological materials for construction
		CO3	Equip with factors leading to various geological hazards and able to identify areas vulnerable to sliding, come out measures to stabilize slopes and seismic vulnerability.
		CO4	Equip with basic knowledge required for identification of suitable site for the proposed construction project, equip with basic knowledge of hydro geological properties of rocks, identification of potential pockets for tapping groundwater and geological settings that are un favorable / unsafe for construction of dams and driving the tunnels.
19CE2103	Surveying	CO1	Understand basic concepts of surveying
		CO2	Understand how to operate instruments required for surveying
		CO3	Applying the surveying equipments required based on the functionality and nature of work
		CO4	Apply field data to prepare a plan required for a given civil engineering project
19CE2104	Construction Materials and Concrete Technology	CO1	Compare the properties of most common and advanced building materials
		CO2	Understand the typical and potential applications of these materials such as concrete and its mix proportioning
		CO3	Understand the relationship between material properties and structural form
		CO4	Understand the importance of experimental verification of material properties.

19CE2204	Environmental Engineering	CO1	Understand various aspects related to water supply process and water quality
		CO2	Design and analyze water treatment system
		CO3	Assess Sewage quantity and design of sewerage system
		CO4	Design and analyze of sewage treatment process, Learn the impacts of air pollution its control techniques and disposal of solid wastes
19CE2202	Building Planning and Construction	CO1	Understand the concept of building planning and the building bye laws and the regulations
		CO2	Understand the stages involved in building planning
		CO3	Understand different techniques of construction viz., Brick Masonry and stone Masonry
		CO4	Understand the different types of floors, roofs, doors, stairs and its use, know about the supporting structures and building amenities.
19CE2201	Structural Analysis	CO1	Find the deformation using energy theorems i.e. Castigliano's theorems, Betti's theorem and Maxwell's reciprocal theorem.
		CO2	Students will be able to estimate the deflection of beams by various methods such as deflection curves, moment area method, conjugate beam method and unit load method
		CO3	Able to analysis proper cantilevers and fixed beams for any type of loading using consistent deformation method and can analysis conjugate beam by Clapereyon's theorem of Three moments
		CO4	Student will be able to analyze beams and frames for any type of loading using slope deflection method and moment deflection methods
19CE2203	Hydraulics and Hydraulic Machines	CO1	To understand open channel flow through Chezy's, Kutter's and Manning's formula, design economical channel sections, Rapidly Varied Flow and applications.
		CO2	To understand the mechanics of impact of jet on various types of vanes.
		CO3	To understand the components, function and uses of Pelton turbine, Francis turbine and Kaplan turbine.
		CO4	To performance of hydraulic design of turbines and pumps (C.P and R.P), To know various hydraulic aspects of components function and uses of Centrifugal Pumps and Reciprocating Pumps.
19CE2206	Geo -Technical Engineering	CO1	Understand origin, index & engineering properties of soil
		CO2	Classify the soil according to I.S. guidelines and to know the stresses in soil
		CO3	Analyze stresses developed at various points below the ground surface using various methods and Analyze important engineering property of soil such as permeability
		CO4	Analyze important engineering properties of soil such as compaction, compressibility and consolidation of soil, Analyze important engineering property of soil such as shear strength of soil
		CO5	Analyze and interpret the physical and engineering properties of soil by performing the required laboratory tests for any geotechnical investigation.
19CE3212	Foundation Engineering	CO1	Carry out geotechnical field investigation and can prepare field reports and Thoroughly understand different geotechnical investigation methodologies and can handle individually
		CO2	Can compute stress distribution using different techniques and can carry settlement analysis in different soil types
		CO3	Compute bearing capacity of shallow and deep foundations in laboratory and field using different methods
		CO4	Can analyze stability of slopes for finite and infinite in different soil conditions and methods, carry earth pressure analysis and can design retaining walls
19CE3101	Design of Reinforced Concrete Structures	CO1	Design RC beams subjected to bending using Working Stress Method.
		CO2	Explain the concept of Limit State Design and apply it to beams
		CO3	Apply Limit state design for flanged sections subjected to shear, torsion and concept of bond
		CO4	Design one-way, two-way and continuous slabs, Design columns and isolated footings subjected to axial load, Uni-axial and bi-axial bending
		CO5	Analysis and Design of Structures using software such as ETABS/Staad Pro/CYPE CADD etc.
19CE3102	Water Resources Engineering	CO1	Compute the components of hydrological cycle using different methods
		CO2	Estimate the ground water yield and requirement of water for the crops
		CO3	Estimate the quantity of water for canal irrigation, storage capacity and life of reservoir.
		CO4	Analyse stability of Gravity and Earth dams
19CE3211	Advanced Structural Analysis	CO1	Students will be able to draw influence line diagrams for determinate structure and able to estimate maximum bending moment and absolute maximum bending moment.
		CO2	Students will be able to analysis cable structure and three hinged arches.
		CO3	Students will be able to carry plastic analysis of structures
		CO4	Analyze beams and frames using matrix methods of analyze such as force method and displacement method
19CE3203	Design of Steel Structures	CO1	Analyse and design bolted and welded connections
		CO2	Design single and compound beams as per IS code
		CO3	Design simple and built-up columns as per IS code
		CO4	Design column base systems as per IS code, Calculate wind forces and design roof trusses

19CE3103	Transportation Engineering	CO1	Know Versatile with history - current trends of transportation and Carry engineering surveys and can decide the alignment
		CO2	Analyze and design highway geometric elements
		CO3	Analyze and design of flexible, rigid pavements, Pavement Drainage
		CO4	Handle pavement construction activities and also conduct quality control at site and Evaluate pavement condition and can identify and suggest remedial measures, understand traffic Rules, Analyze and design of traffic infrastructure
19CE3221	Advanced Design of Reinforced Concrete Structures	CO1	Design different types of stair cases.
		CO2	Select appropriate foundation system.
		CO3	Apply the design principles of retaining walls.
		CO4	Differentiate types of rectangular water tanks and analyse as per IS code methods, select types of circular water tanks and analyse as per IS code methods
19CE3201	Quantity Surveying and Estimation	CO1	To understand the fundamentals of estimation and specification
		CO2	To provide exposure to rate analysis
		CO3	To provide hands on experience on estimation
		CO4	To study the fundamentals of evaluation, To carry out valuation by different methods
		CO5	Applying estimation concept to buildings, road works, canal works, and B.B.S by using a software package (M.S Excel).
19CE3221	Prestressed Concrete	CO1	To introduce prestressing methods, principles and concepts
		CO2	To determine losses in prestress
		CO3	To Analyse PSC Sections both at transfer of prestress and Service load conditions
		CO4	To design prestressed concrete beams as per IS Code, to design end block of PSC beams.
19CE4141	Bridge Engineering	CO1	To design slab culvert as per IRC Code
		CO2	To design simple supported T-beam girder beam
		CO3	To design pier and abutments
		CO4	To design various bridge bearing, to design bridge foundation like well foundation
19CE4151	Sustainable construction Technologies	CO1	Understand the construction basics of a Common building construction methods conventional
		CO2	Understand the modern construction methods basics of construction Modular Construction Precast concrete.
		CO3	Understand the sustainable construction materials technologies and project management strategies
		CO4	Understand the LEED for New Construction rating system
19CE3222	Ground Improvement Techniques	CO1	Knowledge about the different techniques of ground improvement and their suitability.
		CO2	Understanding and design of stone columns for enhancing soil bearing capacity.
		CO3	Knowledge of the grouts, their types, properties and application.
		CO4	Introduction to geo synthetics, their types, function and application, Ability to design and analyse the earth-reinforcements with their connections
19CE3232	Geotechnical Earthquake Engineering	CO1	Knowledge of the seismic phenomenon, its occurrence, tectonic theories, seismic waves and their motion in different media and measurement of ground motions.
		CO2	Analysis skills of 1-D ground responses using linear and non-linear approaches.
		CO3	Ability to analyze the seismic hazard through deterministic and probabilistic approaches.
		CO4	Ability of modifying the actual ground motion records and their time and frequency domain generation. Knowledge of dynamic soil properties and their measurements using field and laboratory tests, Knowledge of the liquefaction phenomenon and its effects and the remedial measures to be taken for soil improvement.
19CE4142	Design of Earth Retaining Structures	CO1	Knowledge about the different techniques of earth retaining structures and their suitability.
		CO2	Understanding and design of retaining walls, braced cuts and sheet piles.
		CO3	Knowledge of the grouts, their types, properties and application.
		CO4	Introduction to reinforced earth and geo synthetics, their types, function and application, Ability to design and analyse the earth-reinforcements and coffer dams with their functions.
19CE4152	Rock Mechanics	CO1	Analyze the physical properties of rocks and failure criterion
		CO2	Analyze the rock mass classification, stress around mine openings
		CO3	Analyze the strain and displacement of the rock mass
		CO4	Analyze shear strength of soil and analyze and interpret the laboratory and field tests required for any geotechnical investigation
19CE3213	Sustainable engineering & technology	CO1	Design and draw the Vertical drop weir on permeable foundations
		CO2	Design and draw the Canal regulator, Irrigation canal, direct sluice, Surplus weir of a tank
		CO3	Design and draw the Profile of a Ogee spillway
		CO4	Design and draw the Cross Drainage works

19CE3223	Environmental impact assessment and life cycle analyses	CO1	Understand stream flow and its measurements
		CO2	Understand the classification of the rivers and design of cross drainage works
		CO3	Understand the reservoir planning and classification of dams
		CO4	Able to design gravity and earth dams
19CE3233	Solid Waste Management and Landfills	CO1	Understand the basic concept of Environmental impact assessment, types of environmental impacts, significance and criteria for selection
		CO2	Select methodology for identification of environmental impact.
		CO3	Apply the knowledge of predicting impact of proposed project on air & water
		CO4	Acquire knowledge of predicting impact of proposed project on Noise, Soil, Biological and Socio-economic conditions, Acquire the skills of preparing environment management plans.
19CE4168	Solid Waste Management and Landfills	CO1	Understand types, sources of solid waste, composition and their Properties.
		CO2	Understand the present scenario, challenges of solid waste management and various waste disposal options available.
		CO3	Understand methods of solid waste disposal methods of land filling, systems adopted for conversion of solid waste and recovery of materials and energy from solid waste.
		CO4	Understand the components of hazardous waste types, composition, properties and acquire skills of designing of various lining system for landfill and treatment as per MoEF and CPCB
17CE4173	Advanced Environmental Engineering	CO1	Understand the basic concepts of Stream Sanitation & design of Stabilization ponds
		CO2	Acquire the knowledge of industrial wastewater treatment process
		CO3	Acquire the knowledge on new concepts in biological waste treatment
		CO4	Analyze air pollution and plume behavior, measuring of noise pollution, understand various aspects related to Solid & Hazardous waste management
19CE3251	Intelligent transportation systems	CO1	Understand the Objectives ITS
		CO2	Understand the Importance of telecommunications in the ITS system
		CO3	Understand Advanced Traffic Management Systems
		CO4	Understand Integration of Automated Highway Systems
19CE3235	Traffic Engineering & maintenance	CO1	Apply the Concepts of Probability in traffic Engineering
		CO2	Know the Fundamental design concepts of Interchanges, Parking Facilities, Freeways
		CO3	Design Traffic Facilities include Un signalized Intersections (Rotary), Signalized Intersection (signal design)
		CO4	Know the Accident Situation in India, road safety measures, Understand Detrimental Effects of traffic on the environment
19CE3225	Pavement materials & design	CO1	Characterize pavement materials and also carry the advance tests on bituminous mixtures
		CO2	Thorough with stresses and strains of flexible and rigid pavements.
		CO3	Thorough with analysis and design of flexible highway and airport pavements
		CO4	Thorough with analysis and design of rigid highway and airport pavements
19CE4145	Urban Transport Systems Planning	CO1	Learn the concept of travel demand and supply and modes available for transportation
		CO2	Understand the different types of Traffic Surveys used in planning
		CO3	Identify and analyze trips as a part of transport planning
		CO4	Plan Public Transport Systems, Utilize ITS in Transport Planning
19CE4155	Railway engineering airport planning and design	CO1	Understand about the Classification of Railways, Permanent Way & its components, functions.
		CO2	Analyze track alignment, geometric elements, Horizontal and Vertical curves, super elevation, and Negative Super elevation.
		CO3	Understand about the various factors affecting Selection of site for Airport.
		CO4	Geometric Design of Runway, Computation of Runway length, Correction for runway length, Understand the layout of port components and operation of navigational aids that involved in functions of ports.
19CE3216	Construction Contracts	CO1	Understand the Engineering and Technology of Materials
		CO2	Understand the Development of Microstructure.
		CO3	Understand the Construction Materials and Criteria for Selection
		CO4	Understand the Non-structural materials
19CE4156	Advanced Concrete Technology	CO1	Understand the Materials
		CO2	Understand the Nondestructive evaluation
		CO3	Understand the Properties of constituent materials of Fibre reinforced concrete
		CO4	Understand the Durability of flyash concretes and High-performance concretes
19CE4166	Engineering Economy	CO1	Understand the unique features of construction
		CO2	Understand the Construction project planning
		CO3	Understand the Techniques of planning
		CO4	Understand the Planning and organizing construction site and resources involving Monitoring & control-Supervision

19CE40A2	Environmental Pollution Control Methods	CO1	Understand the sources and types of pollutants
		CO2	Understand the Meteorological factors
		CO3	Understand Water quality and Effluent discharge standards
		CO4	Understand the Disposal methods and Noise and its measurement
19CE30A3	Solid and Hazardous Waste Management	CO1	Understand the importance types, sources and disposal methods of Solid Waste Management.
		CO2	To understand the importance of conversion and recycling of waste.
		CO3	Understand types, Sources of Hazardous Waste Management.
		CO4	Understand disposal and treatment methods of Hazardous Waste Management.
19CE40A4	Remote Sensing and GIS	CO1	To understand the basic concepts of remote sensing and image processing.
		CO2	To understand the basic concepts of Geographical Information System
		CO3	To acquire the knowledge of Integrating the Remote sensing and GIS
		CO4	To apply the remote sensing and GIS tool for solving various civil engineering and societal problems
19CE40A5	Disaster Management	CO1	Understand the types of disasters, related hazards and the causes for disasters
		CO2	Apply the resilience and mitigation measures for various disasters by proper planning with respect to the kind of disaster that occur.
		CO3	Understand the disaster risk, reduction and the various organizations involved with related to disasters.
		CO4	Understand the disaster vulnerability with the help of case studies
19CE3216	Resource, Safety and Quality Management	CO1	Understand the basics systems of men and materials management
		CO2	Understand the basics systems of machinery management
		CO3	Understand the basics systems of safety management
		CO4	Understand the basics systems of quality management