GURU GOBIND SINGH COLLEGE OF ENGINEERING AND RESEARCH CENTRE, NASHIK
CIVIL ENGINEERING DEPARTMENT

SE(Civil Engineering) 2019 Course	
Sem - I: SECE	
201001 Building Technology and Architectural Planning [Theory]	
CO ID.	**Course Outcome**
CO201.1	Identify types of building and basic requirements of building components.
CO201.2	Make use of Architectural Principles and Building byelaws for building construction.
CO201.3	Plan effectively various types of Residential Building forms according to their utility,functions with reference to National Building Code.
CO201.4	Plan effectively various types of Public Buildings according to their utility functions withreference to National Building Code.
CO201.5	Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects.
CO201.6	Understand different services and safety aspects
201002 Mechanics of structure [Theory]	
CO ID.	**Course Outcome**
CO202.1	Understand concept of stress-strain and determine different types of stress, strain in determinate, indeterminate homogeneous and composite structures.
CO202.2	Calculate shear force and bending moment in determinate beams for different loading conditions and illustrate shear force and bending moment diagram.
CO202.3	Explain the concept of shear and bending stresses in beams and demonstrate shear and bending stress distribution diagram.
CO202.4	Use theory of torsion to determine the stresses in circular shaft and understand concept of Principal stresses and strains.
CO202.5	Analyze axially loaded and eccentrically loaded column.
CO202.6	Determine the slopes and deflection of determinate beams and trusses.
201003 Fluid Mechanics [Theory]	
CO ID.	**Course Outcome**
CO203.1	Understand concept of Fluid Properties, hydro statics and apply it for solving practical problems.
CO203.2	Develop continuity equation, Bernoulli equation and apply it for practical problems of fluid flow
CO203.3	Form non dimensional numbers and Conduct dimensional analysis of flow problem and Apply Boundary layer theory for solving practical problems of fluid flow.
CO203.4	Analyze flow through pipe & pipe network using principles fluid kinematics and dynamics
CO203.5	Develop channel flow resistance equation,specific energy & specific force curve to solve open channel flow problems
CO203.6	Categorize channel bottom slope and Compute GVF profile Understand development and practical application of fluid flow around submerged objects,
207001 Engineering Mathematics III [Theory]	
CO ID.	**Course Outcome**
CO204.1	Solve Higher order linear differential equations and its applications to modelling and analyzing Civil engineering problems such as bending of beams, whirling of shafts and mass spring systems.
CO204.2	Solve System of linear equations using direct & iterative numerical techniques and develop solutions for ordinary differential equations using single step & multistep methods applied to hydraulics, geotechnics and structural systems
CO204.3	Apply Statistical methods like correlation, regression and probability theory in data analysis and predictions in civil engineering
CO204.4	Perform Vector differentiation &integration, analyze the vector fields and apply to fluid flow problems
CO204.5	Solve Partial differential equations such as wave equation, one and two dimensional heat flow equations
207003 Engineering Geology [Theory]	
CO ID.	**Course Outcome**
CO205.1	Explain about the basic concepts of engineering geology, various rocks, and minerals both in lab and on the fields and their inherent characteristics and their uses in civil engineering constructions.
CO205.2	Exploring the importance of mass wasting processes and various tectonic processes that hampers the design of civil engineering projects and its implications on environment and sustainability.
CO205.3	Recognize effect of plate tectonics, structural geology and their significance and utility in civil engineering activities.
CO205.4	Incorporate the various methods of survey, to evaluate and interpret geological nature of the rocks present at the foundations of the dams, percolation tanks, tunnels and to infer site / alignment/ level free from geological defects.
CO205.5	Assess the Importance of geological nature of the site, precautions and treatments to improve the site conditions for dams, reservoirs, and tunnels.
CO205.6	Explain geological hazards and importance of ground water and uses of common building stones.

Sem-II: SECE	
201008 Geotechnical Engineering [Theory]	
CO ID.	**Course Outcome**
CO206.1	Identify and classify the soil based on the index properties and its formation process.
CO206.2	Explain permeability and seepage analysis of soil by construction of flow net.
CO206.3	Illustrate the effect of compaction on soil and understand the basics of stress distribution.
CO206.4	Express shear strength of soil and its measurement under various drainage conditions.
CO206.5	Evaluate the earth pressure due to backfill on retaining structures by using different theories.
CO206.6	Analysis of stability of slopes for different types of soils.
201009 Survey [Theory]	
CO ID.	**Course Outcome**
CO207.1	Define,Explain and apply a basics of plane surveying and differentiate the instruments used for it.Express proficiency in handling surveying equipment and analyse the surveying data from these equipment.Describe different methods of surveying and find relative positions of points on the surface of earth
CO207.2	Express proficiency in handling surveying equipment and analyse the surveying data from these equipment. Describe different methods of surveying and find relative positions of points on the surface of earth.
CO207.3	Execute curve setting for civil engineering projects such as roads, railways etc.
CO207.4	Articulate advancements in surveying such as space based positioning systems
CO207.5	Differentiate map and aerial photographs, also interpret aerial photographs.Define explain and apply Fundamental about Hydrographic survey, Geodetic survey
201010 Concrete Technology [Theory]	
CO ID.	**Course Outcome**
CO208.1	Able to select the various ingredients of concrete and its suitable proportion to achieved desired strength.
CO208.2	Able to check the properties of concrete in fresh and hardened state.
CO208.3	Get acquainted to concreting equipments, techniques and different types of special concrete.
CO208.4	Able to predict deteriorations in concrete and get acquainted to various repairing methods and techniques.
201011 Structural Analysis [Theory]	
CO ID.	**Course Outcome**
CO209.1	Understand the basic concept of static and kinematic indeterminacy and analysis ofindeterminate beams.
CO209.2	Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frames
CO209.3	Implement application of the slope deflection method to beams and portal frames.
CO209.4	Analyze beams and portal frames using moment distribution method.
CO209.5	Determine response of beams and portal frames using structure approach of stiffness matrix method.
CO209.6	Apply the concepts of plastic analysis in the analysis of steel structures.
201012 Project management [Theory]	
CO ID.	**Course Outcome**
CO210.1	Students will be able to describe project life cycle and the domains of Project Management.
CO210.2	Students will be able to apply networking methods and their applications in planning and management.
CO210.3	Students will be able to categorize the materials as per their annual usage and also Calculate production rate of construction equipment
CO210.4	Students will be able to demonstrates resource allocation techniques and apply it for manpower planning.
CO210.5	Student will be able to understand economical terms and different laws associated with project management.
CO210.6	Student will be able to apply the methods of project selection and recommend the best economical project.

TE(Civil Engineering) 2019 Course	
Sem - I: TECE	

301001 Hydrology and Water Resources Engineering [Theory]

CO ID.	Course Outcome
CO301.1	On successful completion of this course, the learner will be able to Understand government organizations, apply & analyze precipitation & its abstractions.
CO301.2	On successful completion of this course, the learner will be able to Understand, apply & analyze runoff, runoff hydrographs and gauging of streams.
CO301.3	On successful completion of this course, the learner will be able to Understand, apply & analyze floods, hydrologic routing & Q-GIS software in hydrology.
CO301.4	On successful completion of this course, the learner will be able to Understand, apply & analyze reservoir planning, capacity of reservoir & reservoir economics.
CO301.5	On successful completion of this course, the learner will be able to Understand water logging & water management, apply & analyze ground water hydrology
CO301.6	On successful completion of this course, the learner will be able to Understand irrigation, piped distribution network and canal revenue, apply and analyze crop water requirement.

301002 Water Supply Engineering [Theory]

CO ID.	Course Outcome
CO302.1	Learner will able to Define, identify, describe reliability of water sources, estimate water requirement for various sectors
CO302.2	Learner will able to Ascertain and interpret water treatment method required to be adopted with respect to source and raw water characteristics
CO302.3	Learner will able to Design various components of water treatment plant and distribution system
CO302.4	Learners will able to identify and compare contemporary issues and advanced treatment operations and process available in the market, including packaged water treatment plants
CO302.5	Learner will able to design elevated service reservoir capacity and understand the rainwater harvesting
CO302.6	Learner will able to identify the requirement of water treatment plant for infrastructure and Government scheme

301003 Design of Steel Structures [Theory]

CO ID.	Course Outcome
CO303.1	The learner will be able to demonstrate knowledge about the types of steel structures, steel code provisions, and design of the adequate steel section subjected to tensile force.
CO303.2	The learner will be able to determine the adequate steel section subjected to compression load and design of built up columns along with lacing and battening.
CO303.3	The learner will be able to design eccentrically loaded columns for section strength and column bases for axial load and uniaxial bending.
CO303.4	The Learner will be able to design a laterally restrained and unrestrained beam with and without flange plate using rolled steel section.
CO303.5	The Learner will be able to analyze the industrial truss for dead, live, and wind load and the design of the gantry girder for moving load.
CO303.6	The learner will be able to understand the role of components of welded plate girders and design cross-section for welded plate girders including stiffeners and their connections.

301004 Engineering Economics and Financial Management [Theory]	
CO ID.	**Course Outcome**
CO304.1	The learner will be able to understand basics of construction economics.
CO304.2	The learner will be able to develop an understanding of financial management in civil engineering projects.
CO304.3	The learner will be able to prepare and analyze the contract account.
CO304.4	The learner will be able to decide on right source of fund for construction projects.
CO304.5	The learner will be able to understand working capital and its estimation for civil engineering projects.
CO304.6	The learner will be able to illustrate the importance of tax planning & understand role of financial regulatory bodies.
301005 Elective I Advanced Concrete Technology [Theory | elective]	
CO ID.	**Course Outcome**
CO305.1	Students will able to understand the chemistry of cement and its effect on properties of concrete.
CO305.2	Students will able to apply the knowledge of supplementary cementitious materials to produce sustainable concretes.
CO305.3	Students will able to evaluate the characteristic properties of fiber reinforced concrete.
CO305.4	Students will able to understand the mechanism of working of admixtures and their effect on properties of concrete
CO305.5	Students will able to understand the durability properties of concrete.
CO305.6	Students will able to interpret the properties of concrete through advance testing methods.
301005 c Elective I Construction Management [Theory | elective]	
CO ID.	**Course Outcome**
CO306.1	Understand the overview of construction sector
CO306.2	Illustrate construction scheduling, work study and work measurement.
CO306.3	Acquaint various labor laws and financial aspects of construction projects.
CO306.4	Explain elements of risk management and value engineering.
CO306.5	State material and human resource management techniques in construction.
CO306.6	Understand basics of artificial intelligence techniques in civil engineering.
301401 Honors* Urban Housing and Infrastructure Planning [Theory | elective]	
CO ID.	**Course Outcome**
CO307.1	Students will understand Planning of Residential Areas
CO307.2	Students will understand current practices of Housing for urban poor
CO307.3	Students will learn about .Housing policies and finance
CO307.4	Students will understand the process of Urban Infrastructure Planning
CO307.5	Students will learn to apply the Networks and Services Systems
CO307.6	Students will understand the Infrastructure Networks

Sem-II: TECE	
301012 Waste Water Engineering [Theory]	
CO ID.	**Course Outcome**
CO308.1	Recall sanitation infrastructure, quantification and characterization of wastewater, natural purification of streams
CO308.2	Design preliminary and primary unit operations in waste water treatment plant
CO308.3	Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process
CO308.4	Understand and design suspended and attached growth wastewater treatment systems
CO308.5	Explain and apply concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment systems
CO308.6	Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment
301013 Design of RC Structures [Theory]	
CO ID.	**Course Outcome**
CO 309.1	Apply relevant IS code provisions to ensure safety and serviceability of structures, understand the design philosophies and behavior of materials: steel & concrete.
CO 309.2	Recognize mode of failure as per LSM and evaluate moment of resistance for singly, doubly rectangular, and flanged sections.
CO 309.3	Design & detailing of rectangular one-way and two-way slabs with different boundary conditions.
CO 309.4	Design & detailing of dog legged and open well staircase
CO 309.5	Design & detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond and torsion.
CO 309.6	Design & detailing of short columns subjected to axial load, uni-axial/bi-axial bending and their footings.
301014 Remote Sensing and GIS [Theory]	
CO ID.	**Course Outcome**
CO310.1	Articulate fundamentals and principles of RS techniques.
CO310.2	Demonstrate the knowledge of remote sensing and sensor characteristics.
CO310.3	Distinguish working of various spaces-based positioning systems.
CO310.4	Analyze the RS data and image processing to utilize in civil engineering
CO310.5	Explain fundamentals and applications of RS and GIS
CO310.6	Acquire skills of data processing and its applications using GIS
301015 Elective II -Architecture and Town Planning [Theory]	
CO ID.	**Course Outcome**
CO311.1	Apply the principles of architectural planning and landscaping for improving quality of life
CO311.2	Understand the confronting issues of the area and apply the acts
CO311.3	Evaluate and defend the proposals.
CO311.4	Appraise the existing condition and to develop the area for betterment

BE(Civil Engineering) 2019 Course
Sem - I: BECE

401001 Foundation Engineering [Theory]

CO ID.	Course Outcome
CO401.1	Perform subsurface investigations for foundations using different methods.
CO401.2	Estimate the bearing capacity of shallow foundations
CO401.3	Calculate immediate and primary consolidation settlement of shallow foundations
CO401.4	Decide the capacity of a pile and pile group.
CO401.5	Understand the steps in geotechnical design of shallow foundations and well foundations.
CO401.6	Analyze problems related to expansive soil and overcome them using design principles, and construction techniques in black cotton soil

401002 Transportation Engineering [Theory]

CO ID.	Course Outcome
CO402.1	Understand principles and practices of transportation planning.
CO402.2	Demonstrate knowledge of traffic studies, analysis and their interpretation.
CO402.3	Design Geometric Elements of road pavement.
CO402.4	Evaluate properties of highway materials as a part of road pavement.
CO402.5	Appraise different types of pavements and their design.
CO402.6	Understand the fundamentals of Bridge Engineering and Railway Engineering

401003 Elective-III Operation Research [Theory | elective]

CO ID.	Course Outcome
CO403.1	Able to correlate applications of Operations Research in Civil Engineering field
CO403.2	Able to Solve the problems related to stochastic programming
CO403.3	Able to Optimize transportation and assignment problems
CO403.4	Able to Optimize linear problems
CO403.5	Able to Optimize non-linear problems
CO403.6	Able to Suggest solution for the problems related to dynamic models, games theory and replacement of items

401 004 a Elective-IV Air Pollution and Control [Theory | elective]

CO ID.	Course Outcome
CO404.1	Recall air pollution, legislation and regulations.
CO404.2	Evaluate air pollutant concentrations as a function of meteorology.
CO404.3	Interpret sampling results with prescribed standards.
CO404.4	Assess emission inventory and air quality models.
CO404.5	Compare the air pollution control equipment.
CO404.6	Infer indoor air pollution and its mitigation.

401 009 Computer Programming in Civil Engineering [Theory]

CO ID.	Course Outcome
CO405.1	At the end of course the learner will be able to, Understand basics of Python Programming .
CO405.2	At the end of course the learner will be able to, Write Python codes for variety of problems in civil Engineering.

401401 Honors* Traffic and Transportation Planning [Theory | elective]

CO ID.	Course Outcome
CO406.1	To Understand elements of highway safety and approaches to traffic Studies
CO406.2	To Understand, conduct and interpret data for traffic simulation experiments
CO406.3	To Understand the contemporary issues related to the use of advanced technology in traffic modeling and control
CO406.4	To Recommend suitable traffic management and demand management measures
CO406.5	To know about basic principals of land transport planning system
CO406.6	To Know about urban transportation system planning process, land use planning, different urban mass transit systems-their merits and limitations, different types of transportation surveys, travel demand modeling, urban mass transit system operation and urban goods movement.

401010 Audit Course I a: Stress Management by Yoga

CO ID.	Course Outcome
CO407.1	Develop understanding of Yoga and its impact on human body and mind.
CO407.2	Learn different Yogasans
CO407.3	Develop an understanding of meditation through pranayama
CO407.4	Learn different techniques of Pranayam

401 005 Project Stage I

CO ID.	Course Outcome
CO408.1	Appraise the current Civil Engineering research/techniques/developments/interdisciplinary areas.
CO408.2	Review and organize literature survey utilizing technical resources, journals etc.
CO408.3	Evaluate and draw conclusions related to technical content studied.
CO408.4	Demonstrate the ability to perform critical writing by preparing a technical report.
CO408.5	Develop technical writing and presentation skills.

Sem - II: BECE	

401011 Dams and Hydraulics Structures [Theory]

CO ID.	Course Outcome
CO409.1	Understand types of dams and instrumentation working
CO409.2	Execute stability analysis of Gravity Dam
CO409.3	Understand types of spillways & Design of Ogee spillway
CO409.4	Illustrate the failures and analyze stability of earthen dam
CO409.5	Design Canals and understand the canal structures
CO409.6	Analysis of the Diversion headwork and Cross Drainage work

401012 Quantity Surveying, Contracts and Tenders [Theory]

CO ID.	Course Outcome
CO410.1	Understand concept of estimates and prepare approximate estimate for various for Civil Engineering works.
CO410.2	Describe tendering process, construction contracts, and aspects of Arbitration and prepare tender documents.
CO410.3	Prepare detailed estimate of various items of work by different methods and calculate quantity of steel from Bar bending schedule.
CO410.4	Apply engineering knowledge to prepare estimate for roads, culverts, and water tank (Elevated storage tank)
CO410.5	Apply concepts of specification to draft brief specification, detailed specification and prepare detailed rate analysis report.
CO410.6	Evaluate depreciation and valuation of property on the basis of present condition, specifications and market trend.

401013 d Elective V Design of Precast and Composite Structures [Theory]

CO ID.	Course Outcome
CO411.1	Achieve knowledge of design and development of problem solving skills.
CO411.2	Explore the concept of precast construction.
CO411.3	Learn the principles and design of precast structures
CO411.4	Understand the need, advantages and limitations of composite material.
CO411.5	Apply basic mechanical principles in analysis of composite structures like beams, columns, floors, shear connectors.
CO411.6	Understand and apply various provisions as per Indian standards in design of structural components using composite materials.

401014 a Elective VI: TQM and MIS

CO ID.	Course Outcome
CO412.1	Recognize quality and contribution of quality gurus for evaluation of best practices
CO412.2	Relate the functioning and application of TQM & Six Sigma in the domain of construction sector
CO412.3	Recommend ISO 9001 principles in preparation of quality manual to construction business
CO412.4	Apply management control & certification systems for construction industry
CO412.5	Choose TQM process implementation and various quality awards for construction sector
CO412.6	Propose MIS for allied fields in construction sector

401 015 Project Stage II

CO ID.	Course Outcome
CO413.1	Appraise the current Civil Engineering research/techniques/developments/interdisciplinary areas.
CO413.2	Review and organize literature survey utilizing technical resources, journals etc.
CO413.3	Evaluate and draw conclusions related to technical content studied.
CO413.4	Demonstrate the ability to perform critical writing by preparing a technical report.
CO413.5	Develop technical writing and presentation skills.

Laboratory Outcomes

SE(Civil Engineering) 2019 Course
Sem - I: SECE

201004 Building Technology and Architectural Planning Lab [Practical]

CO ID.	Course Outcome
CO1	Student will able to draw types of masonry, bricks bond, doors, windows and arches.
CO2	Student will able to developed typical plan, elevation, section and various components drawing of building.
CO3	Student will able to developed typical plan, elevation, section and various components drawing of building using CAD.
CO4	Student will able to identify and draw the various component of building, water supply and drainage line, site plan and required documents for making report.

201005 Mechanics of structure Lab [Practical]

CO ID.	Course Outcome
CO 1	Ability to analyze the properties of materials (Tensile, compressive, shear stresses, strains, Abrasion values,Energy absorberd by the material, etc.)
CO 2	Develop ability to analyze the numerical relations in different parameters solve the numericals.
CO 3	Students will be able to develop the impact of External force on the support reaction, shear force & bending moment at any section.
CO 4	Students will get the knowledge of the practical specifications market rates of different materials used on the field and available in the market

201006 Fluid Mechanics Lab [Practical]

CO ID.	Course Outcome
CO1	Learn correct procedures for experimental set-up, measurement, data gathering, data analysis.
CO2	Demonstrate practical understanding of conducting, analyzing flow systems in pipe and open channel in terms of mass, momentum and energy principles
CO3	Demonstrate practical understanding of development of boundary layers, separation, drag, and lift.
CO4	Ability to compare actual experimental measurements with theoretical values and develop conclusion
CO5	Use word processors, and computational software in solving assignment

207004 Engineering Geology Lab [Practical]

CO ID.	Course Outcome
CO1	Explain about the basic concepts of engineering geology, various rocks, and minerals both in lab and on the fields and their inherent characteristics and their uses in civil engineering constructions.
CO2	Exploring the importance of mass wasting processes and various tectonic processes that hampers the design of civil engineering projects and its implications on environment and sustainability.
CO3	Recognize effect of plate tectonics, structural geology and their significance and utility in civil engineering activities.
CO4	Incorporate the various methods of survey, to evaluate and interpret geological nature of the rocks present at the foundations of the dams, percolation tanks, tunnels and to infer site / alignment/ level free from geological defects.
CO5	Assess the Importance of geological nature of the site, precautions and treatments to improve the site conditions for dams, reservoirs, and tunnels.
CO6	Explain geological hazards and importance of ground water and uses of common building stones.

Sem - II: SECE	
201010 Concrete Technology Lab [Practical]	
CO ID.	**Course Outcome**
CO1	Able to select the various ingredients of concrete and its suitable proportion to achieved desired strength.
CO2	Able to check the properties of concrete in fresh and hardened state.
201013 Geotechnical Engineering Lab [Practical]	
CO ID.	**Course Outcome**
CO1	Identify and classify the soil based on the index properties and its formation process
CO2	Explain permeability and seepage analysis of soil by construction of flow net.
CO3	Illustrate the effect of compaction on soil and understand the basics of stress distribution.
CO4	Express shear strength of soil and its measurement under various drainage conditions.
CO5	Evaluate the earth pressure due to backfill on retaining structures by using different theories.
CO6	Analysis of stability of slopes for different types of soils.
201014 Survey Lab [Practical]	
CO ID.	**Course Outcome**
CO1	Define,Explain and apply a basics of plane surveying and differentiate the instruments used for it.Express proficiency in handling surveying equipment and analyse the surveying data from these equipment.Describe different methods of surveying and find relative positions of points on the surface of earth
CO2	Express proficiency in handling surveying equipment and analyse the surveying data from these equipment. Describe different methods of surveying and find relative positions of points on the surface of earth.
CO3	Execute curve setting for civil engineering projects such as roads, railways etc.
CO4	Articulate advancements in surveying such as space based positioning systems
CO5	Differentiate map and aerial photographs, also interpret aerial photographs.Define explain and apply Fundamental about Hydrographic survey, Geodetic survey
201017 Project Based Learning [Practical]	
CO ID.	**Course Outcome**
CO1	Identify the community/ practical/ societal needs and convert the idea into a product/ process/ service.
CO2	Analyse and design the physical/ mathematical/ ICT model in order to solve identified problem/project.
CO3	Create, work in team and applying the solution in practical way to specific problem.
TE(Civil Engineering) 2019 Course	
Sem - I: TECE	
Elective I Lab -Construction Management [Practical | elective]	
CO ID.	**Course Outcome**
CO1	Understand and create written communications appropriate to the construction discipline and understand construction project control processes.
CO2	create oral presentations appropriate to the construction discipline.
CO3	understand construction accounting and cost control and create construction project cost estimates.
CO4	analyze methods, materials, and equipment used to construct projects.
CO5	apply electronic-based technology to manage the construction process.
CO6	understand construction risk management.
301007 Hydrology and Water Resources Engineering Lab [Practical]	
CO ID.	**Course Outcome**
CO1	Understand government organizations, apply & analyze precipitation & its abstractions.
CO2	Understand, apply & analyze runoff, runoff hydrographs and gauging of streams.
CO3	Understand, apply & analyze floods, hydrologic routing & Q-GIS software in hydrology.
CO4	Understand, apply & analyze reservoir planning, capacity of reservoir & reservoir economics.
CO5	Understand water logging & water management, apply & analyze ground water hydrology
CO6	Understand irrigation, piped distribution network and canal revenue, apply and analyze crop water requirement.
301008 Water Supply Engineering Lab [Practical]	
CO ID.	**Course Outcome**
CO1	Students will able to Define identify, describe reliability of water sources, estimate water requirement for various sectors
CO2	Students will able to Ascertain and interpret water treatment method required to be adopted with respect to source and raw water characteristics
CO3	Students will able to Design various components of water treatment plant and distribution system.
CO4	Students will able to identify and compare contemporary issues and advanced treatment operations and process available in the market, including packaged water treatment plants.
CO5	Students will able to design elevated service reservoir capacity and understand the rainwater harvesting.
CO6	Students will able to identify the requirement of water treatment plant for infrastructure and Government scheme.

301009 Design of Steel Structures Lab [Practical]

CO ID.	Course Outcome
CO1	The learner will be able to demonstrate knowledge about the types of steel structures, steel code provisions, and design of the adequate steel section subjected to tensile force.
CO2	The learner will be able to determine the adequate steel section subjected to compression load and design of built up columns along with lacing and battening.
CO3	The learner will be able to design eccentrically loaded columns for section strength and column bases for axial load and uniaxial bending.
CO4	The Learner will be able to design a laterally restrained and unrestrained beam with and without flange plate using rolled steel section.
CO5	The Learner will be able to analyze the industrial truss for dead, live, and wind load and the design of the gantry girder for moving load.
CO6	The learner will be able to understand the role of components of welded plate girders and design cross-section for welded plate girders including stiffeners and their connections.

301010 Elective I Lab- Advanced Concrete Technology [Practical | elective]

CO ID.	Course Outcome
CO4	Students will able to evaluate the characteristic properties of fiber reinforced concrete.
CO3	Students will able to understand the mechanism of working of admixtures and their effect on properties of concrete
CO5	Students will able to understand the durability properties of concrete.
CO6	Students will able to interpret the properties of concrete through advance testing methods.

301402 Honors* Urban Housing and Infrastructure Planning -PR/Lab [Practical | elective]

CO ID.	Course Outcome
CO1	CO1 Understand housing layouts for different economic classes and prepare drawing on AutoCAD software
CO2	Communicate about housing policies for urban poor in India.
CO3	Understand standards and norms as per URDPFI,NBC, and TCPO etc.
CO4	Study urban infrastructure network for local area in group of student
CO5	Prepare of plans, elevations, sections, center line plan, structural plan, footing detailing and importantdetails of an apartment unit.
CO6	Understand the process of management assessment, financial feasibility, Cost Benefit Analysis of Project, Social and learn Economic Impacts of residential and public Projects.

Sem-II: TECE	

301009 Design of RC Structures Lab [Practical]

CO ID.	Course Outcome
PCO1	Students will be able to plan G+2 building as per Aspect & Prospect. Students will be able to use Auto Cad software.
PCO2	Students will be able to apply the concept of LSM to the singly reinforced RC section. Students will be able to analyze and design one way Slab.
PCO3	Students will be able to apply the concept of LSM to singly reinforced RC section. Students will be able to analyze and design Two way Slab.
PCO4	Students will be able to apply the concept of LSM to singly reinforced RC section and doubly reinforced section to beam. Students will be able to analyse and design beam for flexure, shear, bond and torsion.
PCO5	Students will be able to design & detailing of short columns subjected to axial load, uni-axial/bi-axial bending and their footings.
PCO6	Students will be able to design & detailing of footing subjected to axial load, uni-axial bending and combined footings.

301012 Waste Water Engineering Lab [Practical]

CO ID.	Course Outcome
CO1	Recall sanitation infrastructure, quantification and characterization of wastewater, natural purification of streams
CO2	Design preliminary and primary unit operations in waste water treatment plant
CO3	Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process
CO4	Understand and design suspended and attached growth wastewater treatment systems
CO5	Explain and apply concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment systems
CO6	Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment

301019 Remote Sensing and GIS Lab [Practical]

CO ID.	Course Outcome
CO1	Articulate fundamentals and principles of RS techniques.
CO2	Demonstrate the knowledge of remote sensing and sensor characteristics.
CO3	Distinguish working of various spaces-based positioning systems.
CO4	Analyze the RS data and image processing to utilize in civil engineering
CO5	Explain fundamentals and applications of RS and GIS
CO6	Acquire skills of data processing and its applications using GIS

301020 e Elective II Lab -Architecture and Town Planning [Practical]

CO ID.	Course Outcome
CO1	Apply the principles of architectural planning and landscaping for improving quality of life
CO2	Understand the confronting issues of the area and apply the acts
CO3	Evaluate and defend the proposals.
CO 4	Appraise the existing condition and to develop the area for betterment

BE(Civil Engineering) 2019 Course	
Sem - I: BECE	

401007 Transportation Engineering-Lab [Practical | regular]

CO ID.	Course Outcome
CO1	Understand principles and practices of transportation planning.
CO2	Demonstrate knowledge of traffic studies, analysis and their interpretation.
CO3	Design Geometric Elements of road pavement.
CO4	Evaluate properties of highway materials as a part of road pavement.
CO5	Appraise different types of pavements and their design.
CO6	Understand the fundamentals of Bridge Engineering and Railway Engineering

401008A Elective-IV Air pollution and Control [Practical | elective]

CO ID.	Course Outcome
CO1	Recall air pollution, legislation and regulations.
CO2	Evaluate air pollutant concentrations as a function of meteorology.
CO3	Interpret sampling results with prescribed standards.
CO4	Assess emission inventory and air quality models.
CO5	Compare the air pollution control equipment.
CO6	Infer indoor air pollution and its mitigation.

401401 Honors* Traffic and Transportation Planning -PR/Lab [Practical | elective]

CO ID.	Course Outcome
CO1	Interpret the traffic signs at the given road intersection or road
CO2	Suggest preventive measures by analyzing the traffic conditions at site
CO3	Suggest the road signs for given traffic situation with justification
CO4	Suggest the relevant measures to guide the traffic in the given situation with justification
CO5	Points to be considered while designing rotary intersection