MARATHA VIDYA PRASARAK SAMAJ'S
Karmaveer Adv. Baburao Ganpatrao Thakare
College of Engineering, Nashik
• MECHANICAL
• COMPUTER
• INSTRUMENTATION AND CONTROL
• CIVIL
• INFORMATION TECHNOLOGY (IT)
NATIONAL BOARD OF ACCREDITATION
A++ NAAC
Permanently Affiliated to Savitribai Phule Pune University Vide Letter No. : CA/1542 & Approved by AICTE New Delhi - Vide Letter No. : 740-89-32 (E) ET/98 AISHE Code - C-41622

Program: Civil Engineering

COURSE OUTCOMES

Vision

To be the leading department providing quality education to develop competent Civil Engineers, Entrepreneurs, and innovators to serve the nation.

Mission

M1- To provide technical education.

M2- To prepare competitive students for employment/self-employment

M3 –To focus on developing the professional skills as well as the values

Program Educational Objectives

1. To ensure that graduates will have a mastery of fundamental knowledge, problem solving skills, engineering experimental abilities, and design capabilities necessary for entering civil engineering career and/or graduate school.
2. To incorporate verbal and written communication skills necessary for successful professional practice.
3. Demonstrate knowledge of management principles and engineering techniques for effective project management.
4. To prepare graduates to deal with ethical and professional issues, taking into account the broader societal implications of civil engineering.

Program Outcomes

PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcome

PSO 1	Graduates will apply technical knowledge, engineering skills, and competencies necessary for entering civil engineering career.
PSO 2	Graduates will demonstrate knowledge and techniques in engineering fields for effective management and professional development.
PSO 3	Graduates will apply technical and professional skills to be nationally competitive for employment/self-employment thereby benefit the society.

SE Civil
Course Outcomes (2019 Pattern)
Semester – I

Course Code	Course: Building Technology and Architectural Planning (201001)
C201.1	Identify types of building and basic requirements of building construction and masonry.
C201.2	Make use of Architectural Principles and Building bye laws for building construction.
C201.3	Identify and select various building components according to their requirement.
C201.4	Plan effectively various types of Residential Building and green building according to their utility, functions with reference to National Building Code.
C201.5	Plan effectively various types of Public Buildings according to their utility functions with reference to National Building Code.
C201.6	Make use of Principles of Planning in Town Planning, Safety aspects, building services.

Course Code	Course: Mechanics of structure (201002)
C202.1	Use concept of stress-strain and determine different types of stress, strain in determinate, indeterminate homogeneous and composite structures.
C202.2	Calculate shear force and bending moment in determinate beams for different loading conditions and illustrate shear force and bending moment diagram.
C202.3	Apply the concept of shear and bending stresses in beams and demonstrate shear and bending stress distribution diagram.
C202.4	Determine the torsion stresses in circular shaft and Principal stresses and strains.
C202.5	Analyse axially loaded and eccentrically loaded column.
C202.6	Determine the slopes and deflection of determinate beams and trusses.

Course Code	Course: Fluid Mechanics (201003)
C203.1	Explain the fluid properties, the concept and basic equation of fluid statics, measurement of fluid pressure and the concept of buoyancy and floatation.
C203.2	Describe the fluid kinematics with reference to continuity equation and fluid dynamics with Modified Bernoulli's equation and its application to measure fluid flow.
C203.3	Demonstrate the concept of dimensional analysis using Buckingham π theorem with similarity and model laws and application of boundary layer theory for solving practical problem of fluid flow.
C203.4	Explain the laminar and turbulent flow through pipes, losses in pipes and analyze the pipe network using Hardy Cross method.
C203.5	Illustrate the open channel flow, uniform flow formulae, most efficient channel section, concept of specific energy and specific force diagram.
C203.6	Describe gradually varied flow in open channel flow, methods of computation of GVF profile and fluid flow around submerged bodies.

Course Code	Course: Engineering Mathematics III (207001)
C204.1	Solve higher order linear differential equations.
C204.2	Solve system of linear equations and ordinary differential equations by numerical methods.
C204.3	Apply Statistical methods and probability theory in data analysis and predictions in civil engineering.
C204.4	Perform vector differentiation and analyze the vector fields.
C204.5	Perform vector integration and apply it to fluid mechanics.
C204.6	Apply Partial differential equations for wave and 1D and 2D heat flow problems.

Course Code	Course: Engineering Geology (207009)
C205.1	Explain basic concepts, common rocks, minerals, their significance and application in civil engineering.
C205.2	Infer the stratigraphy, physiographic divisions of India, mass wasting and tectonic processes responsible for geomorphic features.
C205.3	Recognise tectonic effects, Geological structures and their significance in Civil Engineering.
C205.4	Integrate findings of Geological Surveys, investigations, remote sensing and GIS techniques in civil engineering.
C205.5	Assess Geological conditions, nature of rocks, site suitability, precautions and treatments to improve the site for dams, reservoirs and tunnels.
C205.6	Explain geological hazards, geo-hydrological characters of the rocks, and good building stones.

Course Code	Course: Building Technology and Architectural Planning Lab (201004)
C206.1	Identify types of building and basic requirements of building construction and masonry.
C206.2	Make use of Architectural Principles and Building byelaws for building construction.
C206.3	Identify and select various building components according to their requirement.
C206.4	Plan effectively various types of Residential Building and green building according to their utility, functions with reference to National Building Code.

Course Code	Course: Mechanics of Structure Lab (201005)
C207.1	Examine tensile, shear, torsion and impact strength of metals.

C207.2	Test the compressive and flexural strength of timber.
C207.3	Determine the properties of bricks and tiles.
C207.4	Construct influence line diagrams for determinate beams
C207.5	Compare the cost of structural materials.

Course Code	**Course: Fluid Mechanics Lab (201006)**
C208.1	Study of uniform flow formulae, velocity distribution, and calibration of notches in open channel
C208.2	Measurement of Viscosity and surface tension of given fluid
C208.3	Verification of Bernoulli's theorem, Calibration of Venturimeter /Orifice meter
C208.4	Determination of Darcy-Weisbatch friction factor (f) and minor losses in a given pipe
C208.5	Experiment with flow around a circular Cylinder/Aerofoil
C208.6	Construct flow net by Electrical Analogy for flow below weir.

Course Code	**Course: Engineering Geology Lab (207010)**
C209.1	Explain common rocks, minerals, their use, significance, and application in civil engineering.
C209.2	Construct sections from contoured geological maps, interpretation of it and giving solutions of engineering geological problems in civil engineering.
C209.3	Interpret the core drilling data to apply in civil engineering.
C209.4	Recognize geological features in field, their significance in civil engineering and study of suitable software.

Course Code	**Audit Course 1 Awareness to Civil Engineering Practices (201007)**
C210.1	Classify sectors/sub-disciplines in civil engineering and eminent institutes in India and abroad.
C210.2	Interpret drawings and documents required and used in different Civil Engineering works
C210.3	Explain the importance of Code of Ethics to be practiced by a Civil Engineer.
C210.4	Identify health hazards on site and suggest safety measures.

SE Civil
Course Outcomes (2019 Pattern)
Semester – II

Course Code	Course: Geotechnical Engineering (201008)
C211.1	Identify and classify the soil based on the index properties and its formation process.
C211.2	Explain permeability and seepage analysis of soil by construction of flow net.
C211.3	Illustrate the effect of compaction on soil and understand the basics of stress distribution.
C211.4	Determine shear strength of soil and its measurement under various drainage conditions.
C211.5	Evaluate the earth pressure due to backfill on retaining structures by using different theories.
C211.6	Analysis of stability of slopes for different types of soils.

Course Code	Course: Survey (201009)
C212.1	Apply concept of bearing, plane table surveying and levelling on field measurements.
C212.2	Operate theodolite to carry out angular measurement.
C212.3	Explain contouring and determine horizontal distances and elevations by tacheometry.
C212.4	Explain the curves and setting out of curves using linear and angular methods.
C212.5	Illustrate construction survey, modern techniques and setting out and alignment of civil structures.
C212.6	Explain geodetic survey, hydrographic survey and aerial photogrammetry.

Course Code	Course: Concrete Technology (201010)
C213.1	Understand chemistry, properties, and classification of cement, fly ash, aggregates and admixtures, and hydration of cement in concrete.
C213.2	Understand how to prepare and test the fresh concrete
C213.3	Understand how to test hardened concrete with destructive and non-destructive testing instruments
C213.4	Design concrete mix of desired grade
C213.5	Get acquainted to concrete handling equipment's and different special concrete types.
C213.6	Predict deteriorations in concrete and repair it with appropriate methods and techniques.

Course Code	Course: Structural Analysis (201011)
C214.1	Explain the basic concept of static and kinematic indeterminacy and analysis of indeterminate beams.
C214.2	Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frame
C214.3	Analyze beams and portal frames using Slope and deflection method
C214.4	Analyze beams and portal frames using moment distribution method
C214.5	Analyze the structure using stiffness matrix method.
C214.6	Apply the concepts of plastic analysis in the analysis of steel structures

Course Code	Course: Project Management (201012)
C215.1	Describe concepts and domains of Project Management.
C215.2	Apply project planning and scheduling techniques in construction.
C215.3	Determine the materials as per their usage and production rate of construction equipment with safety measures.
C215.4	Demonstrates resource allocation techniques for planning.
C215.5	Explain economical terms and laws associated with project management
C215.6	Apply the methods of project selection for the best economical project.

Course Code	Course: Geotechnical Engineering Lab (201013)
C216.1	Examine index properties of soil using Water content test, Pycnometer test, Sieve analysis test, Consistency limits test, and Field density test.
C216.2	Analyse permeability of soil using Constant head and Variable head permeability test.
C216.3	Evaluate the Optimized Moisture Content and Maximum Dry Density using Standard Proctor test.
C216.4	Determine shear strength of soil using direct shear test, unconfined compression test, Vane Shear test.
C216.5	Evaluate the earth pressure using Rebhann's and Cullman's graphical method, Differential free swell test.

Course Code	Course: Survey Lab (201014)
C217.1	Experiment the magnetic bearing, plane table survey and, simple and differential levelling.
C217.2	Use the theodolite for angular measurement, tacheometry, setting out curve and building.

C217.3	Use the nautical sextant, instruments used in hydrographic surveying and special functions available in total station.
C217.4	Summarize city survey, and spatial database creation using GIS software.
C217.5	Explain finding out the scale of photograph and air base distance.
C217.6	Compile the data of total station traversing, road project data to obtain sections and contouring data to create contour map.

Course Code	**Course: Concrete Technology Lab (201015)**
C218.1	Check the suitability of cement to be used for the concrete construction.
C218.2	Check the suitability of fine and coarse aggregate to be used for the concrete construction.
C218.3	Select the various ingredients of concrete and its suitable proportion to achieved desired strength.
C218.4	Check the properties of concrete in fresh and hardened state.

Course Code	**Course: Project Based Learning (201017)**
C219.1	Identify the community/ practical/ societal needs
C219.2	Apply the physical/ mathematical/ ICT model in order to solve identified problem/project to convert the idea into a product/ process/service.
C219.3	Prepare a report and present/demonstrate in a team.

Course Code	**Audit Course II: Disaster Management (201018)**
C220.1	Explain the type and risk of disasters.
C220.2	Discuss important disasters like earthquake, flood, landslides & drought.
C220.3	Summarise the mitigation and management techniques of disasters.
C220.4	Apply the various advanced techniques for disaster management

TE Civil
Course Outcomes (2019 Pattern)
Semester – I

Course Code	Course: Hydrology and Water Resource Engineering (301001)
C301.1	Compute the various parameter of hydrological cycle
C301.2	Determine the Crop water requirement
C301.3	Evaluate occurrence, distribution, and movement of ground water.
C301.4	Analyze runoff and flood frequency by different methods
C301.5	Assess various parameter for reservoir planning and sedimentation
C301.6	Extend water management techniques to overcome water logging problems

Course Code	Course: Water Supply Engineering (301002)
C302.1	Define identify, describe reliability of water sources, estimate water requirement for various sectors.
C302.2	Ascertain and interpret water treatment method required to be adopted with respect to source and raw water characteristics
C302.3	Design various components of water treatment plant and distribution system.
C302.4	Understand and compare contemporary issues and advanced treatment operations and process available in the market, including packaged water treatment plants.
C302.5	Design elevated service reservoir capacity and understand the rainwater harvesting.
C302.6	Understand the requirement of water treatment plant for infrastructure and Government scheme.

Course Code	Course: Design of Steel Structures (301003)
C303.1	Demonstrate knowledge about the types of steel structures, steel code provisions and design of the adequate steel section subjected to tensile force.
C303.2	Determine the adequate steel section subjected to compression load and design of built-up columns along with lacing and battening.
C303.3	Design eccentrically loaded column for section strength and column bases for axial load and uniaxial bending.
C303.4	Design of laterally restrained and unrestrained beam with and without flange plate using rolled steel section.
C303.5	Analyze the industrial truss for dead, live and wind load and design of gantry girder for moving load.

C303.6	Understand the role of components of welded plate girder and design cross section for welded plate girder including stiffeners and its connections.

Course Code	Course: Engineering Economics and Financial Management (301004)
C304.1	Analyse basics of construction economics.
C304.2	Analyse understanding of financial management in civil engineering projects.
C304.3	Prepare and analyze the contract account.
C304.4	Articulate Capital Budgeting
C304.5	Articulate Working Capital and Apply Inventory Management Techniques
C304.6	Get acquainted with Taxation and Financial Regulatory Bodies

Course Code	Course: Elective I Construction Management (301005)
C305.1	Infer the overview of construction sector.
C305.2	Illustrate construction scheduling, work study and work measurement.
C305.3	Discuss various labor laws and financial aspects of construction projects.
C305.4	Explain elements of risk management and value engineering.
C305.5	Apply material management techniques in construction.
C305.6	Describe the applications of human resource management and artificial intelligence techniques in civil engineering.

Course Code	Course: Seminar (301006)
C306.1	Appraise the current civil engineering research / techniques / developments / interdisciplinary areas.
C306.2	Review and organize literature survey utilizing technical resources, journals etc.
C306.3	Evaluate and draw conclusions related to technical content studied.
C306.4	Demonstrate the ability to perform critical writing by preparing a technical report.
C306.5	Develop technical writing and presentation skills.

Course Code	Course: Hydrology and Water Resources Engineering Lab (301007)
C307.1	Determine average annual precipitation and yield using topo sheet
C307.2	Analyze rainfall data and frequency
C307.3	Demonstrate software used in water resources system
C307.4	Determine peak flood discharge of basin and storage capacity of a reservoir
C307.5	Explain the components of hydrological cycle on field

Course Code	Course: Water Supply Engineering Lab (301008)
C308.1	Determine the physical, chemical, and biological characteristics of water sample.
C308.2	Design the water distribution network.
C308.3	Illustrate the working of water treatment units.
C308.4	Explain water intake structure.
C308.5	Design water treatment plant

Course Code	Course: Design of Steel Structures Lab (301009)
C309.1	Design and detailing of Tension member as per IS 800-2007
C309.2	Design and detailing of compression member as per IS 800-2007
C309.3	Design and detailing of slab base and gusseted base
C309.4	Design and detailing of laterally supported and unsupported flexural members
C309.5	Design and detailing of welded plate girder
C309.6	Design and detailing of truss

Course Code	Course: Elective I Construction Management Lab (301010)
C310.1	Illustrate construction scheduling, work study and work Break Down Structure
C310.2	Interprete Financial statement of construction Project
C310.3	Summarize Risk Management with help of case study
C310.4	Apply Economic order Quantity for material management.
C310.5	Explain Artificial Intelligence Techniques in civil Engineering

Course Code	Audit Course I Professional Ethics and Etiquettes (301011)
C311.1	Apply the concept of ethics in Engineering.
C311.2	Apply the concept Research Ethics and Codes of Ethics.
C311.3	Understand Safety, Responsibilities and Rights.
C311.4	Understand Professional Etiquette.

Course Code	Honours Course: Urban Housing and Infrastructure Planning (301401)
C312.1	Identify the factors to be considered for planning of residential areas
C312.2	Interpret the housing for urban poor
C312.3	Classify different housing polices and finance
C312.4	Collect the data for Urban Infrastructure Planning

C312.5	Classify Networks and Services System related to urban infrastructure
C312.6	Differentiate various infrastructure network

Course Code	**Honours Course: Urban Housing and Infrastructure Planning Lab. (301402)**
C313.1	Prepare report on housing layouts for different economic classes
C313.2	Prepare report on housing policies of urban poor India
C313.3	Prepare report on urban infrastructure standards using different norms such as URDPFI, NBC, and TCPO
C313.4	Prepare report on urban infrastructure network for local area
C313.5	Prepare plans, elevations, sections, centre line plan, structural plan, footing detailing for an apartment unit
C313.6	Prepare financial feasibility, for residential and public Projects

TE CIVIL
Course Outcome (2019 Pattern)
Semester - II

Course Code	Course: Wastewater Engineering (301012)
C314.1	Recall sanitation infrastructure, quantification and characterization of wastewater, natural purification of streams.
C314.2	Design preliminary and primary unit operations in wastewater treatment plant.
C314.3	Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process.
C314.4	Understand and design suspended and attached growth wastewater treatment systems.
C314.5	Explain and apply the concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment systems.
C314.6	Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment.

Course Code	Course: Design of RC Structures (301013)
C315.1	Assess different design philosophies of R.C.C. structure and estimate the moment carrying capacity of singly, Doubly and Flanged section.
C315.2	Design & detailing of rectangular one way and two-way slab with different boundary conditions
C315.3	Design & detailing of dog legged and open well staircase
C315.4	Design & detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond and torsion.
C315.5	Design & detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond and torsion.
C315.6	Design & detailing of short columns subjected to axial load, uni-axial/bi-axial bending

Course Code	Course: Remote Sensing and GIS (301014)
C316.1	Articulate fundamentals and principles of RS techniques.
C316.2	Demonstrate the knowledge of remote sensing and sensor characteristics.
C316.3	Distinguish working of various spaces-based positioning systems.
C316.4	Analyze the RS data and image processing to utilize in civil engineering
C316.5	Explain fundamentals and applications of RS and GIS
C316.6	Acquire skills of data processing and its applications using GIS

Course Code	Course: Elective II Advanced Engineering Geology with Rock Mechanics (301015-a)
C317.1	Illustrate seismic zones, plate tectonics and civil engineering significance of major rock formations of India with their characteristics.
C317.2	Explain soil profile, geo-hydrological characters of various rock formations and necessity of geological studies in water conservation.
C317.3	Apply knowledge of geology in Infrastructural, Urban development and demonstrate importance of national wealth.
C317.4	Validate the suitability of rocks based on mechanical properties, R.Q.D. and geophysical exploration.
C317.5	Explore subsurface Geology for civil engineering projects to suggest foundation treatments for various geological defects and channel erosion.
C317.6	Illustrate the suitability of proposed alignments for tunnels and bridges on the basis of Geological investigations.

Course Code	Course: Internship (301016)
C318.1	Develop professional competence through industry internship
C318.2	Apply academic knowledge in a personal and professional environment
C318.3	Build the professional network and expose students to future employees
C318.4	Apply professional and societal ethics in their day-to-day life
C318.5	Become a responsible professional having social, economic, and administrative considerations
C318.6	Make own career goals and personal aspirations

Course Code	Course: Wastewater Engineering Lab (301017)
C319.1	Determine the physical, chemical, and biological characteristics of wastewater sample.
C319.2	Illustrate the working of sewage treatment units.
C319.3	Design sewage treatment plant
C319.4	Explain sewer materials, choice of materials, testing of sewer pipes, sewer appurtenances.

Course Code	Course: Design of RC Structures Lab. (301018)
C320.1	Design of slab as per 456-2000 and detailing as per SP 34- 1987
C320.2	Design of beam as per 456-2000 and detailing as per SP 34- 1987
C320.3	Design of column as per 456-2000 and detailing as per SP 34- 1987
C320.4	Design of footing as per 456-2000 and detailing as per SP 34- 1987

Course Code	Course: Remote Sensing and GIS Lab. (301019)
C321.1	Summaries the fundamental tools and steps to import and export data in GIS software.
C321.2	Generate thematic maps using GIS software.
C321.3	Interpret the data from the aerial photographs and satellite images.
C321.4	Apply RS & GIS techniques for development of smart cities, land use classification and DEM for geomorphological features.

Course Code	Course: Elective II Advanced Engineering Geology with Rock Mechanics Lab (301020-a)
C322.1	Explain Geology, soil profile, seismic zones of India and parameters of morphometric analysis of river.
C322.2	Examine the site suitability for civil engineering structures using RQD and electrical resistivity survey.
C322.3	Analyze the drill hole data to check suitability of site for civil engineering projects.
C322.4	Illustrate geological aspects of civil engineering project in field and their significance in civil engineering.

Course Code	Audit Course II (C323) Industrial Safety301021)
C323.1	Classify techniques for industrial safety
C323.2	Explain techniques for industrial safety performance and preventions of accidents
C323.3	Illustrate general accident prevention, safety measures and training elements.
C323.4	Explain safety work practices, job safety analysis and reporting of accidental occurrences.

Course Code	Honours Course: -Sustainable Architectural and Landscape Design (301403)
C324.1	Describe the planning technologies used in ancient India
C324.2	Explain basics of sustainable development
C324.3	Study techniques for sustainable planning
C324.4	Demonstrate knowledge of fundamental concept and idea in the field of landscape architectures
C324.5	Express Knowledge of landscape architecture on field
C324.6	Compare the landscape planning in urban and rural areas and landscape treatment in special areas.

BE CIVIL
Course Outcome (2019 Pattern)
Semester - I

Course Code	Course: Foundation Engineering (401001)
C401.1	Perform subsurface investigations for foundations using different methods.
C401.2	Estimate the bearing capacity of shallow foundations.
C401.3	Calculate immediate and primary consolidation settlement of shallow foundations.
C401.4	Decide the capacity of a pile and pile group.
C401.5	Understand the steps in geotechnical design of shallow foundations and well foundations.
C401.6	Analyse problems related to expansive soil and overcome them using design principles, construction techniques in black cotton soil.

Course Code	Course: Transportation Engineering (401002)
C402.1	Discuss the highway development and planning.
C402.2	Discuss the traffic engineering and control methods.
C402.3	Design of road geometry with drainage system.
C402.4	Analysis various pavement materials.
C402.5	Design of Road Pavement.
C402.6	Understand the fundamentals of Bridge Engineering and Railway Engineering

Course Code	Course: Elective III Integrated Water Resources Planning & Management (401003.c)
C403c.1	Understand concerned organizations, IWRP & M objectives, principles, challenges, application & analysis of IWRP&M approaches & principles in a case study
C403c.2	Understand PIM, WDS, WALMI, agriculture in the concept of integrated water resources, apply and analyse water requirements for food production
C403c.3	Understand assessment of surface and ground water quality, EIA, CPCB regulations, application & analysis of effluent quality standards as per CPCB
C403c.4	Understand water economics and funding, application & analysis of planning for a sustainable water future
C403c.5	Understand legal regulatory settings of IWRP & M, application & analysis of inter-basin water transfers and IWRP & M
C403c.6	Understand flood control & power generation for IWRP & M, application QIGIS for analysis of a basin for IWRP & M

Course Code	Course: Elective III Operation Research (401003.f)
C403f.1	To get acquainted with the various optimization techniques and their use in civil engineering
C403f.2	Apply stochastic programming to reduce the processing time
C403f.3	To optimize transportation cost and proficiently allocating scare resources to optimize and maximize the profit
C403f.4	To formulate and analyze linear programming problems
C403f.5	To optimize different nonlinear functions
C403f.6	Ability to utilize dynamic programming in decision making for linear programming problems

Course Code	Course: Elective IV Airport and Bridge Engineering (401004-d)
C404d.1	Plan airport as per specifications of international organizations
C404d.2	Plot airport layout and design runway and taxiway
C404d.3	Design runway and taxiway pavements and drainage
C404d.4	Locate heliports w.r.t landing area, marking and lighting
C404d.5	Investigate site for bridge construction and analyze it with different loading conditions
C404d.6	Classify bridges and bearings

Course Code	Course: Project Stage I (401005)
C405.1	Identify thrust area in civil engineering and finalize problem statement.
C405.2	Review the literature to search for technical information from various resources on selected problem.
C405.3	Formulate the appropriate solution methodology.
C405.4	Apply the principles, tools and techniques to solve the problem.
C405.5	Prepare a report and presentation of project.

Course Code	Course: Transportation Engineering Lab (401006)
C406.1	Evaluate properties of aggregates as a part of road pavement
C406.2	Evaluate properties of bitumen as a part of road pavement
C406.3	Discuss pavement construction and Apply modern trends in Highway materials.

Course Code	Course: Elective III Integrated Water Resources Planning & Management Lab (401007-c)
C407c.1	Analyze the components and approaches of Integrated Water Resources Planning and Management (IWRP &M), national water policy, participatory irrigation management and water distribution societies.
C407c.2	Compare the effluent quality standards as per CPCB
C407c.3	Illustrate the economics in IWRP & M and decision making, Dublin Principles (1992), water laws (National, State & Local), global water partnership (GWP).
C407c.4	Summarize the application of soft computing tool for flood forecasting and QGIS for IWRM.

Course Code	Course: Elective III Operation Research Lab (401007-f)
C407f.1	To get acquainted with the various optimization techniques and their use in civil engineering
C407f.2	Apply stochastic programming to reduce the processing time
C407f.3	To optimize transportation cost and proficiently allocating scare resources to optimize and maximize the profit
C407f.4	To formulate and analyze linear programming problems
C407f.5	To optimize different nonlinear functions
C407f.6	Ability to utilize dynamic programming in decision making for linear programming problems

Course Code	Course: Elective IV Airport and Bridge Engineering Lab (401008-d)
C408d.1	Design runways with the required length and make necessary corrections while creating sketches of essential runway markings.
C408d.2	Design both pipe culverts and box culverts with a focus on structural and hydraulic considerations.
C408d.3	Demonstrate their ability to perform structural design for flexible or rigid pavements, considering design factors.
C408d.4	Present report on a topic related to the latest trends in airport planning and design, bridge site selection, or other relevant aspects of airport and bridge engineering, showcasing their research and presentation skills.

Course Code	Course: Computer Programming in Civil Engineering Lab (401009)
C409.1	Understand the basics of python programming language
C409.2	Write python codes to solve problems in civil engineering

Course Code	Course: Audit Course I (401010)
C410.1	Develop an understanding of workplace codes, professionalism at workplace
C410.2	Learn the workplace ethics
C410.3	Develop an understanding of Business ethics, workplace privacy and ethics
C410.4	Learn teamwork at workplace

Course Code	Course: Honor's Course: - Traffic and Transportation Planning(401401)
C4H1.1.	Understand traffic characteristics and methodology.
C4H1.2	Study traffic flow analysis.
C4H1.3	Understand design standards of transport.
C4H1.4	Design rotary intersection, at grade intersection and grade separated intersection
C4H1.5	Understand transport land use pattern
C4H1.6	Understand how to plan sustainable urban transportation with transportation system

BE Civil
Course Outcome (2019 Pattern)
Semester – II

Course Code	Course: Dams and Hydraulic Structures (401011)
C411.1	Understand types of dams and instrumentation working
C411.2	Execute stability analysis of Gravity Dam
C411.3	Understand types of spillways & Design of Ogee spillway
C411.4	Illustrate the failures and analyze stability of earthen dam
C411.5	Design Canals and understand the canal structures
C411.6	Analysis of the Diversion headwork and Cross Drainage work

Course Code	Course: Quantity Surveying, Contracts and Tenders (401012)
C412.1	Understand concept of estimates and prepare approximate estimate for various for Civil Engineering works.
C412.2	Describe tendering process, construction contracts, and aspects of Arbitration and prepare tender documents.
C412.3	Prepare detailed estimate of various items of work by different methods and calculate quantity of steel from Bar bending schedule.
C412.4	Apply engineering knowledge to prepare estimate for roads, culverts, and water tank (Elevated storage tank
C412.5	Apply concepts of specification to draft brief specification, detailed specification and prepare detailed rate analysis report.
C412.6	Evaluate depreciation and valuation of property on the basis of present condition, specifications and market trend.

Course Code	Course: Elective V Hydropower Engineering (401013-e)
C413e.1	Understand the classification of power resources & trends in energy use patterns
C413e.2	Identify the components of hydro power plant.
C413e.3	Analyze the load assessment for turbines.
C413e.4	Prepare the layout of powerhouse based on the various structures need for it.
C413e.5	Design the turbines and surge tanks.
C413e.6	Understand the laws and regulatory aspects of hydroelectric power

Course Code	Course: Elective VI TQM and MIS (401014-a)
C414a.1	Recognize quality and contribution of quality gurus for of best practices.
C414a.2	Relate the functioning and application of TQM & Six Sigma in the domain of construction sector
C414a.3	Understand ISO 9001 principles in preparation of quality manual to construction business
C414a.4	Understand management control & certification systems for construction industry
C414a.5	Choose TQM process implementation and various quality awards for construction sector
C414a.6	Propose MIS for allied fields in construction sector

Course Code	Course: Elective VI Green Structures and Smart Cities (401014-d)
C414d.1	Describe the importance of energy and minimization by altering the building materials.
C414d.2	Understand the importance of green construction and green rating system
C414d.3	Introduction of the applications of energy conservation and efficiency practices in buildings.
C414d.4	Understand phases and approval involved in smart city project
C414d.5	Assess the national and global experience of smart cities.
C414d.6	Understand the importance of sustainable development and current protocol of sustainable development goals

Course Code	Course: Project Stage II (401015)
C415.1	Identify thrust area in civil engineering and finalize problem statement.
C415.2	Review the literature to search for technical information from various resources on selected problem.
C415.3	Formulate the appropriate solution methodology.
C415.4	Apply the principles, tools and techniques to solve the problem.
C415.5	Prepare a report and presentation of project.

Course Code	Course: Dams and Hydraulics Structures Lab (401016)
C416.1	Understand different types of dams
C416.2	Execute stability analysis of gravity dam and earthen dam
C416.3	Design of profile spillway and energy dissipation device below the spillway
C416.4	Analysis of weirs on permeable foundations

Course Code	Course: Dams and Hydraulics Structures Lab (401016)
C416.5	Design of lined canal
C416.6	Understand the different components, working of gravity dam, earthen dam.

Course Code	Course: Quantity Surveying, Contracts and Tenders Lab (401017)
C417.1	Understand concept of estimates and prepare approximate estimate for various for Civil Engineering works.
C417.2	Prepare a tender documents with conditions of contracts,
C417.3	Prepare a detailed estimate for load bearing structures
C417.5	Apply concepts of the specification to draft brief specification, detailed specification and prepare detailed rate analysis report.
C417.6	Evaluate depreciation and valuation of property on the basis of present condition, specifications and market trend.
C417.1	Understand concept of estimates and prepare approximate estimate for various for Civil Engineering works.

Course Code	Course: Elective V Hydropower Engineering Lab (401018-e)
C418e.1	Assess the load and power output of an hydroelectric power plant
C418e.2	Design turbines and draft tube
C418e.3	Design water conveyance system components
C418e.4	Justify the economics and environmental impact of hydroelectric power plant

Course Code	Course: Audit Course II (401019)
C419.1	Gather Knowledge about Human rights and Human rights Movement
C419.2	Develop understanding of Human rights and Indian Constitution
C419.3	Discuss Human Rights of the Different Sections and contemporary issues
C419.4	Discuss International scenario towards human rights with reference to engineering Industry

Course Code	Course: Honor's Course: - Land Use and Land Cover (401403)
C4H2.1	C4H2.1 Understand how to use history of town planning for design of new area.
C4H2.2	C4H2.2 Analyze urban settlement and growth pattern of area.
C4H2.3	C4H2.3 Understand surveys required to be conducted for area planning.

Course Code	Course: Honor's Course: - Land Use and Land Cover (401403)
C4H2.4	C4H2.4 Understand different land use classification.
C4H2.5	C4H2.5 Identify role of different planning agencies in urban land use development.
C4H2.6	C4H2.6 Understand how to use different area planning tools for land use and land cover activity.