Course	Course code	CO Statements (Students should be able to..)
Environmental Engineering - II	C401.1	Design of circular sanitary sewer and explain characteristics of sewage and stream sanitation.
	C401.2	Design of screen chamber, grit chamber, and primary sedimentation tank.
	C401.3	Describe and design the secondary treatment units with special emphasis on activated sludge process and trickling filter.
	C401.4	Design of oxidation pond, aerated lagoon and explain root zone cleaning system.
	C401.5	Classify and design onsite sanitation treatment systems and explain anaerobic digester in detail.
	C401.6	Explain the characteristics and the treatment process of industrial wastewater of sugar, dairy and distillery industry.
Transportation Engineering	C402.1	Interpret and study of rural road development vision and on-going road development projects and earlier plans.
	C402.2	Evaluate Geometric design of highways.
	C402.3	Categorize the road traffic regulation and control devices.
	C402.4	Experiment and Validate Pavement materials suitability in mix-design.
	C402.5	Design of pavement using IS Code and IRC guidelines.
	C402.6	Adapt the Modern Trends in Pavement Construction.
Structural Design and Drawing - III	C403.1	Compute the stresses and losses in PSC Structures.
	C403.2	Designing of PSC rectangular and flanged beams with end block, one way and 2 way post tensioned slabs conforming to IS: 1343:2012.
	C403.3	Designing of PT flat slab conforming to IS:456-2000, IS: 1343:2012
	C403.4	Analysis and design of RCC cantilever T and L shape retaining walls conforming to IS 456:2000.
	C403.5	Analyze and Design Liquid Retaining Structures resting on ground conforming to IS:3370-2009.
	C403.6	Derive the equations of motion for free, forced, un-damped and damped vibrations. Estimate the EQ forces by seismic coefficient method conforming to IS 1893:2002.
E1 (Advanced Concrete Technology)	C404.1	Explore the properties of concrete and types of cement, aggregates and admixtures.
	C404.2	Select the utilization of special types of concrete as per requirement.
	C404.3	Design the grade of concrete as per requirement and Explain Advanced non-destructive testing methods.
	C404.4	Explain the development and importance of FRC.
	C404.5	Differentiate the properties of hardened FRC under compression and tension.
	C404.6	Explain the properties and applications of Ferrocement.
E2 (TQM & MIS in Civil Engineering)	C405.1	Recognize quality & contribution of quality gurus.
	C405.2	Relate the functioning and application of TQM & Six Sigma.
	C405.3	Implement ISO 9001 principles in preparation of quality manual.
	C405.4	Construct & apply management control & certification systems.
	C405.5	Execute TQM Implementation and various Quality Awards.
	C405.6	Justify MIS & its application in construction sector.
E2 (Integrated Water Resources PM)	C405.1	Explain the water resourses in India with water infrastructure problems, perspectives and water laws.
	C405.2	Analyse the water pricing and study the Paradigm shift in water management.
	C405.3	Assess the surface and subsurface water, import/export of water and explain the flood & drought management
	C405.4	Evaluate the water demand and supply based management.
	C405.5	Buid a sytem to protect environment and evaluate the social impacts on water resources developments.
	C405.6	Prepare the basin planning & watershed management.

Course	Course code	CO Statements (Students should be able to..)
Project Phase I	C406.1	Undertake problem identification and need of its solution.
	C406.2	Demonstrate a sound technical knowledge about their selected project.
	C406.3	Invent the required methodology for formulation and solution.
	C406.4	Design engineering solutions to complex problems utilising prior art.
Dams and Hydraulic Structures	C407.1	Differentiate the types of dams and explain the importance of instrumentation for safety of dams.
	C407.2	Analyze the Stability of gravity dam and describe the Concept of Arch Dam.
	C407.3	Design the spillways with appropriate given data and explain the concept of Spillway gates.
	C407.4	Explain the types of Earthen dam, failures and Diversion head works.
	C407.5	Design of lined and unlined Canals and classify the various types of canal structures.
	C407.6	Explain the importance of River training works and CD works.
Quantity Surveying, Contracts and Tenders	C408.1	Choose and apply the appropriate principles in quantity computations.
	C408.2	Formulate the detail estimates and bill of quantities for various civil engineering projects.
	C408.3	Exercise schedule of rates using DSR specifications.
	C408.4	Judge the value through current market rates and prepare valuation report.
	C408.5	Formulate the tender and explore PWD work execution processes.
	C408.6	Apply the skill to defend a contract by knowing arbitration laws.
E3 (Air Pollution and control)	C409.1	Explore the meteorological aspects, Gaussian model and Emission inventory.
	C409.2	Classify and analyze Air sampling methods.
	C409.3	Select methods for control and prevention of air pollution.
	C409.4	Design of air pollution control equipment's.
	C409.5	Discuss Air Pollution prevention and control Act.
	C409.6	Explore the Environmental impact assessment and management.
E3 (Statistical Analysis and Computational Methods in Civil Engineering)	C409.1	Apply various numerical techniques, principles and their application to Civil engineering problems.
	C409.2	Use numerical methods to obtain approximate solutions to mathematical problems.
	C409.3	Analyze and evaluate accuracy of various numerical methods and their applicability.
E4 (Construction Management)	C410.1	Summarize the construction project monitoring and reporting system.
	C410.2	Evaluate the progress of projects by using project scheduling and work study methods.
	C410.3	Interpret the legal and financial aspects of project.
	C410.4	Apply the risk management and value analysis models in construction projects.
	C410.5	Justify and implement Material and Human Resource management policies in construction organizations.
	C410.6	Recognize the importance and application of artificial intelligence technique.
PRO	C411.1	Conduct experimentory investigation by adopting selected methodology.
	C411.2	tabulate and validates the outcomes in result analysis.
	C411.3	Write project thesis by adopting modern tool sets.
	C411.4	Demonstrate the knowledge, skills and attitudes of a professional engineer.

Course Name	Course Code	CO No.	Co Statement (On completion of the course, learner will be able to:)
Building Technology and Architectural Planning	201001	C201.1	Identify types of building and basic requirements of building components.
		C201.2	Make use of Architectural Principles and Building byelaws for building construction.
		C201.3	Plan effectively various types of Residential Building forms according to their utility, functions with reference to National
		C201.4	Plan effectively various types of Public Buildings according to their utility functions with reference to National Building Code.
		C201.5	Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects.
		C201.6	Understand different services and safety aspects.
Mechanics of structure	201002	C202.1	Understand 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	Explain the concept of shear and bending stresses in beams and demonstrate shear and bending stress distribution diagram.
		C202.4	Use theory of torsion to determine the stresses in circular shaft and understand concept of Principal stresses and strains.
		C202.5	Analyze axially loaded and eccentrically loaded column.
		C202.6	Determine the slopes and deflection of determinate beams and
Fluid Mechanics	201003	C203.1	Understand the use of Fluid Properties, concept of Fluid statics, basic equation of Hydrostatics, measurement of fluid pressure, buoyancy & floatation and its application for solving practical problems.
		C203.2	Understand the concept of fluid kinematics with reference to Continuity equation and fluid dynamics with reference to Modified Bernoulli's equation and its application to practical problems of fluid flow
		C203.3	Understand the concept of Dimensional analysis using Buckingham's π theorem, Similarity & Model Laws and boundary layer theory and apply it for solving practical problems of fluid flow.
		C203.4	Understand the concept of laminar and turbulent flow and flow through pipes and its application to determine major and minor losses and analyze pipe network using Hardy Cross method.
		C203.5	Understand the concept of open channel flow, uniform flow and depth-Energy relationships in open channel flow and make the use of Chezy's and Manning's formulae for uniform flow computation and design of most economical channel section.

Course Name	Course Code	CO No.	Co Statement (On completion of the course, learner will be able to:)
FM	201003	C203.6	Understand the concept of gradually varied flow in open channel and fluid flow around submerged objects, compute GVF profile and calculate drag and lift force on fully submerged body.
Engineering Mathematics III	207001	C204.1	Solve Higher order linear differential equations and its analysing Civil engineering problems such as bending of beams, whirling of shafts and massapplications to modelling and spring systems.
		C204.2	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.
		C204.3	Apply Statistical methods like correlation, regression and probability theory in data analysis and predictions in civil engineering.
		C204.4	Perform Vector differentiation &integration, analyze the vector fields and apply to fluid flow problems.
		C204.5	Solve Partial differential equations such as wave equation, one and two dimensional heat flow equations.
Engineering Geology	207009	C205.1	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.
		C205.2	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.
		C205.3	Recognize effect of plate tectonics, structural geology and their
		C205.4	Incorporate the various methods of survey, to evaluate and interpret
		C205.5	Assess the Importance of geological nature of the site, precautions and treatments to improve the site conditions for dams, reservoirs, and tunnels.
		C205.6	Explain geological hazards and importance of ground water and uses of common building stones.
Road Safety Management	201007	C206.1	Summarize the existing road transport scenario of our country
		C206.2	Explain the method of road accident investigation
		C206.3	Describe the regulatory provisions needed for road safety
		C206.4	Identify the safety issues for a road and make use of IRC's road safety manual for conducting road safety audit.
MOS (Lab)	201005	C207.1	Conduct Tension and bend-rebend test, Shear test on mild and TMT steel, Torsion test on mild steel and aluminum, Izod and Charpy impact test on mild steel, aluminum, brass and copper
		C207.2	Perform Compression test, Bending test on timber and plywood.
		C207.3	Find Water absorption, efflorescence test and Compressive strength test on bricks
		C207.4	Compute Flexural strength, perform abrasion test of flooring tiles

Course Name	Course Code	CO No.	Co Statement (On completion of the course, learner will be able to:)
Fluid Mechanics (Lab)	201006	C208.1	To understand the behaviour and applications of fluid properties and fluid pressure
		C208.2	To study the concept of fluid kinematics and fluid dynamics with reference to bernoullis theorem, venturimeter etc.
		C208.3	To determine friction factor and analyze pipe network using Hardy Cross Method
		C208.4	To understand the concept of open channel flow with reference to velocity distribution, uniform flow formulae etc.
		C208.5	To Recognize the idea of drag and lift forces
Engineering Geology (Lab)	207010	C209.1	Categorize different mineral specimens.
		C209.2	Categorize different rock specimens.
		C209.3	Interprete and construct the geological sections from contoured geological maps.
		C209.4	Analyse engineering geological problems such as alignment of dams, tunnels, roads, canals,bridges, etc. based on geological maps.
		C209.5	Prepare a core log from drilling data.
Awareness to Civil Engineering Practices (Audit Course I)	201007	C210.1	Describe functioning/working of different types of industries/sectors in Civil Engineering.
		C210.2	Describe drawings and documents required and used in different Civil Engineering works.
		C210.3	Understand the importance of Code of Ethics to be practiced by a Civil Engineer and also understand the duties and responsibilities as a Civil Engineer.
		C210.4	Understand different health and safety practices on the site.
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	Express 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.
Survey	201009	C212.1	Define and Explain basics of plane surveying and differentiate the instruments used for it.
		C212.2	Express proficiency in handling surveying equipment and analyse the
		C212.3	Describe different methods of surveying and find relative positions of points on the surface of earth.
		C212.4	Execute curve setting for civil engineering projects such as roads, railways etc.

Course Name	Course Code	CO No.	Co Statement (On completion of the course, learner will be able to:)
Survey	201009	C212.5	Articulate advancements in surveying such as space based positioning systems
		C212.6	Differentiate map and aerial photographs, also interpret aerial photographs.
Concrete Technology	201010	C213.1	Select the various ingredients of concrete and its suitable proportion to achieved desired strength.
		C213.2	Check the properties of concrete in fresh and hardened state.
		C213.3	Get acquainted to concreting equipments, techniques and different types of special concrete.
		C213.4	Predict deteriorations in concrete and get acquainted to various repairing methods and techniques.
Structural Analysis	201011	C214.1	Understand 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 frames.
		C214.3	Implement application of the slope deflection method to beams and portal frames.
		C214.4	Analyze beams and portal frames using moment distribution method.
		C214.5	Determine response of beams and portal frames using structure approach of stiffness matrix method.
		C214.6	Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frames.
Project Management	201012	C215.1	Describe project life cycle and the domains of Project Management.
		C215.2	Explain networking methods and their applications in planning and management.
		C215.3	Categorize the materials as per their annual usage and also Calculate production rate of construction equipment.
		C215.4	Demonstrates resource allocation techniques and apply it for
		C215.5	Understand economical terms and different laws associated with project management.
		C215.6	Apply the methods of project selection and recommend the best economical project.
Geotechnical Engineering (Lab)	201013	C216.1	To conduct water content, specific gravity, sieve analysis, consistency limits, field density, coefficient of permeability of soil.
		C216.2	To conduct Direct shear test, unconfined compression test,vane shear test, triaxial test, standard proctor test, free swell test and swelling pressure test on soil.
Survey (Lab)	201014	C217.1	Compute true bearing of sides of a triangle or quadrilateral using prismatic compass
		C217.2	Draw traverse by using plane table survey

Course Name	Course Code	CO No.	Co Statement (On completion of the course, learner will be able to:)
Survey (Lab)	201014	C217.3	Calculate horizontal distance and vertical elevation using a Tacheometer
		C217.4	Find relative positions of points on the surface of earth.
		C217.5	Analyze temporary adjustments of the vernier transit Theodolite and to adjust closed traverse
		C217.6	Setting out a circular curve by Rankine's method of deflection angles
		C217.7	Comment on application of Electronic Total Station in construction
		C217.8	Differentiate map and aerial photographs, also interpret aerial photographs.
Concrete Technology (Lab)	201015	C218.1	Perform the practically tests on cement as per IS standard to check the various properties like Initial, final setting time and standard consistency.
		C218.2	Perform the practically tests on coarse and fine aggregate as per IS standard to check the various properties like Fineness modulus, Moisture content, bulk density and specific gravity.
		C218.3	Prepare the fresh concrete and take the workability test on concrete like Slump cone,Vee-Bee Consistometer and Compaction factor test.
		C218.4	Conduct test on harden concrete by using compressive and Universal testing machine.
		C218.5	Design the required grade of concrete as per IS guidelines
Project Based Learning	201017	C219.1	Identify the community/ practical/ societal needs and convert the idea into a product/ process/ service.
		C219.2	Analyse and design the physical/ mathematical/ ICT model in order to solve identified problem/project.
		C219.3	Create, work in team and applying the solution in practical way to specific problem.

Course Name	Course Code	CO No.	Co Statement (On completion of the course, learner will be able to:)
HWRE	301001	C301.1	Understand government organizations, apply & analyze precipitation & its abstractions.
		C301.2	Understand, apply & analyze runoff, runoff hydrographs and gauging of streams.
		C301.3	Understand, apply & analyze floods, hydrologic routing & Q-GIS software in hydrology.
		C301.4	Understand, apply & analyze reservoir planning, capacity of reservoir & reservoir economics.
		C301.5	Understand water logging & water management, apply & analyze ground water hydrology
		C301.6	Understand irrigation, piped distribution network and canal revenue, apply and analyze crop water requirement.
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.
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.
Engineering Economics and Financial Management	301004	C304.1	Understand basics of construction economics.
		C304.2	Develop an understanding of financial management in civil engineering projects.

Course Name	Course Code	CO No.	Co Statement (On completion of the course, learner will be able to:)
Engineering Economics and Financial Management	301004	C304.3	Prepare and analyze the contract account.
		C304.4	Decide on right source of fund for construction projects.
		C304.5	Understand working capital and its estimation for civil engineering projects.
		C304.6	Illustrate the importance of tax planning & understand role of financial regulatory bodies
Construction Management	301005 c	C305.1	Understand the overview of construction sector.
		C305.2	Illustrate construction scheduling, work study and work measurement.
		C305.3	Acquaint various labor laws and financial aspects of construction projects.
		C305.4	Explain elements of risk management and value engineering.
		C305.5	State material and human resource management techniques in construction.
		C305.6	Understand basics of artificial intelligence techniques in civil
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.
HWRE (Lab)	301007	C307.1	To understand and analyze the precipitation
		C307.2	To understand, apply and analyze floods and hydrologic routing in hydrology
		C307.3	To understand, apply and analyze reservoir planning and capacity of reservoir
		C307.4	To understand the application of suitable software used in water resources
Water Supply Engineering (lab.)	301008	C308.1	Understand various parameters related to water quality.
		C308.2	Analyze the water quality parameters
		C308.3	Design various components of water treatment plant and distribution system.
Design of Steel Structures (Lab.)	301009	C309.1	To draw drawing sheets consists of steel structural detailing .
		C309.2	To design industrial building including roof truss, purlin, bracings, gantry girder, column, column base and connections as per SP:38 and IS:800-2007.
		C309.3	To design welded plate girder: design of cross section, curtailment of flange plates, stiffeners and connections as per IS:800-2007.
ELE. I (CM) Lab	301010C	C310.1	Illustrate construction scheduling, work study and work measurement

Course Name	Course Code	CO No.	Co Statement (On completion of the course, learner will be able to:)
ELE. I (CM) Lab	301010C	C310.2	Acquaint financial aspects of construction projects
		C310.3	Explain elements of risk management
		C310.4	State material management techniques in construction
		C310.5	Understand basics of artificial intelligence techniques in civil
		C310.6	Develop technical writing and presentation skills
Audit Course I: Professional Ethics and Etiquettes	301011 a	C311.1	Understand the basic perception of profession, professional ethics, various moral issues and uses of ethical theories
		C311.2	Understand various social issues, industrial standards, code o ethics and role of professional ethics in engineering field.
		C311.3	Follow ethics as an engineering professional and adopt good standards and norms of engineering practice.
		C311.4	Apply ethical principles to resolve situations that arise in their professional lives
Waste Water Engineering	301012	C312.1	Recall sanitation infrastructure, quantification and characterization of wastewater, natural purification of streams
		C312.2	Design preliminary and primary unit operations in waste water treatment plant
		C312.3	Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process
		C312.4	Understand and design suspended and attached growth wastewater treatment systems
		C312.5	Explain and apply concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment systems
		C312.6	Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment
Design of Reinforced Concrete Structures	301013	C313.1	Apply relevant IS provisions to ensure safety and serviceability of structures, understand the design philosophies and behavior of materials: steel & concrete.
		C313.2	Recognize mode of failure as per LSM and evaluate moment of resistance for singly, doubly rectangular, and flanged sections.
		C313.3	Design & detailing of rectangular one way and two-way slab with different boundary conditions
		C313.4	Design & detailing of dog legged and open well staircase
		C313.5	Design & detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond and torsion.
		C313.6	Design & detailing of short columns subjected to axial load, uni-axial/bi-axial bending and their footings.

Course Name	Course Code	CO No.	Co Statement (On completion of the course, learner will be able to:)
Remote Sensing and Geographic Information System	301014	C314.1	Articulate fundamentals and principles of RS techniques.
		C314.2	Demonstrate the knowledge of remote sensing and sensor characteristics.
		C314.3	Distinguish working of various spaces-based positioning systems.
		C314.4	Analyze the RS data and image processing to utilize in civil
		C314.5	Explain fundamentals and applications of RS and GIS
		C314.6	Acquire skills of data processing and its applications using GIS
Internship	301016	C316.1	To develop professional competence through industry internship
		C316.2	To apply academic knowledge in a personal and professional environment
		C316.3	To build the professional network and expose students to future employees
		C316.4	Apply professional and societal ethics in their day to day life
		C316.5	To become a responsible professional having social, economic and administrative considerations
		C316.6	To make own career goals and personal aspirations
Waste Water Engineering (Lab)	301017	C317.1	Characterize the wastewater for physical, chemical and microbiological treatment
		C317.2	Test the waste water sample for various fundamental pollutants
		C317.3	Design the different components of waste water treatment plant.
Design of Reinforced Concrete Structures (Lab)	301018	C318.1	Design G + 2 (residential/commercial/public) building covering all types of slabs, beams, columns, footings and staircase (first and intermediate flight).
		C318.2	Draw RCC detailing of slabs, beams, columns footings and Staircase
		C318.3	Design any one element of G + 2 (residential/commercial/public) building by using spread sheet or use of analysis and design by suitable software.
RS GIS (Lab)	301019	C319.1	Analyze the RS data and image processing to utilize in civil
		C319.2	Generation of thematic maps using Softawres
		C319.3	Interpret aerial photographs.
		C319.4	Acquire skills of data processing and its applications using GIS
		C319.5	Analysis of exporting data from GIS to other softwares