

# Civil Engineering

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## Course Outcomes SE (Civil Engineering)-Semester-I

### C211 Concrete Technology

At the end of this course, students will be able to

C211.1	Select appropriate type of concrete for specific requirements.
C211.2	Design a concrete mix of required strength and durability using suitable ingredients.
C211.3	Identify, formulate and solve problems on concrete mixes for Engineering Projects.
C211.4	Conduct experiments, interpret & analyse data and report results.
C211.5	Design a process that meets desired specifications within realistic constraints.

### 212- Structural Mechanics-I

At the end of this course, students will be able to

C212.1	Employ the knowledge of mechanics to understand the behavior of structures.
C212.2	Draw Shear Force Diagram and Bending Moment Diagram of determinate beam subjected to different types of loading.
C212.3	Analyze Bending Stresses of determinate beam subjected to different types of loading.
C212.4	Analyze Shear Stresses of determinate beam for different section.
C212.5	Analyze Combine Stresses of column of rectangular section having eccentricity.

### C213. Surveying-I

At the end of this course, students will be able to

C213.1	Determine quality of measurements and surveys. based on instrumental, natural and personal errors
C213.2	Professional and ethical responsibilities to record accurate field notes and to recognize and report poor survey results.
C213.3	Perform measuring and surveying procedures for a variety of engineering tasks such as horizontal and vertical control surveys, underground pipe alignment, and strategic topographic point selection for terrain modeling.
C213.4	Create a representative electronic terrain model using a computer program and developing a scaled topographic map of a proposed project site, including selecting appropriate engineering scales and including typical drawing information.
C213.4	Determine Area and Volume for given map by instrumental and analytical methods.

### C214. BUILDING CONSTRUCTION AND DRAWING

At the end of this course, students will be able to

C214.1	Identify and apply knowledge of various building materials on work site.
C214.2	Ascertain working of building components arch and floor and their construction methods.
C214.3	Design and draw different types of stair case for public and residential building with suitable scale.
C214.4	Design and draw all types of doors and windows with suitable scale.
C214.5	Distinguish between different types of masonry work and their construction method.

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## **C215 Fluid Mechanics I – Course Outcomes**

At the end of this course, students will be able to

C215.1	Develop ability to design and conduct experiments, interpret and analyze data with experimental results in hydraulic engineering.
C215.2	Measure fluid pressure using different pressure measuring devices .
C215.3	Carry out calibration of venture meter, orifice meter, mouthpieces..
C215.4	Analyze fluid flows.
C215.5	Design pipe networks.

## **C216. Engineering Geology**

At the end of this course, students will be able to

C216.1	Identify different type of rocks and minerals.
C216.2	Draw geological maps.
C216.3	Carry out preliminary geological investigation of site related to civil engineering projects.
C216.4	Analyze influence of geological condition on various aspect of Dam/Bridge/Tunnel
C216.5	Demonstrate identification of Subsurface rock

## **C217 Lab Practice**

At the end of this course, students will be able to

C217.1	Draw using Software, the geometric constructions, multi-view, sectional view, dimensioning and detail drawings of typical 2-D engineered objects
C217.2	Produce architectural floor plan of a small residential building
C217.3	Develop and draw views like elevation, section, furniture planning for a small residential building
C217.4	Apply computer software to prepare civil engineering drawing
C217.5	Complete Printing the AutoCad output

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## SE (Civil Engineering)-Semester-II

### C221.Structural Mechanics-II

At the end of this course students will be able to,

C221.1	Employ the knowledge of mechanics to understand the behavior of structure.
C221.2	Identify principal planes and find principal stresses.
C221.3	Find slope and deflection of beams under different loading conditions.
C221.4	Draw influence line diagram and its applications.
C221.5	Analyze three hinge arch for different types of loading condition.

### C222. Surveying-II

At the end of this course, students will be able to

C222.1	Plan project survey for bridges tunnels, building, dam , culvert etc.
C222.2	Prepare contour maps and other surveying maps such as longitudinal profile and cross sections for various civil engineering projects.
C222.3	Work on various application software related to surveying.
C222.4	Collect Data using GPS receiver
C222.5	Set Horizontal and Vertical Curves

### C223 Building Construction and Design

At the end of this course, students will be able to

C223.1	Plan and design a residential building according to principles of planning and design.
C223.2	Apply knowledge for low cost housing in buildings.
C223.3	Apply knowledge of Plumbing & Sanitation services in Building
C223.4	Apply knowledge of Electrification services in Building
C223.5	Apply knowledge of Ventilation and Air conditioning services in building
C223.6	Apply knowledge of building finishes like Paint, Tiles Cladding, POP etc.

### C224 Fluid Mechanics II

At the end of this course, students will be able to

C224.1	Develop an ability to design and conduct experiments with analysis of data to produce experimental results.
C224.2	differentiate gradually (GVF) and rapidly varied flow (RVF) and study types of slopes
C224.3	Calculate discharge through various notches and weirs.
C224.4	Study different hydraulic machines, i.e. turbines and pumps also develop an ability to function as leader or member of multidisciplinary teams.
C224.5	Study dimensional analysis and develop skills in hydraulic model making through dimensional analysis.

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## **C225. Water Resources Engineering- I**

At the end of this course, students will be able to

C225.1	Assess stream flow, rainfall, and geographic data.
C225.2	Construct and apply models of hydrologic processes
C225.3	Select appropriate method of irrigation
C225.4	Explain need of participatory irrigation management
C225.5	Suggest appropriate method of watershed management

## **C226. Engineering Mathematics-III –**

At the end of this course, the students will be able to

C226.1	Solve the higher order linear differential equation related to various structural elements like, beams, columns, struts, etc.
C226.2	Express the function in terms of sines and cosines.
C226.3	Apply the methods of statistics and probability in Civil Engineering Problems.
C226.4	Apply Laplace Transformation to solve linear Differential Equations with constant Coefficients.
C226.5	Use Vector Calculus for differentiation of Vector fields.

## **C227. Computer Programming and Numerical Methods**

At the end of this course, students will be able to

C227.1	Write computer programs for Matrix operations on computer necessary for structural analysis
C227.2	Develop computer programs for calculating Roots of equation, Numerical Integration, ordinary differential equations and for various applications in Civil Engineering
C227.3	Carry out statistical analysis of data by writing programs for statistical methods
C227.4	Find Solution of ordinary differential equation
C227.5	Perform Numerical integration

## **C228 Environmental Science**

At the end of this course, students will be able to

C217.1	To recognize the natural environment and its relationships with human activities
C217.2	Integrate facts, concepts, and methods from multiple disciplines and apply to environmental problems
C217.3	Characterize and analyze human impacts on the environment
C217.4	Design and evaluate strategies, technologies, and methods for sustainable management of environmental systems
C217.5	Analyze the social, economic, and political and policy dynamics involved in both the emergence and the resolution of environmental problems
C217.6	Evaluate critical analytical skills concerning to energy portfolio and other.

## **T.E (Civil Engineering)-Semester-I**

### **C311. Design of Steel Structures**

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At the end of this course, the students will be able to

C311.1	Select various load combinations acting on steel structure elements and choose appropriate ones for steel structure design
C311.2	Adopt and apply 'Limit State' design approach for designing various elements of steel structures for strength and serviceability.
C311.3	Perform Analysis of various steel structures
C311.4	Design various steel structure elements viz. Bolted and welded connections, Tension members Compression members, Column bases, Flexural members etc. as per procedures defined by Indian Standard Code of practice : IS 800: 2007(General Construction in Steel)
C311.4	Analyze beams and portal frames by plastic analysis approach

## **C312 Geotechnical Engineering –I**

At the end of this course, students will be able to,

C312.1	Conduct various experiments in the laboratory and on the field to evaluate various index properties and strength properties of soil
C312.2	Apply basic hydraulic flow principles to soils, to calculate the seepage through earth structures and foundations.
C312.3	Evaluate the stress intensity and construct the pressure bulb below the foundation due to applied load
C312.4	Apply one dimensional consolidation theory to estimate time-dependent settlements of foundations.
C312.5	Estimate various types of earth pressure on retaining structure for a given situation.

## **C313 Building Planning & Design**

At the end of this course, students will be able to,

C313.1	Plan and design a public building according to requirements adhering to appropriate norms and standards.
C313.2	Prepare "Municipal drawing" for public buildings for obtaining building permission from competent authority.
C313.3	Incorporate "Green Building" principles and design while designing public buildings.
C313.4	Apply knowledge of Acoustic and Sound Insulation while designing Auditorium hall, Classrooms & Broadcasting rooms
C313.5	Incorporate Fire protection precautions to make Fire Resistant Structures
C313.6	Prepare the building drawings by using suitable 'Computer Aided Drawing and Design' application software.

## **C314 Environmental Engineering I**

At the end of this course, students will be able to,

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C314.1	Plan and design water supply systems for a rural/urban area based on population forecasts.
C314.2	Design various water treatment units and plan their operations on the basis of raw water quality and water demand.
C314.3	Apply knowledge of advanced water treatment processes for individual water purification units.
C314.4	Carry out Design of water distribution system
C314.5	Design and supervise building plumbing systems and their maintenance

### **C315 Engineering Management- I**

At the end of the course, a student will be able to:

C315.1	Lead a team, as well as work as a member of a team, for effective management of construction projects.
C315.2	Apply the various Optimization techniques for decision making in construction industry.
C315.3	Successfully manage the inventory of a project or industry.
C315.4	Assess and assure about quality of materials and workmanship, in Civil Engineering projects.
C315.5	Prepare suitable disaster management plan and implement it effectively to mitigate the disaster.

### **C316. Transportation Engineering-I,**

At the end of this course, students will be able to

C316.1	Carry out geometric design and pavement design of roads for particular nature and intensity of traffic as per IRC standards.
C316.2	Carry out testing various road construction materials in Laboratory using modern equipments & instruments and draw appropriate conclusions regarding their usability.
C316.3	Undertake traffic studies and adopt appropriate traffic Signals.
C316.4	Design various bridge components.
C316.5	Select appropriate shape of tunnel and adopt proper tunneling method of tunnel construction.

### **C317. Self Learning (H.S.S. course) Professional Ethics**

At the end of this course, students will be able to

C317.1	Conduct research meeting the highest standards of honesty and clarity
C317.2	Identify the ethical elements in decisions and actions
C317.3	Address and resolve problems arising from questionable practice
C317.4	Assess Safety and Risk
C317.5	Demonstrate Respect for Human Values

## **T.E (Civil Engineering)-Semester-II**

### **C321. Structural Mechanics III**

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At the end of this course, students will be able to

C321.1	Discretize simple structures, identify static and kinematic degrees of freedom
C321.2	Analyze beams, trusses and frames by applying various methods of force method of analysis such as Method of consistent deformation, Flexibility method etc.
C321.3	Analyze beams, trusses and frames by applying various methods of Displacement method of analysis such as Moment distribution method, Stiffness method etc.
C321.4	Analyze the structures by energy methods using Castigliano's theorem
C321.5	Select and use appropriate application software for structural analysis.

## C322 Geotechnical Engineering –II

At the end of this course, students will be able to,

C322.1	Perform various field tests such as plate load test, standard penetration test for the evaluation of bearing capacity.
C322.2	Perform Geometrical design of different types of shallow foundations such as isolated footing, combined footing, raft foundation etc which will suit the given field and loading conditions.
C322.3	Evaluate the load carrying capacity of pile by individual action as well as by group action
C322.4	Select and apply suitable ground improvement techniques such as vibroflotation, grouting, and soil reinforcement which best suits for given field and loading conditions.
C322.5	Investigate slope stability of embankments for their safety and stability under the worst possible conditions
C322.6	Evaluate and draw the pressure distribution diagram of sheet pile having embedment and retainment of various types of soil

## C323 Environmental Engineering II

At the end of this course, students will be able to

C323.1	Plan the layout of sewage collection system, matching the topography of the region and characterization of sewage.
C323.2	Decide sequence and design of wastewater treatment units to meet the sewage treatment standards.
C323.3	Design the wastewater treatment plant using Trickling filter, anaerobic treatment and low cost treatment methods
C323.4	Adopt appropriate methods of Solid waste Disposal and Management of hazardous waste
C323.5	Measure air pollution and adopt control measures to control of industrial air pollution

## C324 Engineering Management- II

At the end of the course, students will be able to:-

C324.1	Plan the project and prepare Bar chart and Network to optimize the project duration and cost.
C324.2	Update the network and reevaluate the resources.
C324.3	Demonstrate the decision making abilities based on economics in projects and to appraise

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	alternative projects.
C324.4	Analyze life cycle cost and value of the project
C324.5	Use appropriate project management application software for planning, tracking and reporting progress of civil engineering projects.

### **C325 Transportation Engineering-II**

At the end of this course, students will be able to

C325.1	Perform geometric design for the Railway tracks.
C325.2	Design simple turnout at points and crossings and explain the working principles of railway interlocking system.
C325.3	Plan the layout of different types of Air terminals.
C325.4	Locate the orientation of runway and design the geometry of the runway and taxiway.
C325.5	Identify components of Docks and Harbour and their working principles.

### **C326 Steel Structural Design & Drawing**

At the end of this course, students will be able to

C326.1	Carry out Analysis of various steel structures
C326.2	Prepare Design of various steel components
C326.3	Design and prepare drawings of the various components of industrial shed with roof truss or portal frame or gable frames
C326.4	Design and draw the various components of building frames/ foot bridge / welded plate girder
C326.5	Select and use appropriate design software for analysis and design

### **C327 Mini project (Any subject in Civil Engg.)**

At the end of this course, students will be able to

C327.1	Conduct and write the Literature Survey
C327.2	Carry out Theoretical Formulation
C327.3	Synthesize and Compose the subject Knowledge
C327.4	Develop working prototypes /simulation models / Conduct extensive parametric research
C327.5	Draft the progress reports and make presentations.

### **C328 Field Training Report**

At the end of this course, students will be able to

C328.1	Make technical communication with the Company/ Contact Person about the intent and permission for the field training
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C328.2	Collect knowledge about the company and nature of work being conducted
C328.3	Observe the Safety precautions on and off the field
C328.4	Prepare the field notes
C328.5	Draft the field training reports.

### **C329-Pavement Analysis and Design (Self Learning Technical Course)**

At the end of this course, students will be able to

C329.1	Calculate stresses in flexible and rigid pavement as per Burmister's and Westergaard's theory.
C329.2	Design flexible and rigid pavement as per layer concept system, AASHTO and IRC guidelines.
C329.3	Carry out testing various road construction materials in Laboratory using modern equipments & instruments and draw appropriate conclusions regarding their usability.
C329.4	Understand different methodologies and equipments used in construction of flexible and concrete pavements.
C329.5	Identify different distresses in flexible and rigid pavement and suggest appropriate remedial measures.

### **B.E (Civil Engineering)-Semester-I**

#### **C411. Design Oof Concrete Structures – I**

At the end of this course, students will be able to

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C411.1	Use IS code of practice for the design of concrete elements
C411.2	Analyse and Design singly reinforced, Doubly reinforced, Tee and L beams
C411.3	Analyse and Design Simply supported, Continuous and Cantilever slabs
C411.4	Analyse and Design Axially loaded and eccentrically loaded columns
C411.5	Prepare detailed drawings of various RCC structural elements

### **C412. Quantity Surveying & Valuation**

At the end of this course, students will be able to

C412.1	Write specifications and prepare estimates for various Civil Engineering works.
C412.2	Carry out analysis of rates for various items of works of construction.
C412.3	Carry out valuation of land and buildings.
C412.4	Demonstrate professional ethics in Civil Engineering sector.
C412.5	Prepare Detailed estimate of buildings

### **C413. Earthquake Engineering**

At the end of this course, students will be able to

C413.1	Employ the Principles of Earthquake Engineering in planning, design and construction of building.
C413.2	Demonstrate the dynamic analysis of structures under earthquake load
C413.3	Incorporate Earthquake resistant features for various types of construction.
C413.4	Analyze the structures for earthquake forces
C413.5	Use of Provisions of IS 1893 and 13920 Codes
C413.6	Incorporate Ductility features in the structures.

### **C414. Water Resources Engineering- II**

At the end of this course, students will be able to

C414.1	Plan and design the reservoirs depending upon the water resources potential.
C414.2	Analyze and design Gravity dams and Earth dams (Simple Designs).
C414.3	Demonstrate the design principles of Arch dams.
C414.4	Solve seepage problems for Weirs on Permeable Foundations
C414.5	Demonstrate the knowledge of water power engineering and river training.

### **C415A Elective- I Open Channel and River Hydraulics**

At the end of this course, students will be able to

C415.1	Demonstrate basic principles of the open channel flow
C415.2	Classify the various types of flows, e.g. uniform flow, gradually varied flow, spatially varied and rapidly varied flow.
C415.3	Analyze the concept of sediment transportation study in open channel, and design the

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	channel by using Lacey's and Kennedy's theory.
C415.4	Understand different river training works in open channel.
C415.5	Develop skill in model analysis spatially in distorted models.

### **C415B ELE- I Air Pollution and Control**

At the end of this course, students will be able to

C415.1	Identify the sources of air pollutants and their effect on human, plants and materials
C415.2	Apply knowledge of meteorology for controlling air pollution
C415.3	Design of air pollution controlling equipments
C415.4	Apply Rules and bi-laws
C415.5	Prevent and control of air pollution based on legislation

### **C 415 C - Elective- I Design Of Foundations**

At the end of this course, students will be able to

C415C.1	Evaluate the bearing capacity of soil analytically as well as by field test such as plate load test, Standard Penetration test etc.
C415C.2	Design the different shallow foundation and deep foundation to meet the site requirement and loading conditions
C415C.3	Apply suitable soil improvement techniques such as soil isolation, Geotextiles or using CNS soil for the give field condition.
C415C.4	Design the simple machine foundations using codal provision.
C415C.5	Explain methods of Shoring and under-pinning

### **C 416 Seminar**

At the end of this course, students will be able to

C416.1	Conduct literature Survey of the technical Civil Engineering subject of his choice.
C416.2	Prepare Theoretical Formulation on the subject of his/her interest
C416.3	Compose the subject Knowledge based on Case Study
C416.4	Present the Seminar effectively in report form
C416.5	Communicate the subject matter orally to the audience

### **C417. Project work**

At the end of this course, students will be able to

C417.1	Carry out Literature Survey
C417.2	Conduct Theoretical Formulation

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C417.3	Synthesize and Compose the subject Knowledge
C417.4	Develop working prototypes / simulation models / Conduct extensive parametric research
C417.5	Prepare Draft progress reports and make presentations.

### **C418.Field Training-II**

At the end of this course, students will be able to

C328.1	Make technical communication with the Company/ Contact Person about the intent and permission for the field training
C328.2	Collect knowledge about the company and nature of work being conducted
C328.3	Observe the Safety precautions on and off the field
C328.4	Prepare the field notes
C328.5	Draft the field training reports.

### **B.E (Civil Engineering)-Semester-II**

#### **C421. Design of Concrete Structures- II**

At the end of this course, students will be able to

C421.1	Analyze & Design RCC staircases by Limit State Method
C421.2	Analyze & Design footings by Limit State Method
C421.3	Analyze & Design Cantilever and counter fort retaining walls.

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C421.4	Analyze & Design RCC water tanks by approximate and Indian Standard method.
C421.5	Design a pre-stressed concrete beams accounting for losses
C421.6	Design the anchorage zone for post tensioned members

### **C422-Construction Practices and Town Planning**

At the end of this course, students will be able to

C422.1	Prepare layout of small towns
C422.2	Identify and select various inputs for town planning
C422.3	Calculate output of construction machines
C422.4	Execute various items of construction work using construction machinery and adopt appropriate safety measures.
C422.5	Explain the Prefabricated construction

### **C423A Elective-II Traffic Engineering & Control**

At the end of this course, students will be able to

C423A.1	Undertake various traffic studies and analysis of traffic data including parking studies and calculation of parking demand.
C423A.2	Establish relation between flow, density, speed, concept of level of service for urban and rural area.
C423A.3	Define traffic regulations on vehicle, driver and speed. Also able to understand Various traffic control devices like different signs, markings, signals and lighting.
C423A.4	Demonstrate Intelligent Transport System (ITS) and their application in traffic Engineering.
C423A.5	Demonstrate the use of various instruments used in traffic studies and their Applications.

### **423B Elective-II Solid and Hazardous Waste Management**

At the end of this course, students will be able to

C423B.1	Suggest waste reduction and resource recovery methods
C423B.2	Explain various waste disposal methods
C423B.3	Examine legal, political and administrative considerations in design and operation of solid and hazardous waste management
C423B.4	Explain Bio –gas energy from organic solid waste
C423B.5	Perform Qualitative estimation of damages, risk assessment and management

### **C423C- Elective –II Design of Bridges**

At the end of this course, students will be able to

C423C.1	Evaluate various types of loads acting on the bridges as per the IRC bridge code
C423C.2	Design the different types of Deck slabs such as Solid slab and T beam type slab for two lane and four lane bridges.
C423C.3	Verify the adequacy of the Pier and Abutments for the given data

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C423C.4	Design the elastomeric type of bearing for given loading condition
C423C.5	Identify the most suitable techniques for the maintenance and repair of the bridge under the given conditions

### **C424 A Elective-III Industrial Waste Treatment**

At the end of this course, students will be able to

C424A.1	Characterize different industrial wastes
C424A.2	Suggest treatment alternative based on characteristics of industrial waste
C424A.3	Develop basic knowledge of legislation for pollution control
C424A.4	Explain Recycling and reuse and recovery
C424A.5	Calculate volume of equalization tank

### **C424 B Elective-III Water Power Engineering**

At the end of this course, students can able to

C424B.1	Understand types of energy sources and estimate the hydropower in a project
C424B.2	Select suitable types of hydro-power system for particular site conditions
C424B.3	Design different parts of hydropower plant e.g. penstock and anchor blocks
C424B.4	Analyze the different types of loads on power plants
C424B.5	Understand the concept and importance of Tidal power plant

### **C424 C. Elective-III Advanced Concrete Technology**

At the end of this course, students can able to

C424C.1	Select proper admixtures to obtain concrete of desired properties.
C424C.2	Adopt appropriate type of special concrete for desired results.
C424C.3	Design a concrete mix of required strength and workability properties
C424C.4	Adopt appropriate method for repairs and rehabilitation of concrete structures
C424C.5	Quality control of concrete can ensure.
C424C.6	Advanced testing method of concrete.

### **C425 R.C.C. Structural Design and Drawing-II**

At the end of this course, students can able to

C425.1	Use different IS codes and design the structure as per codal provision.
C425.2	Apply loading depending upon the functional requirement of building component
C425.3	Analysis structure under different loading condition hence student will be able to imagine and predict response of structures

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C425.4	Design the building elements depending upon the structural analysis
C425.5	Design the substructure i.e. foundation to transfer the load safely to ground
C425.6	Prepare detailed drawing of R.C.C section of designed building.

### **C426 Project Work**

At the end of this course, students can able to

C424.1	Develop working prototypes /simulation models / Conduct extensive parametric research
C424.2	Write literature review, progress reports and make presentations.
C424.3	Work effectively in a team
C426.4	Develop working prototypes / simulation models / Conduct extensive parametric research
C426.5	Draft progress reports and make presentations.