



**MEENAKSHI SUNDARARAJAN ENGINEERING COLLEGE**  
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**DEPARTMENT OF CIVIL ENGINEERING**

**REGULATION – 2017**  
**COURSE OUTCOMES**

**MA8353- Transforms and Partial Differential Equations (C201)**

C201.1	Formulate and solve partial differential equations.
C201.2	Evaluate Fourier series of periodic functions.
C201.3	Apply the method of separation of variables to find the solution of heat and wave equation.
C201.4	Illustrate the Fourier transform techniques.
C201.5	Examine Z transform techniques and solve difference equations.

**CE8301- Strength of Materials I (C202)**

C202.1	Understand the behaviour of different material with its strength, stress, strain and evaluate the deformation of solids with applications to bars, beams and two dimensional state of stress and plane trusses
C202.2	Understand the different types of supports and loading also able to analyze the shear force and bending moment in beams and understand concept of theory of simple bending with the induced stress resultants, deformations and also about flitched beams and leaf springs.
C202.3	Predict sufficient knowledge to evaluate the deflection of beams by different methods and selection of method for determining slope and deflection.
C202.4	Predict the effect of torsion on shafts and springs and apply basic equation of torsion in design of circular shafts and different types of springs.
C202.5	Predict space truss and analyze the pin jointed plane and space frames

**CE8302- Fluid Mechanics (C203)**

C203.1	Gain knowledge about the properties of fluids like specific gravity, weight, volume and fluid statics problems in pressure measurement, forces on plane and buoyancy and flotation.
C203.2	Understand and solve the problems related to equation of motion, continuity equation and Bernoulli's theorem and its application.
C203.3	Gain knowledge about dimensional, model and prototype analysis of hydraulic structures.
C203.4	Solve the losses of flow in pipes by using Darcy and Weisbach equation.
C203.5	Understand the turbulent and boundary layer of flow to find the drag force, displacement, energy and momentum thickness.

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**CE8351 – Surveying (C204)**

C204.1	Gain knowledge about equipment's used in linear measurement, angular measurement and levelling.
C204.2	Work with theodolite and also understand the concepts of tacheometer to find the height and distance of the object.
C204.3	Understand the concept of different elements of geodetic measurements, control survey methodology and adjust the survey errors using various methods.
C204.4	Conduct astronomical surveying and familiar with methods to determine time, longitude, latitude and azimuth.
C204.5	Understand the concept and principle of modern surveying using advanced instruments total station and GPS.

**CE8391 - Construction Materials (C205)**

C205.1	Understand the properties of most common building materials such as stones, bricks and concrete blocks.
C205.2	Understand the typical and potential applications of lime, cement and aggregates and their properties.
C205.3	Understand the materials used in preparation of concrete and its mix design.
C205.4	Understand the applications of timber and other materials including their properties.
C205.5	Understand the importance of modern material for construction and their properties.

**CE8392 Engineering Geology (C206)**

C206.1	Understand the importance of various geological features, agencies and seismic zones in India.
C206.2	Gain a wide knowledge about the properties of various minerals and rock
C206.3	Gain knowledge about types and properties of rocks, their distribution and uses.
C206.4	Understand structure of folds, faults & joints and geophysical methods of investigation.
C206.5	Understand the application of geological investigation in projects such as dams, tunnels, bridges, roads, airport and harbour.

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**CE8311 Construction Materials Laboratory (C207)**

C207.1	Interpret and test the properties of fine aggregate as a construction material.
C207.2	Interpret and test the properties of coarse aggregate as a construction material.
C207.3	Interpret and test the properties of fresh concrete as a construction material.
C207.4	Interpret and test the properties of hardened concrete as a construction material.
C207.5	Interpret and test the properties of bricks, blocks and tiles as a construction material.

**CE8361 Surveying Laboratory (C208)**

C208.1	Acquired practical knowledge on handling survey instruments like Theodolite, Tachometer and Total station
C208.2	Determine the location of any point horizontally and vertically using Tachometry.
C208.3	Have a basic idea about foundation marking
C208.4	Record the reduced levels using various methods of levelling
C208.5	Possess knowledge about Survey field techniques

**HS8381 Interpersonal Skills / Listening and Speaking (C209)**

C209.1	Ability to listen and respond appropriately.
C209.2	Ability to participate in group discussions.
C209.3	Ability to make effective presentations.
C209.4	Ability to listen/view and comprehend different spoken discourses/excerpts different accents and to speak clearly in simple language.
C209.5	Ability to participate confidently and appropriately in formal and informal conversations.

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**MA8491 Numerical Methods (C210)**

C210.1	Have clear perception of the power of numerical techniques ideas and would be able to demonstrate the applications of these techniques to problems drawn from industry, management and other engineering fields.
C210.2	Gain knowledge of interpolation-forward and backward.
C210.3	Solve problems in differentiation and integration.
C210.4	solve various types of initial value partial differential Equations
C210.5	Solve various types of Seidal method problems.

**CE8401 Construction Techniques and Practices. (C211)**

C211.1	Understand the different construction techniques and structural systems from sub structure to super structure.
C211.2	Understand various techniques and practices such as masonry construction, flooring, and roofing.
C211.3	Know the methods and techniques involved in the construction of various types of substructures.
C211.4	Know the methods and techniques involved in the construction of various types of super structures.
C211.5	Select and understand the knowledge on operation and maintenance of different class of equipment for various engineering applications.

**CE8402 Strength Of Materials II (C212)**

C212.1	The different structural elements and the concept of strain energy methods and compute the deflection of determinate beams, frames and trusses using energy principles.
C212.2	Analyse propped cantilever, fixed beams and continuous beams using theorem of three moments equation for external loadings and support settlements.
C212.3	Understand the different end conditions of column and find the load carrying capacity of columns and stresses induced in columns in various methods. The students will also understand the stress action in cylinders and types of failure.
C212.4	Determine principal stresses and planes for an element in three dimensional state of stress and study various theories of failure
C212.5	Understand the critical condition of loading and determine the stresses due to unsymmetrical bending of beams, locate the shear centre and to find the stresses in curved beams.

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**CE8403 Applied Hydraulic Engineering. (C213)**

C213.1	Design of open channels of various cross sections including economical channel sections.
C213.2	Compute water profile at different conditions
C213.3	Apply energy concepts to flow in open channel sections, Calculate energy dissipation.
C213.4	Design turbines for the given data, and to know their operation characteristics under different operating conditions.
C213.5	Design pumps for the given data, and to know their operation characteristics under different operating conditions.

**CE8404 Concrete Technology (C214)**

C214.1	Understand the various requirements of cement, aggregates and water for making concrete
C214.2	Gain knowledge about the effect of admixtures on properties of concrete
C214.3	Understand the concept and procedure of mix design as per IS method
C214.4	Gain knowledge about the properties of concrete at fresh and hardened state
C214.5	Understand the importance and application of special concretes

**CE8491 Soil Mechanics (C215)**

C215.1	Understand the classification and composition of the soil, structural arrangements of clay mineralogy, phase relationships in soil and factors affecting field and lab compaction test.
C215.2	Analyse the effective stress with and without capillary rise, permeability of soil based on darcy law with laboratory explanation of constant and variable head, seepage concept on earthen dam and flow net properties with Laplace equations.
C215.3	Evaluate the stress distribution by Boussinesq, Westergaard and Newmark chart, compute the settlement of immediate and primary, Terzaghi one dimensional equation, derivation of square root method and logarithmic time fitting method.
C215.4	Analyse the shear strength of cohesionless and cohesion soil by analytical and graphical method. Computation of shear strength by laboratory methods nad factors influencing shear strength.
C215.5	Remember the infinite slopes and finite slopes, friction circle method, Use of stability number, Guidelines for location of critical slope surface in cohesive, slope protection measures.



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**CE8481 Strength of Materials Laboratory (C216)**

C216.1	Understand tension test on steel rod and compression test on wood.
C216.2	Understand double shear test on metal and torsion test on mild steel rod.
C216.3	Understand Impact test on metal specimen (Izod and Charpy) and Hardness test on metals (Rockwell and Brinell Hardness Tests)
C216.4	Understand Deflection test on metal beam and Compression test on helical spring
C216.5	Understand Deflection test on carriage spring

**CE8461 Hydraulic Engineering Laboratory (C217)**

C217.1	Compare and interpret the knowledge of theorems and principles in hydraulic engineering.
C217.2	Detect the measurement of flow in pipes and determine the friction and minor losses.
C217.3	Gain knowledge and assess the characteristics of pumps such as discharge and power efficiency.
C217.4	Gain knowledge and assess the characteristics of turbines discharge and power efficiency.
C217.5	Understand the concept of metacentre and determine the metacentric height of a floating object.

**HS8461 Advanced Reading and Writing (C218)**

C218.1	Function effectively as an individual in multi-disciplinary settings.
C218.2	Able to comprehend and write effective reports.
C218.3	Write different types of essays by understanding the elements and structure of a good essay.
C218.4	Write winning job application and project report, statement of purpose and apply these in their career.
C218.5	Read and evaluate texts critically and display critical thinking in various professional contexts.

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**CE8501 Design of Reinforced Cement Concrete Elements (C301)**

C301.1	Understand the type of loadings and various design methods for the design of RC elements and also able to classify the section for rectangular beams.
C301.2	Analysis and design of flanged beams by limit state method and design of beams for shear, bond and torsion.
C301.3	Understand the types of loads acting on the slab and also design the various types of slabs and staircase by limit state method.
C301.4	Design columns for axial, uniaxial and biaxial eccentric loadings.
C301.5	Understand the safe bearing capacity of soil and Design the footing by limit state method

**CE8502 Structural Analysis I (C302)**

C302.1	Understand strain energy method and able to analyze continuous beams, pin-jointed indeterminate plane frames, rigid plane frames by strain energy method.
C302.2	Predict sway and non-sway frames and can be able to analyze the continuous beams and rigid frames by slope deflection method.
C302.3	Understand moment distribution method and will be able to analyze continuous beams and rigid frames with and without sway using moment distribution method.
C302.4	Predict about flexibility method and will be able to analyze the indeterminate pin jointed plane frames, continuous beams and rigid frames by using matrix flexibility method.
C302.5	Predict about stiffness method and will be able to analyze continuous beams, pin jointed trusses and rigid plane frames by using stiffness matrix methods.

**EN8491 Water supply Engineering (C303)**

C303.1	Understanding of water quality criteria and standards and their relation to public health.
C303.2	Have an insight into the structure of drinking water supply systems, including water transport, treatment and distribution.
C303.3	Have the ability to design various functional units in treatment system
C303.4	Know the detailed treatment systems involved in treating water including advanced treatment units
C303.5	Gain the ability to design and evaluate water supply distribution systems and their alternatives on basis of chosen selection criteria.

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**CE8591 Foundation Engineering (C304)**

C304.1	Understand the site investigations, methods and sampling with respect to foundation buildings.
C304.2	Get knowledge on bearing capacity and testing methods to find safe bearing capacity of soil based on field investigation and laboratory tests.
C304.3	Know how to design types of footings based on loads on structure and bearing capacity of soil and seismic force.
C304.4	Get knowledge how to determine the load carrying capacity and settlement of pile foundation based on field investigation and soil properties.
C304.5	Gain knowledge on earth pressure analysis and stability analysis of retaining walls.

**GE8071 Disaster Management (C305)**

C305.1	Differentiate the types of disasters, causes and their impact on environment and society
C305.2	Assess vulnerability and various methods of risk reduction measures as well as mitigation.
C305.3	Draw the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management.
C305.4	Gain knowledge on Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster
C305.5	Gain knowledge on Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

**OAI551 Environment and Agriculture (C306)**

C306.1	Gain knowledge on the issues of with respect to land use and land scape changes. Students able to gain the knowledge about water quality, globalization and agro eco system.
C306.2	Understand the environmental impacts with respect to erosion and deposition problems in irrigation and mechanized agriculture etc.
C306.3	Gain knowledge on the basic concepts of Climate Change, Water scarcity and water shortage.
C306.4	Understand the ecosystem, ecological diversity, farming principles and forest fragmentation.
C306.5	Understand the alternate culture systems, Mega farms and vertical farms , Agricultural environment policies and its impacts

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**CE8511 Soil Mechanics Laboratory (C307)**

C307.1	Identify and classify soil based on standard geotechnical engineering practice.
C307.2	Determine index properties of the soil and its behaviour
C307.3	Capable of performing laboratory compaction and in place density tests for fill quality control.
C307.4	Gain knowledge of site specific field investigations including collection of soil samples for testing and observation of soil behaviour/ building damage.
C307.5	Determine engineering properties such as shear strength, compressibility and permeability by conducting appropriate tests.

**CE8512 Water and Waste Water Analysis Lab. (C308)**

C308.1	Calibrate and determine the pH, turbidity, conductivity and hardness of the wastewater by using electrode and titration method.
C308.2	Understand and determine the alkalinity, acidity, chloride, available and residual chlorine and coagulation present in the wastewater by using titration method and jar test apparatus.
C308.3	Calibrate and determine the phosphates, sulphates, iron and fluoride present in the waste water sample by using spectrophotometry method.
C308.4	Determine the oil and grease, suspended, volatile and fixed solids present in the waste water sample using vacuum pump and hot air oven.
C308.5	Understand and determine the dissolved oxygen, biological and chemical oxygen demand, microscopic examination, SVI and MPN index present in the waste water using BOD and COD digester, microscope and bacteria culture test.

**CE8513 Survey Camp (C309)**

C309.1	Gain a thorough knowledge of preparation of contours in different terrains
C309.2	Gain a good idea of calculation of earthwork excavation.
C309.3	Apply a variety of techniques about computing large areas
C309.4	Well versed with the concept of astronomical surveying
C309.5	Capable of drawing the features of different elements along the proposal road

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**CE8604 Highway Engineering (C313)**

C313.1	Understand the history of road development, cross section of road, classification of roads and factors influencing highway alignment.
C313.2	Design and analyse the geometrical curves of types of horizontal and vertical, concept of super elevation, transition curves and gradients.
C313.3	Understand the pavement components and design consideration of flexible and rigid pavements as per IRS guidelines.
C313.4	Remember the properties and testing of highway materials, Quality control measures and highway drainage.
C313.5	Evaluate the pavement, maintenance of pavement, roughness, present serviceability index and skid resistance.

**EN8592 Waste Water Engineering. (C314)**

C314.1	Estimate sewage generation and design sewer system including sewage pumping stations and gain required understanding on the characteristics and composition of sewage.
C314.2	Perform basic design of the unit operations and processes, understand the primary treatment of sewage and methods of treatment process based on the specific composition of sewage.
C314.3	Understand the secondary process of sewage treatment and methods of selection of treatment process based on the specific composition of sewage.
C314.4	Understand the standard methods for disposal of sewage and self-purification of streams
C314.5	Gain knowledge on sludge treatment, disposal and understand the products which are recoverable from sludge treatment process.

**CE8005 Air Pollution and Control Engineering (C315)**

C315.1	Understand the nature, characteristics and basic concepts of air pollutants.
C315.2	Design stacks and to study the plume characteristics in relation to atmosphere
C315.3	Design and evaluate air pollutant control equipment for particulate contaminants
C315.4	Design and evaluate air pollutant control equipment for gaseous contaminants
C315.5	Identify, formulate and solve air and noise pollution problems

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**CE8601 Design of Steel Structural Elements (C310)**

C310.1	Understand the concepts of various design philosophies
C310.2	Design common bolted and welded connections for steel structures
C310.3	Design tension members and understand the effect of shear lag.
C310.4	Understand the design concept of axially loaded columns and column base connections
C310.5	Understand specific problems related to the design of laterally restrained and unrestrained steel beams.

**CE8602 Structural Analysis II. (C311)**

C311.1	Understand about the moving load, influence lines and able to analyse determinate structures for moving loads
C311.2	Identify indeterminate structures and analyse indeterminate structures for moving loads
C311.3	Understand about the arches in structural forms and can able to analyse the arches.
C311.4	Predict cables and able to analyze the cables, suspension bridge
C311.5	Understand Upper and lower bound theorems and will be able to perform plastic analysis of indeterminate beams and frames.

**CE8603 Irrigation Engineering (C312)**

C312.1	Understand and evaluate the crop water requirements.
C312.2	Understand the methods and management of irrigation.
C312.3	Design the Impounding structures like gravity dam, earth dam and arch dam.
C312.4	Understand the canal irrigation including canal regulators, canal drop, canal outlet and canal lining.
C312.5	Understand the water management on optimization of water use, participatory irrigation management.

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**CE8611 Highway Engineering Laboratory. (C316)**

C316.1	Understand the test on the aggregates like specific gravity, los Angeles abrasion test and water absorption of aggregates.
C316.2	Understand specific gravity of bitumen and penetration test.
C316.3	Understand viscosity test and softening point test and ductility test.
C316.4	Understand stripping test and determination of binder content and Marshall stability and flow values of bituminous mixes.
C316.5	Understand field testing equipment like skid resistance tester / Benkelbeam etc.

**CE8612 Irrigation and Environmental Engineering Drawing (C317)**

C317.1	Gain knowledge in the design principles and drawing of tank components and impounding structures.
C317.2	Gain knowledge in the design principles and drawing of cross drainage works and canal regulation structures.
C317.3	Design the applications of environmental engineering drawings like municipal water treatment plants.
C317.4	Design the applications of environmental engineering drawings like sewage treatment plants.

**HS8581 - Professional Communication – (C318)**

C318.1	To enhance the students to make effective presentations.
C318.2	To help the students participate confidently in Group Discussions.
C318.3	To motivate and prepare the students to attend job interviews and be successful in their pursuit.
C318.4	To train and develop the adequate Soft Skills required for the workplace.
C318.5	Ability to interpret different genres of texts, infer implied meanings and evaluate it for ideas as well as for methods of presentation relevant in different situations.

  
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**CE8701 Estimation, Costing and Valuation Engineering (C401)**

C401.1	Prepare and articulate the estimation of quantities for various engineering structures.
C401.2	Organize the schedules and cost estimates for a construction project through codes and computer software.
C401.3	Prepare and articulate the specifications, reports and tender documents for a construction project.
C401.4	Understand and review the framework required to legally establish different types of contracts among stakeholders.
C401.5	Calculate the types of valuation required to assess engineering structures.

**CE8702 Railways, Airports, Docks and Harbour Engineering (C402)**

C402.1	Understand the elements of permanent way such as rails, sleepers, Ballast, rail fixtures and fastenings, selection of gauges, track stress, coning of wheels, creep in rails, defects in rails and to create the route alignment surveys, conventional and modern methods of geometric design of railway, gradient, super elevation, widening of gauge on curves and level crossings
C402.2	Evaluate the earthwork and stabilization of track on poor soil, track drainage, calculation of materials required for track laying, construction and maintenance of tracks in railway station and yards and passenger amenities, signalling.
C402.3	Remember the Air transport characteristics, airport classification of ICAO- airport planning and site selection of typical Airport layouts, case studies, parking and circulation area.
C402.4	Create the runway design orientation, Wind Rose Diagram, problems on basic and actual length, geometric design such as elements of taxiway design. Airport zones, passenger facilities and services like runway and taxiway markings.
C402.5	Remember the definition of basic terms of harbour, design of harbours, harbour layout and terminal facilities, coastal structures: Piers, breakwaters, wharves, jetties, Quays, spring fenders, dolphins and floating landing stage like Inland water transport and wave action on coastal Structures and coastal protection works, coastal regulation zone, 2011

**CE8703 Structural Design & Drawing (C403)**

C403.1	Design and draw reinforced concrete cantilever and counterfort type retaining walls.
C403.2	Understand the design and draw flat slab as per code provisions
C403.3	Understand the design and draw reinforced concrete and steel bridges
C403.4	Design and draw reinforced concrete and steel tanks.
C403.5	Design the various steel trusses and gantry girders.

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**EN8591 Municipal Solid Waste Management. (C404)**

C404.1	Understand the nature and characteristics of municipal solid wastes
C404.2	Understand the regulatory requirements regarding municipal solid waste management
C404.3	Plan waste minimisation and design storage, collection and transport
C404.4	Understand off site processing and equipments
C404.5	Understand disposal techniques of municipal solid waste

**OML751 Testing of Materials (C405)**

C405.1	The students will be able to understand the importance of material testing, Testing organizations, committee and standards.
C405.2	Students should be able to identify suitable testing technique to inspect industrial component.
C405.3	Students will be able to know the non-destructive testing methods.
C405.4	Students able to get knowledge in the material characterization testing.
C405.5	Students should know the ability to use the different technique and know its applications and limitations.

**CE8711 Creative and Innovative Project. (C406)**

C406.1	Come up with designs, fabrication or algorithms and programs expressing their ideas in a novel way.
C406.2	Develop a methodology to achieve the objectives..
C406.3	Demonstrate the novelty of the project through the results and outputs.

**CE8712 Industrial Training (C407)**

C407.1	Have a firsthand knowledge of practical problems in carrying out engineering tasks.
C407.2	Understand the problem solving methods in the field.
C407.3	Learn the text book knowledge in the field.

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**DEPARTMENT OF CIVIL ENGINEERING**

**GE8076 Professional Ethics in Engineering (C408)**

C408.1	Gain awareness on human values for professional excellence and stress management
C408.2	Gain knowledge on engineering ethics, moral issues & uses of ethical theories
C408.3	Understand the role of engineers as responsible experimenters along with courses of ethics in engineering field .
C408.4	Gain awareness of responsibilities of an engineer for safety and risk along with risk benefit analysis
C408.5	Acquire knowledge on global issues and able to apply ethical principles to resolve situations that arise in their professional lives

**CE8022 Prefabricated Structures. (C409)**

C409.1	Gain knowledge about design principles, layout of factory and stages of loading in precast of different elements and precast construction.
C409.2	Acquire knowledge about panel systems, slabs, connection used in precast construction and they will be in a position to design the elements.
C409.3	Gain knowledge about types of floor systems, stairs and roofs used in precast construction.
C409.4	Predict the types of walls used in precast construction, sealants, design of joints.
C409.5	Gain knowledge in behaviour of structural elements during abnormal loadings.

**CE8811 Project Work (C410)**

C410.1	Take up challenging practical problems and solve problems by formulating proper methodologies
C410.2	Gain knowledge of the civil engineering field and gain knowledge and be up to date with the latest technology.
C410.3	Find solutions for complex civil engineering problems.

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