MEENAKSHI COLLEGE OF ENGINEERING

No-12, Vembuli Amman Koil Street, West K.K Nagar,
Chennai - 600 078

DEPARTMENT OF CIVIL ENGINEERING

REGULATION-2017

COURSE OUTCOMES

SEMESTER I

COMMUNICATIVE ENGLISH (HS8151)

CO1	Read articles of a general kind in magazines and newspapers.
CO2	Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.
CO3	Comprehend conversations and short talks delivered in English
CO4	Write short essays of a general kind and personal letters and emails in English.

ENGINEERING MATHEMATICS – I (MA8151)

CO1	Use both the limit definition and rules of differentiation to differentiate functions.
CO2	Apply differentiation to solve maxima and minima problems.
CO3	Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.
CO4	Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.
CO5	Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.
CO6	Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.
CO7	Apply various techniques in solving differential equations.

ENGINEERING PHYSICS (PH8151)

CO1	The students will gain knowledge on the basics of properties of matter and its applications,
CO2	The students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,
CO3	The students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,
CO4	The students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes, and
CO5	The students will understand the basics of crystals, their structures and different crystal growth techniques.

ENGINEERING CHEMISTRY (CY8151)

CO1	The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

PROBLEM SOLVING AND PYTHON PROGRAMMING (GE8151)

CO1	Develop algorithmic solutions to simple computational problems
CO2	Read, write, execute by hand simple Python programs.
CO3	Structure simple Python programs for solving problems.
CO4	Decompose a Python program into functions.
CO5	Represent compound data using Python lists, tuples, dictionaries.
CO6	Read and write data from/to files in Python Programs.

ENGINEERING GRAPHICS (GE8152)

CO1	Familiarize with the fundamentals and standards of Engineering graphics
CO2	Perform freehand sketching of basic geometrical constructions and multiple views of objects.
CO3	Project orthographic projections of lines and plane surfaces.
CO4	Draw projections and solids and development of surfaces.
CO5	Visualize and to project isometric and perspective sections of simple solids.

PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY (GE8161)

CO1	Write, test, and debug simple Python programs.
CO2	Implement Python programs with conditionals and loops.
CO3	Develop Python programs step-wise by defining functions and calling them.
CO4	Use Python lists, tuples, dictionaries for representing compound data.
CO5	Read and write data from/to files in Python.

PHYSICS AND CHEMISTRY LABORATORY (BS8161)

CO1	Apply principles of elasticity, optics and thermal properties for engineering applications.
CO2	The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

SEMESTER II

TECHNICAL ENGLISH (HS8251)

CO1	Read technical texts and write area- specific texts effortlessly.
CO2	Listen and comprehend lectures and talks in their area of specialisation successfully.
CO3	Speak appropriately and effectively in varied formal and informal contexts.
CO4	Write reports and winning job applications.

ENGINEERING MATHEMATICS – II (MA8251)

CO1	Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.
CO2	Gradient, divergence and curl of a vector point function and related identities.
CO3	Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.
CO4	Analytic functions, conformal mapping and complex integration.
CO5	Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

PHYSICS FOR CIVIL ENGINEERING (PH8201)

CO1	The students will have knowledge on the thermal performance of buildings,
CO2	The students will acquire knowledge on the acoustic properties of buildings,
CO3	The students will get knowledge on various lighting designs for buildings,
CO4	The students will gain knowledge on the properties and performance of engineering materials, and
CO5	The students will understand the hazards of buildings.

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (BE8251)

CO1	Ability to identify the electrical components and explain the characteristics of electrical machines.
CO2	Ability to identify electronics components and understand the characteristics

ENVIRONMENTAL SCIENCE AND ENGINEERING (GE8291)

CO1	Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
CO2	Public awareness of environmental is at infant stage.
CO3	Ignorance and incomplete knowledge has lead to misconceptions
CO4	Development and improvement in std. of living has lead to serious environmental disasters

ENGINEERING MECHANICS (GE8292)

CO1	Illustrate the vectorial and scalar representation of forces and moments
CO2	Aanalyse the rigid body in equilibrium
CO3	Evaluate the properties of surfaces and solids
CO4	Calculate dynamic forces exerted in rigid body
CO5	Determine the friction and the effects by the laws of friction

ENGINEERING PRACTICES LABORATORY (GE8261)

CO1	Fabricate carpentry components and pipe connections including plumbing works.
CO2	Use welding equipments to join the structures.
CO3	Carry out the basic machining operations
CO4	Make the models using sheet metal works
CO5	Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings
CO6	Carry out basic home electrical works and appliances
CO7	Measure the electrical quantities
CO8	Elaborate on the components, gates, soldering practices.

COMPUTER AIDED BUILDING DRAWING (CE8211)

CO1	The students will be able to draft the plan, elevation and sectional views of the buildings, industrial structures, and framed buildings using computer softwares.

SEMESTER III

TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS (MA8353)

CO1	Understand how to solve the given standard partial differential equations.
CO2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
CO3	Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
CO4	Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
CO5	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

STRENGTH OF MATERIALS I (CE8301)

CO1	Understand the concepts of stress and strain, principal stresses and principal planes.
CO2	Determine Shear force and bending moment in beams and understand concept of theory of simple bending.
CO3	Calculate the deflection of beams by different methods and selection of method for determining slope or deflection.
CO4	Apply basic equation of torsion in design of circular shafts and helical springs,
CO5	Analyze the pin jointed plane and space trusses

FLUID MECHANICS (CE8302)

CO1	Get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.
CO2	Understand and solve the problems related to equation of motion.
CO3	Gain knowledge about dimensional and model analysis.
CO4	Learn types of flow and losses of flow in pipes.
CO5	Understand and solve the boundary layer problems.

SURVEYING (CE8351)

CO1	The use of various surveying instruments and mapping
CO2	Measuring Horizontal angle and vertical angle using different instruments
CO3	Methods of Leveling and setting Levels with different instruments
CO4	Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth
CO5	Concept and principle of modern surveying.

CONSTRUCTION MATERIALS (CE8391)

CO1	Compare the properties of most common and advanced building materials.
CO2	Understand the typical and potential applications of lime, cement and aggregates
CO3	Know the production of concrete and also the method of placing and making of concrete elements.
CO4	Understand the applications of timbers and other materials
CO5	Understand the importance of modern material for construction.

ENGINEERING GEOLOGY (CE8392)

CO1	Will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.
CO2	Will get basics knowledge on properties of minerals.
CO3	Gain knowledge about types of rocks, their distribution and uses.
CO4	Will understand the methods of study on geological structure.
CO5	Will understand the application of geological investigation in projects such as dams, tunnels, bridges, roads, airport and harbor

CONSTRUCTION MATERIALS LABORATORY (CE8311)

CO1	The students will have the required knowledge in the area of testing of construction materials and components of construction elements experimentally.

SURVEYING LABORATORY (CE8361)

CO1	Students completing this course would have acquired practical knowledge on handling basic survey instruments including Theodolite, Tacheometry, Total Station and GPS and have adequate knowledge to carryout Triangulation and Astronomical surveying including general field marking for various engineering projects and Location of site etc.

INTERPERSONAL SKILLS/LISTENING AND SPEAKING (HS8381)

CO1	Listen and respond appropriately.
CO2	Participate in group discussions
CO3	Make effective presentations
CO4	Participate confidently and appropriately in conversations both formal and informal

SEMESTER IV

NUMERICAL METHODS (MA8491)

CO1	Understand the basic concepts and techniques of solving algebraic and transcendental equations.
CO2	Appreciate the numerical techniques of interpolation and error approximations in various intervals in real life situations.
CO3	Apply the numerical techniques of differentiation and integration for engineering problems.
CO4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
CO5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

CONSTRUCTION TECHNIQUES AND PRACTICES (CE8401)

CO1	Know the different construction techniques and structural systems
CO2	Understand various techniques and practices on masonry construction, flooring, and roofing.
CO3	Plan the requirements for substructure construction.
CO4	Know the methods and techniques involved in the construction of various types of super structures
CO5	Select, maintain and operate hand and power tools and equipment used in the building construction sites.

STRENGTH OF MATERIALS II (CE8402)

CO1	Determine the strain energy and compute the deflection of determinate beams, frames and trusses using energy principles.
CO2	Analyze propped cantilever, fixed beams and continuous beams using theorem of three moment equation for external loadings and support settlements.
CO3	find the load carrying capacity of columns and stresses induced in columns and cylinders
CO4	Determine principal stresses and planes for an element in three dimensional state of stress and study various theories of failure
CO5	Determine the stresses due to Unsymmetrical bending of beams, locate the shear center, and find the stresses in curved beams.

APPLIED HYDRAULIC ENGINEERING (CE8403)

CO1	Apply their knowledge of fluid mechanics in addressing problems in open channels.
CO2	Able to identify a effective section for flow in different cross sections.
CO3	To solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
CO4	Understand the principles, working and application of turbines.
CO5	Understand the principles, working and application of pumps.

CONCRETE TECHNOLOGY (CE8404)

CO1	The various requirements of cement, aggregates and water for making concrete
CO2	The effect of admixtures on properties of concrete
CO3	The concept and procedure of mix design as per IS method
CO4	The properties of concrete at fresh and hardened state
CO5	The importance and application of special concretes.

SOIL MECHANICS (CE8491)

CO1	Classify the soil and assess the engineering properties, based on index properties.
CO2	Understand the stress concepts in soils
CO3	Understand and identify the settlement in soils.
CO4	Determine the shear strength of soil
CO5	Analyze both finite and infinite slopes.

STRENGTH OF MATERIALS LABORATORY (CE8481)

CO1	The students will have the required knowledge in the area of testing of materials and components of structural elements experimentally.

HYDRAULIC ENGINEERING LABORATORY (CE8461)

CO1	The students will be able to measure flow in pipes and determine frictional losses.
CO2	The students will be able to develop characteristics of pumps and turbines.

ADVANCED READING AND WRITING (HS8461)

CO1	Write different types of essays.
CO2	Write winning job applications.
CO3	Read and evaluate texts critically.
CO4	Display critical thinking in various professional contexts.

SEMESTER V

DESIGN OF REINFORCED CEMENT CONCRETE ELEMENT (CE8501)

CO1	Understand the various design methodologies for the design of RC elements.
CO2	Know the analysis and design of flanged beams by limit state method and sign of beams for shear, bond and torsion.
CO3	Design the various types of slabs and staircase by limit state method.
CO4	Design columns for axial, uniaxial and biaxial eccentric loadings.
CO5	Design of footing by limit state method.

STRUCTURAL ANALYSIS I (CE8502)

CO1	Analyze continuous beams, pin-jointed indeterminate plane frames and rigid plane frames by strain energy method
CO2	Analyse the continuous beams and rigid frames by slope defection method.
CO3	Understand the concept of moment distribution and analysis of continuous beams and rigid frames with and without sway.
CO4	Analyse the indeterminate pin jointed plane frames continuous beams and rigid frames using matrix flexibility method.
CO5	Understand the concept of matrix stiffness method and analysis of continuous beams, pin jointed trusses and rigid plane frames.

WATER SUPPLY ENGINEERING (EN8491)

CO1	An insight into the structure of drinking water supply systems, including water transport, treatment and distribution
CO2	The knowledge in various unit operations and processes in water treatment
CO3	An ability to design the various functional units in water treatment
CO4	An understanding of water quality criteria and standards, and their relation to public health
CO5	The ability to design and evaluate water supply project alternatives on basis of chosen criteria.

FOUNDATION ENGINEERING (CE8591)

CO1	Understand the site investigation, methods and sampling.
CO2	Get knowledge on bearing capacity and testing methods.
CO3	Design shallow footings.
CO4	Determine the load carrying capacity, settlement of pile foundation.
CO5	Determine the earth pressure on retaining walls and analysis for stability.

DISASTER MANAGEMENT (GE8071)

CO1	Differentiate the types of disasters, causes and their impact on environment and society
CO2	Assess vulnerability and various methods of risk reduction measures as well as mitigation.
CO3	Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management.

SOIL MECHANICS LABORATORY (CE8511)

CO1	Students are able to conduct tests to determine both the index and engineering properties of soils and to characterize the soil based on their properties

WATER AND WASTE WATER ANALYSIS LABORATORY (CE8512)

CO1	Quantify the pollutant concentration in water and wastewater
CO2	Suggest the type of treatment required and amount of dosage required for the treatment
CO3	Examine the conditions for the growth of micro-organisms

SEMESTER VI

DESIGN OF STEEL STRUCTURAL ELEMENTS (CE8601)

CO1	Understand the concepts of various design philosophies
CO2	Design common bolted and welded connections for steel structures
CO3	Design tension members and understand the effect of shear lag.
CO4	Understand the design concept of axially loaded columns and column base connections.
CO5	Understand specific problems related to the design of laterally restrained and unrestrained steel beams.

STRUCTURAL ANALYSIS II (CE8602)

CO1	Draw influence lines for statically determinate structures and calculate critical stress resultants.
CO2	Understand Muller Breslau principle and draw the influence lines for statically indeterminate beams.
CO3	Analyse of three hinged, two hinged and fixed arches.
CO4	Analyse the suspension bridges with stiffening girders
CO5	Understand the concept of Plastic analysis and the method of analyzing beams and rigid frames.

IRRIGATION ENGINEERING (CE8603)

CO1	Have knowledge and skills on crop water requirements.
CO2	Understand the methods and management of irrigation.
CO3	Gain knowledge on types of Impounding structures
CO4	Understand methods of irrigation including canal irrigation.
CO5	Get knowledge on water management on optimization of water use.

HIGHWAY ENGINEERING (CE8604)

CO1	Get knowledge on planning and aligning of highway.
CO2	Geometric design of highways
CO3	Design flexible and rigid pavements.
CO4	Gain knowledge on Highway construction materials, properties, testing methods
CO5	Understand the concept of pavement management system, evaluation of distress and maintenance of pavements.

WASTEWATER ENGINEERING (EN8592)

CO1	An ability to estimate sewage generation and design sewer system including sewage pumping stations.
CO2	The required understanding on the characteristics and composition of sewage, self purification of streams
CO3	An ability to perform basic design of the unit operations and processes that are used in sewage treatment
CO4	Understand the standard methods for disposal of sewage.
CO5	Gain knowledge on sludge treatment and disposal.

AIR POLLUTION AND CONTROL ENGINEERING (CE8005)

CO1	An understanding of the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management
CO2	Ability to identify, formulate and solve air and noise pollution problems
CO3	Ability to design stacks and particulate air pollution control devices to meet applicable standards.
CO4	Ability to select control equipments.
CO5	Ability to ensure quality, control and preventive measures.

HIGHWAY ENGINEERING LABORATORY (CE8611)

CO1	Student knows the techniques to characterize various pavement materials through relevant tests.

IRRIGATION AND ENVIRONMENTAL ENGINEERING DRAWING (CE8612)

CO1	The students after completing this course will be able to design and draw various units of Municipal water treatment plants and sewage treatment plants.

PROFESSIONAL COMMUNICATION (HS8581)

CO1	Make effective presentations
CO2	Participate confidently in Group Discussions.
CO3	Attend job interviews and be successful in them.
CO4	Develop adequate Soft Skills required for the workplace

SEMESTER VII

ESTIMATION, COSTING AND VALUATION ENGINEERING (CE8701)

CO1	Estimate the quantities for buildings,
CO2	Rate Analysis for all Building works, canals, and Roads and Cost Estimate.
CO3	Understand types of specifications, principles for report preparation, tender notices types.
CO4	Gain knowledge on types of contracts
CO5	Evaluate valuation for building and land.

RAILWAYS, AIRPORTS, DOCKS AND HARBOUR ENGINEERING (CE8702)

CO1	Understand the methods of route alignment and design elements in Railway Planning and Constructions.
CO2	Understand the Construction techniques and Maintenance of Track laying and Railway stations.
CO3	Gain an insight on the planning and site selection of Airport Planning and design.
CO4	Analyze and design the elements for orientation of runways and passenger facility systems.
CO5	Understand the various features in Harbours and Ports, their construction, coastal protection works and coastal Regulations to be adopted.

STRUCTURAL DESIGN AND DRAWING (CE8703)

CO1	Design and draw reinforced concrete Cantilever and Counterfort Retaining Walls
CO2	Design and draw flat slab as per code provisions
CO3	Design and draw reinforced concrete and steel bridges
CO4	Design and draw reinforced concrete and steel water tanks
CO5	Design and detail the various steel trusses and cantry girders

MUNICIPAL SOLID WASTE MANAGEMENT (EN8591)

CO1	Understanding of the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management.
CO2	Reduction, reuse and recycling of waste.
CO3	Ability to plan and design systems for storage, collection, transport, processing and disposal of municipal solid waste.
CO4	Knowledge on the issues on solid waste management from an integrated and holistic perspective, as well as in the local and international context.
CO5	Design and operation of sanitary landfill.

INDUSTRIAL TRAINING (CE8712)

CO1	The intricacies of implementation textbook knowledge into practice
CO2	The concepts of developments and implementation of new techniques

SEMESTER VIII

GEO-ENVIRONMENTAL ENGINEERING (CE8018)

CO1	Assess the contamination in the soil
CO2	Understand the current practice of waste disposal
CO3	To prepare the suitable disposal system for particular waste.
CO4	Stabilize the waste and utilization of solid waste for soil improvement.
CO5	Select suitable remediation methods based on contamination.

MAINTENANCE, REPAIR AND REHABILITATION OF STRUCTURES (CE8020)

CO1	The importance of maintenance and assessment method of distressed structures.
CO2	The strength and durability properties,their effects due to climate and temperature.
CO3	Recent development in concrete
CO4	The techniques for repair rand protection methods
CO5	Repair, rehabilitation and retrofitting of structures and demolition methods.

PROJECT WORK (CE8811)

CO1	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.