MALLA REDDY ENGINEERING COLLEGE
AND MANAGEMENT SCIENCES
(Approved by AICTE, New Delhi and Affiliated to JNTUH, Hyderabad)
Kistapur, Medchal, Medchal Dist – 501 401, Telangana – India.
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Course Outcomes

Branch: Civil Engineering **Regulations: R-22**

S.No	Year / Sem	Course Code	Course Name	Course Outcomes
1	I/I	MA101BS	Matrices and Calculus	**CO1:** Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
				CO2: Find the Eigenvalues and Eigen vectors and Reduce the quadratic form to canonical form using orthogonal transformations.
				CO3: Solve the applications on the mean value theorems and Evaluate the improper integrals using Beta and Gamma functions
				CO4: Find the extreme values of functions of two variables with/ without constraints.
				CO5: Evaluate the multiple integrals and apply the concept to find areas, volumes
2	I/I	PH102BS	Applied Physics	**CO1:** Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
				CO2: Identify the role of semiconductor devices in science and engineering Applications.
				CO3: Explore the fundamental properties of dielectric, magnetic materials and energy for their applications.
				CO4: Appreciate the features and applications of Nanomaterials.
				CO5: Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

3	I/I	**ME103ES**	**C Programming and Data Structures**	**CO1:** Understand the various steps in Program development. 2. Explore the basic concepts in C Programming Language.
				CO2: Develop modular and readable C Programs
				CO3: Understand the basic concepts such as Abstract Data Types, Linear and Non-Linear Data structures.
				CO4: Apply data structures such as stacks, queues in problem solving
				CO5: To understand and analyze various searching and sorting algorithms.
4	I/I	ME104ES	**Engineering Workshop**	**CO1:** Study and practice on machine tools and their operations • CO 2:
				CO2: Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
				CO3: Identify and apply suitable tools for different trades of Engineering processes
				CO4: Identify and apply suitable tools for drilling, material removing, measuring and chiseling.
				CO5: Apply basic electrical engineering knowledge for house wiring practice.
5	I/I	**EN105HS**	**English for Skill Enhancement**	**CO1:** Understand the importance of vocabulary and sentence structures.
				CO2: Choose appropriate vocabulary and sentence structures for their oral and written communication. 3.
				CO3: Demonstrate their understanding of the rules of functional grammar and Develop comprehension skills from the known and unknown passages.
				CO4: Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.
				CO5: Acquire basic proficiency in reading and writing modules of English
6	I/I	**CE106ES**	**Elements of Civil**	**CO1:** Understands the method and ways of investigations required for Civil Engineering

			Engineering	projects
				CO2: Identify the various rocks depending on geological
				CO3: Identify the various minerals depending on geological
				CO4: Classifications Evaluate the properties of cement, fine and coarse aggregates
				CO5: Determine its suitability for construction.
7	I/I	**PH107BS**	**Applied Physics Laboratory**	**CO1:** Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
				CO2: Appreciate quantum physics in semiconductor devices and optoelectronics.
				CO3: Gain the knowledge of applications of dielectric constant.
				CO4: Understand the variation of magnetic field and behavior of hysteresis curve.
				CO5: Carried out data analysis
8	I/I	**ME108ES**	**C Programming and Data Structures Laboratory**	**CO1:** Develop modular and readable C Programs
				CO2: Solve problems using strings, functions
				CO3: Handle data in files
				CO4: Implement stacks, queues using arrays, linked lists.
				CO5: To understand and analyze various searching and sorting algorithms.
9	I/I	**EN109HS**	**English Language and Communication Skills Laboratory**	**CO1:** Understand the nuances of English language through audio- visual experience
				CO2: group activities
				CO3: Neutralize their accent for intelligibility
				CO4: Speak with clarity which in turn enhances their employability skills
				CO5: Speak with confidence which in turn enhances their employability skills
10	I/I	***MC110**	**Environmental Science**	**CO1:** The Engineering graduate will understand technologies on the basis of ecological principles and environmental regulations which in turn help in sustainable development

				CO2: The Engineering graduate will evaluate technologies on the basis of ecological principles and environmental regulations which in turn help in sustainable development
				CO3: The Engineering graduate will develop technologies on the basis of ecological principles and environmental regulations which in turn help in sustainable development
				CO4: To educate the students regarding environmental issues and problems at local, national and international level.
				CO5: To know more sustainable way of living
11	I/II	**MA201BS**	**Ordinary Differential Equations and Vector Calculus**	**CO1:** Identify whether the given differential equation of first order is exact or not
				CO2: Solve higher differential equation and apply the concept of differential equation to real world problems.
				CO3: Use the Laplace transforms techniques for solving ODE's.
				CO4: Evaluate the line, surface and volume integrals
				CO5: converting the line, surface and volume integrals from one to another
12	I/II	**CH202BS**	**Engineering Chemistry**	**CO1:** Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
				CO2: The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
				CO3: They can learn the fundamentals and general properties of polymers and other engineering materials.
				CO4: They can predict potential applications of chemistry
				CO5: practical utility in order to become good engineers and entrepreneurs.
13	I/II	**ME203ES**	**Computer Aided Engineering**	**CO1:** Apply computer aided drafting tools to create 2D and 3D objects
				CO2: sketch conics and different types of solids

			Graphics	**CO3:** Appreciate the need of Sectional views of solids and Development of surfaces of solids
				CO4: Read and interpret engineering drawings
				CO5: Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting
14	I/II	**CE204ES**	**Applied Mechanics**	**CO1:** Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces.
				CO2: Solve problem of bodies subjected to friction.
				CO3: Find the location of centroid and calculate moment of inertia of a given section.
				CO4: Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion.
				CO5: Understand rigid body motion.
15	I/II	**CE205PC**	**Surveying**	**CO1:** Calculate angles, distances and levels
				CO2: Identify data collection methods and prepare field notes
				CO3: Understand the working principles of survey instruments
				CO4: Estimate measurement errors and apply corrections
				CO5: Interpret survey data and compute areas and volumes
16	I/II	**CE206ES**	**Python Programming Laboratory**	**CO1:** Develop the application specific codes using python.
				CO2: Understand Strings, Lists, Tuples and Dictionaries in Python
				CO3: Verify programs using modular approach, file I/O
				CO4: Verify programs using, Python standard library
				CO5: Implement Digital Systems using Python
17	I/II	**CH207BS**	**Engineering**	**CO1:** Determination of parameters like hardness of water and rate of corrosion of mild

			Chemistry Laboratory	steel in various conditions.
				CO2: Able to perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
				CO3: Students are able to prepare polymers like bakelite and nylon-6.
				CO4: Estimations saponification value, surface tension
				CO5: viscosity of lubricant oils
18	I/II	**CE208PC**	**Surveying Laboratory - I**	**CO1:** Student will be able to prepare Map and Plan for required site with suitable scale.
				CO2: Student will be able to prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.
				CO3: Student will be able to judge which type of instrument to be used for carrying out survey for a Particular Area and estimate the area.
				CO4: Student will be able to judge the profile of ground by observing the available existing contour map.
				CO5: Student will be able to plot traverses / sides of building and determine the location of points present on field on a piece of paper
19	**II/I**	**CE306PC**	**SURVEYING LABORATORY - I**	**CO1:** Student will be able to prepare Map and Plan for required site with suitable scale.
				CO2: Student will be able to prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.
				CO3: Student will be able to judge which type of instrument to be used for carrying out survey for a Particular Area and estimate the area.
				CO4: Student will be able to judge the profile of ground by observing the available existing contour map.
				CO5: Student will be able to plot traverses / sides of building and determine the location of points present on field on a piece of paper

20	**II/I**	**MA301BS**	**PROBABILITY AND STATISTICS**	**CO1:** Apply the concepts of probability and distributions to some case studies.
				CO2: Correlate the concepts of one unit to the concepts in other units.
				CO3: Students would be able to identify distribution in certain realistic situation. It is mainly useful for circuit as well as non-circuit branches of engineering. Also able to differentiate among many random variables Involved in the probability models. It is quite useful for all branches of engineering.
				CO4: The student would be able to calculate mean and proportions (large sample) and to make Important decisions from few samples which are taken out of unmanageably huge populations.
				CO5: The student would be able to calculate mean and proportions (small sample) and to make Important decisions from few samples which are taken out of unmanageably huge populations
21	**II/I**	**CE302PC**	**BUILDING MATERIALS, CONSTRUCTION AND PLANNING**	**CO1:** Understand the different construction material.
				CO2: Understand the different component parts of building and their construction practices and techniques
				CO3: Understand the functional requirements to be considered for design and construction of building
				CO4: Identify the factors to be considered in planning and construction of buildings
				CO5: Plan a building based on the factors and principles of planning
22	**II/I**	**CE303PC**	**ENGINEERING GEOLOGY**	**CO1:** Site characterization and how to collect, analyze, and report geologic data using standards in engineering practice.
				CO2: The fundamentals of the engineering properties of Earth materials and fluids.
				CO3: Rock mass characterization and the mechanics of planar rock slides and topples.
				CO4: Understand the structure and composition of earth.

				CO5: Understand how precious earth natural resources in the management of construction industry and mineral based industries
23	**II/I**	**CE304PC**	**STRENGTH OF MATERIALS – I**	**CO1:** Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, related to the strength of structured and mechanical components.
				CO2: Recognize various types loads applied on structural components of simple framing geometries and understand the nature of internal stresses that will develop within the components.
				CO3: To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading.
				CO4: Analyze various situations involving structural members subjected to plane stresses by application of Mohr's circle of stress.
				CO5: Analyze the principal stresses and strains by recognize the orientation of principal planes and develops an understanding of various theories of failures.
24	**II/I**	**CE305PC**	**FLUID MECHANICS**	**CO1:** Understand the broad principles of fluid statics, kinematics and dynamics.
				CO2: Understand definitions of the basic terms used in fluid mechanics and characteristics of fluids and its flow.
				CO3: Understand classifications of fluid flow.
				CO4: Be able to apply the continuity, momentum and energy principles.
				CO5: Understand various frictional losses in pipes and measurement of flow using notches & weirs.
25	**II/I**	**CE306PC**	**SURVEYING LABORATORY – II**	**CO1:** Prepare Map and Plan for required site with suitable scale.
				CO2: Prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.

				CO3: Judge which type of instrument to be used for carrying out survey for a Particular Area and estimate the area.
				CO4: Judge the profile of ground by observing the available existing contour map.
				CO5: Determine latitudes and departures for all segments of a closed loop traverse check for closure error, and express the results in the form of the standard accuracy ratio, i.e. accuracy ratio.
26	**II/I**	**CE307PC**	**STRENGTH OF MATERIALS LABORATORY**	**CO1:** Demonstrate the basic knowledge of the mechanical properties of materials
				CO2: Determine the yield stress, ultimate tensile stress, percentage elongation of steel, compressive strength of brick and concrete
				CO3: Determine the ultimate shear stress, modulus of elasticity of steel
				CO4: Determine the stiffness of the close coiled helical spring and hardness number of mild steel, brass, copper and aluminum.
				CO5: Determine the modulus of rigidity and impact strength of steel.
27	**II/I**	**CE308PC**	**COMPUTER AIDED DRAFTING LABORATORY**	**CO1:** Plan buildings as per NBC. •
				CO2: Use different Commands of selected drafting software to draw Conventional signs and brick bonds, Plan, Section and Elevation of buildings
				CO3: Draw section and elevation of panelled doors and trusses.
				CO4: Draw and detail the different components of Stair cases.
				CO5: Develop and draw single /two storey residential building and public building as per the building by-laws.
28	**II/I**	***MC309**	**CONSTITUTION OF INDIA**	**CO1:** Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
				CO2: Discuss the intellectual origins of the framework of argument that informed the

				conceptualization of social reforms leading to revolution in India.
				CO3: Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
				CO4: Discuss the passage of the Hindu Code Bill of 1956.
				CO5: Gain knowledge on roles and functioning of Election Commission.
29	**II/II**	**CE401PC**	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**	**CO1:** To analyze and solve electrical circuits using network laws and theorems.
				CO2: To understand and analyze basic Electric and Magnetic circuits
				CO3: To study the working principles of Electrical Machines
				CO4: To introduce components of Low Voltage Electrical Installations
				CO5: To identify and characterize diodes and various types of transistors
30	**II/II**	**CE402PC**	**CONCRETE TECHNOLOGY**	**CO1:** Determine the properties of concrete ingredients i.e., cement, sand, coarse aggregate by conducting different tests.
				CO2: Recognize the effects of the rheology and early age properties of concrete on its long-term behavior.
				CO3: Apply the use of various chemical admixtures and mineral additives to design cement-based materials with tailor-made properties
				CO4: Use advanced laboratory techniques to characterize cement-based materials.
				CO5: Perform mix design and engineering properties of special concretes such as high-performance concrete, self-compacting concrete, and fiber reinforced concrete.
31	**II/II**	**CE403PC**	**STRENGTH OF MATERIALS**	**CO1:** Describe the concepts and principles, understand the theory of elasticity, and perform calculations, relative to the strength of structures and mechanical components in particular to torsion and direct compression.
				CO2: To evaluate the strains and deformation that will result due to the elastic stresses

				developed within the materials for simple types of loading.
				CO3: Analyze strength and stability of structural members subjected to Direct, and Direct and Bending stresses.
				CO4: Understand and evaluate the shear center and unsymmetrical bending.
				CO5: Design simple bars, beams, and circular shafts for allowable stresses and loads/demonstrate the significance and concept of shear centre
32	**II/II**	**CE404PC**	**HYDRAULICS AND HYDRAULIC MACHINERY**	**CO1:** Apply their knowledge of fluid mechanics in addressing problems in open channels and hydraulic machinery.
				CO2: Understand and solve problems in uniform, gradually and rapidly varied flows in open channel in steady state conditions.
				CO3: Apply dimensional analysis and to differentiate the model, prototype and similitude conditions for practical problems.
				CO4: Get the knowledge on different hydraulic machinery devices and its principles that will be utilized in hydropower development and for other practical usages.
				CO5: Learn about different types of pumps, their working and various engineering characteristics along with the basic concepts related to hydropower plant.
33	**II/II**	**CE405PC**	**STRUCTURAL ANALYSIS – I**	**CO1:** An ability to apply knowledge of mathematics, science, and engineering
				CO2: Analyse the statically indeterminate bars and continuous beams
				CO3: Draw strength behaviour of members for static and dynamic loading.
				CO4: Calculate the stiffness parameters in beams and pin jointed trusses.
				CO5: Understand the indeterminacy aspects to consider for a total structural system.
34	**II/II**	**CE406PC**	**HYDRAULICS AND HYDRAULIC**	**CO1:** Describe the basic measurement techniques of fluid mechanics and its appropriate application
				CO2: Interpret the results obtained in the laboratory for various experiments.

			MACHINERY LABORATORY	**CO3:** Discover the practical working of Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
				CO4: Compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions.
				CO5: Write a technical laboratory report
35	**II/II**	**CE407PC**	**BASIC ELECTRICAL &ELECTRONICS ENGINEERING LABORATORY**	**CO1:** To analyze and solve electrical circuits using network laws and theorems.
				CO2: To understand and analyze basic Electric and Magnetic circuits
				CO3: To study the working principles of Electrical Machines
				CO4: To introduce components of Low Voltage Electrical Installations
				CO5: To identify and characterize diodes and various types of transistors.
36	**II/II**	**CE408PC**	**CONCRETE TECHNOLOGY LABORATORY**	**CO1:** Perform various tests required to assess the characteristics of cement
				CO2: 2. Test and evaluate the properties of fine and coarse aggregates and determine its suitability for construction.
				CO3: Evaluate the fresh and hardened properties of concrete.
				CO4: Design the concrete mix for required strength and test its performance characteristics
				CO5: Get good idea about the water cement ratio
37	**II/II**	***MC410**	**GENDER SENSITIZATION LABORATORY**	**CO1:** Students will have developed a better understanding of important issues related to gender in contemporary India.
				CO2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
				CO3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.

				CO4: Students will acquire insight into the gendered division of labor and its relation to politics and economics.
				CO5: Men and women students and professionals will be better equipped to work and live together as equals.
38	III/I	**CE501PC**	**STRUCTURAL ANALYSIS – II**	**CO1:** Analyze the two hinged arches.
				CO2: Solve statically indeterminate beams and portal frames using classical methods.
				CO3: Sketch the shear force and bending moment diagrams for indeterminate structures.
				CO4: Analyze the structure using Flexibility method.
				CO5: Formulate the stiffness matrix and analyze the beams by matrix methods.
39	III/I	**CE502PC**	**GEOTECHNICAL ENGINEERING**	**CO1:** Characterize and classify the soils.
				CO2: Estimate seepage, stresses under various loading conditions.
				CO3: Understand laboratory and field compaction characteristics.
				CO4: Analyze the compressibility of the soils.
				CO5: Understand the strength of soils under various drainage conditions.
40	III/I	**CE503PC**	**STRUCTURAL ENGINEERING – I (RCC)**	**CO1:** Compare and Design the singly reinforced, doubly reinforced and flanged sections.
				CO2: Design the axially loaded, uniaxial and biaxial bending columns.
				CO3: Classify the footings and Design the isolated square, rectangular and circular footings.
				CO4: Distinguish and Design the one-way and two-way slabs
				CO5: To familiarize about Foundations and their Design.
41	III/I	**SM504MS**	**BUSINESS ECONOMICS AND**	**CO1:** The students will understand the various Forms of Business and the impact of economic variables on the Business.
				CO2: The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt.

			FINANCIAL ANALYSIS	**CO3:** The Students can study the firm's financial position by analysing the Financial Statements of a Company.
				CO4: Describe the significance of the project management, capital budgeting, estimation of the projects through capital budgeting methods for choosing the best and optimal projects.
				CO5: Provide the optimal decisions for acquiring the knowledge on financial accounting, management accounting and ratio analysis
42	III/I	**CE505PC**	**TRANSPORTATION ENGINEERING**	**CO1:** An ability to apply the knowledge of mathematics, science and engineering in the areas of traffic engineering, highway development and maintenance.
				CO2: An ability to design, conduct experiments to assess the suitability of the highway materials like soil, bitumen, aggregates and a variety of bituminous mixtures. Also the students will develop the ability to interpret the results and assess the suitability of these materials for construction of highways.
				CO3: An ability to design flexible and rigid highway pavements for varying traffic compositions as well as soil subgrade and environmental conditions using the standards stipulated by Indian Roads Congress.
				CO4: An ability to evaluate the structural and functional conditions of in-service highway pavements and provide solution in the form of routine maintenance measures or designed overlays using Indian Roads congress guidelines.
				CO5: An ability to assess the issues related to road traffic and provide engineering solutions supported with an understanding of road user psychological and behavioral patterns.
43	III/I	**CE506PC**	**HYDROLOGY AND WATER RESOURCES**	**CO1:** Understand the different concepts and terms used in engineering hydrology.
				CO2: To identify and explain various formulae used in estimation of surface and Ground water hydrology components

			ENGINEERING	**CO3:** Demonstrate their knowledge to connect hydrology to the field requirement.
				CO4: Gain knowledge and skills on drought management and rain water harvesting.
				CO5: Gain knowledge on Hydroelectric Power and Water Resources Planning and Development
44	III/I	**CE507PC**	**TRANSPORTATION ENGINEERING LABORATORY**	**CO1:** Categorize the test on materials used for Bituminous constructions.
				CO2: Evaluate the tests performed for Bitumen and mixes.
				CO3: To prepare a laboratory report
				CO4: Find out peak hour traffic & peak time for a given location on the road.
				CO5: Calculate design speed, maximum speed & minimum speed limits of a location through spot speed.
45	III/I	**CE508PC**	**GEOTECHNICAL ENGINEERING LABORATORY**	**CO1:** Determine the specific gravity of soil fraction by density bottle and pycnometer.
				CO2: Determine the in-situ density of soil by the core cutter and sand replacement method.
				CO3: Obtain knowledge to determine the grain size distribution of coarse grained soil by dry sieve analysis.
				CO4: Gain knowledge to classify the given fine grained soil based on its plasticity characteristics.
				CO5: Determine the coefficient of permeability of soil and also evaluate the shear parameters of soil by various methods.
46	III/I	***MC509**	**INTELLECTUAL PROPERTY RIGHTS**	**CO1:** Distinguish and Explain various forms of IPRs.
				CO2: Identify criteria to fit one's own intellectual work in particular form of IPRs.
				CO3: Apply statutory provisions to protect particular form of IPRs.
				CO4: Appraise new developments in IPR laws at national and international level
				CO5: Understand the concepts of Intellectual property to protect the traditional knowledge

47	III/II	**CE601PC**	**ENVIRONMENTAL ENGINEERING**	**CO1:** Assess characteristics of water and wastewater.
				CO2: Estimate quantities of water and wastewater and plan conveyance components.
				CO3: Design components of water and wastewater treatment plants.
				CO4: Be conversant with issues of air pollution and control.
				CO5: Identify the techniques of disposal methods of waste water and sludge.
48	III/II	**CE602PC**	**FOUNDATION ENGINEERING**	**CO1:** understand the principles and methods of Geotechnical Exploration
				CO2: assess the stability of slopes
				CO3: calculate lateral earth pressures and check the stability of retaining walls
				CO4: analyse and design the shallow and deep foundations
				CO5: Recognize different types of well foundations and understand the design criteria.
49	III/II	**CE603PC**	**STRUCTURAL ENGINEERING – II (STEEL STRUCTURES)**	**CO1:** Analyze the tension members, compression members.
				CO2: Design the tension members, compression members and column bases and joints and connections.
				CO3: Analyze and Design the beams including built-up sections and beam and connections.
				CO4: Identify and Design the various components of welded plate girder including stiffeners
				CO5: Design of Roof Truss and its joints, end bearings.
50	III/II	**CE611PE**	**GREEN BUILDING TECHNOLOGIES (PE – I)**	**CO1:** Relate safety to Green Technology.
				CO2: Identify Renewable Energy systems.
				CO3: Understand the impact of continued use of non-renewable energy resources.
				CO4: Investigate renewable energy systems.
				CO5: Understand energy consumption, efficiency & waste management.

51	III/II	**CS600OE**	**ENTREPRENEURSHIP**	**CO1:** to learn the basics of Entrepreneurship and
				CO2: to learn entrepreneurial development which will help them to provide vision for their own Start-up.
				CO3: Students identify and secure customers, stakeholders, and team members through networks, primary customer research, and competitive and industry analyses in order to prioritize and pursue an initial target market in real-world projects.
				CO4: Students are able to create presentations and business plans that articulate and apply financial, operational, organizational, market, and sales knowledge to identify paths to value creation
				CO5: Students increase their awareness and deliberately practice the skills and disciplines necessary to increase confidence and agency
52	III/II	**CE604PC**	**ENVIRONMENTAL ENGINEERING LABORATORY**	**CO1:** Understand about the equipment used to conduct the test procedures.
				CO2: Perform the experiments in the lab.
				CO3: Examine and Estimate water, waste water, air and soil Quality.
				CO4: Compare the water, air quality standards with prescribed standards set by the local governments.
				CO5: Develop a report on the quality aspects of the environment.
53	III/II	**CE605PC**	**COMPUTER AIDED DESIGN LABORATORY**	**CO1:** Model the geometry of real-world structure Represent the physical model of structural element/structure.
				CO2: Perform analysis.
				CO3: Interpret from the Post processing results.
				CO4: Design the structural elements and a system as per IS Codes
				CO5: The students will be able to analyze and design the simple structural members using computer software’s.

54	III/II	**EN508HS**	**ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY**	**CO1:** To improve the students' fluency in English, with a focus on vocabulary.
				CO2: To enable them to listen to English spoken at normal conversational speed by educated English speakers.
				CO3: To respond appropriately in different socio-cultural and professional contexts.
				CO4: To communicate their ideas relevantly and coherently in writing.
				CO5: To prepare the students for placements.
55	III/II	***MC609**	**ENVIRONMENTAL SCIENCE**	**CO1:** The Engineering graduate will understand technologies on the basis of ecological principles and environmental regulations which in turn help in sustainable development
				CO2: The Engineering graduate will evaluate technologies on the basis of ecological principles and environmental regulations which in turn help in sustainable development
				CO3: The Engineering graduate will develop technologies on the basis of ecological principles and environmental regulations which in turn help in sustainable development
				CO4: To educate the students regarding environmental issues and problems at local, national and international level.
				CO5: To know more sustainable way of living
56	IV/I	**CE701PC**	**QUANTITY SURVEY & VALUATION**	**CO1:** Understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.
				CO2: Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.
				CO3: Understand how competitive bidding works and how to submit a competitive bid proposal.
				CO4: Understand objectives functions and types of organizations in construction managements.
				CO5: Understand the types of contracts and process of bidding.

57	IV/I	**CE702PC**	**PROJECT MANAGEMENT**	**CO1:** Importance of Project Management.
				CO2: Project Planning
				CO3: Project Execution and implementation
				CO4: Significance of teams in projects.
				CO5: Project evaluation techniques.
58	IV/I	**CE721PE**	**PRESTRESSED CONCRETE**	**CO1:** Acquire the knowledge of evolution of process of prestressing.
				CO2: Acquire the knowledge of various prestressing techniques.
				CO3: Acquire the knowledge of loss of prestress in various prestressing techniques.
				CO4: Develop skills in analysis of prestressed structural elements.
				CO5: design of prestressed structural elements as per the IS codal provisions.
59	IV/I	**CE732PE**	**Ground Improvement Techniques**	**CO1:** Understand the various ground improvement methods.
				CO2: Assess different compaction methods for ground modification.
				CO3: Design dewatering systems to reduce the settlements.
				CO4: Comprehend stabilizations with chemical and grouting techniques.
				CO5: Understand the principles of soil reinforcement and confinement in engineering constructions.
60	IV/I	**CE743PE**	**Ground Water Hydrology**	**CO1:** Identify different fundamental equations and concepts as applied in the Groundwater studies.
				CO2: Discuss and derive differential equation governing groundwater flow in three dimensions.
				CO3: To solve groundwater mathematical equations and analyze pumping tests in steady and nonsteady flow cases.
				CO4: Distinguish the saline water intrusion problem in costal aquifers.

				CO5: Understand the saline water intrusion problem in costal aquifers.
61	IV/I	**MM700OE**	**ENGINEERING MATERIALS (Open Elective – II)**	**CO1:** To select and design components based on their properties and requirements.
				CO2: Awareness about the electrical and electronic materials.
				CO3: Knowledge about bio materials like, titanium and stainless steel based.
				CO4: Interpret the vitality of phase rule in metallurgy and application of phase rule to one and two component systems.
				CO5: Understand the relationships between macroscopic material properties and microscopic structures.
62	IV/I	**CE703PC**	**Civil Engineering Software Laboratory**	**CO1:** Understand the features and capabilities of the software.
				CO2: Apply fundamental principles in problem solving using software tools.
				CO3: Apply the software algorithm in the domain area.
				CO4: Develop solution for a range of problem of civil engineering using software tools
				CO5: prepare technical report
63	IV/II	**CE853PE**	**Air pollution**	**CO1:** Identify sampling and analysis techniques for air quality assessment.
				CO2: Describe the plume behavior for atmospheric stability conditions.
				CO3: Apply plume dispersion modelling
				CO4: assess the Concentrations Of Pollutants.
				CO5: Design air pollution controlling devices.
64	IV/II	**CE861PE**	**Airports, Railways and Waterways**	**CO1:** An ability to design of runways and taxiways.
				CO2: An ability to design the infrastructure for large and small airports.
				CO3: An ability to design Super elevation and transition curve for railway horizontal curves.
				CO4: An ability to design various crossing sturnout and signals in Railway Projects.

				CO5: An ability plan the harbours and ports projects including the infrastructure required for new ports and harbours.
65	IV/II	**ME800OE**	**Non-Conventional Sources of energy**	**CO1:** Identify renewable energy sources and their utilization.
				CO2: Understand the basic concepts of solar radiation and analyze the working of solar and thermal systems
				CO3 Understand principles of energy conversion from alternate sources including wind, geothermal, ocean, biomass, biogas and hydrogen.
				CO4: Understand the concepts and applications of fuel cells, thermoelectric convertor and MHD generator.
				CO5: Identify methods of energy storage for specific applications