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.
Mobile No. 9346009393, 9346009494, 9346009595, Website: www.mrem.ac.in

# Course Outcomes

**Branch: Civil Engineering** **Regulations: R-18**

| S.No | Year / Sem | Course Code | Course Name | Course Outcomes |
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| 1 | I-I | MA101BS | MATHEMATICS - I | **CO1:**Find the Eigen values and Eigen vectors |
| | | | | **CO2:**Write the matrix representation of a set of linear equations and to analyse the solution |
| | | | | **CO3:**system of equations |
| | | | | **CO4:**Reduce the quadratic form to canonical form using orthogonal transformations. |
| | | | | **CO5:**Analyse the nature of sequence and series. |
| 2 | I-I | PH102BS | ENGINEERING PHYSICS | **CO1:**The knowledge of Physics relevant to engineering is critical for converting ideas into technology. |
| | | | | **CO2:**An understanding of Physics also helps engineers understand the working and limitations of existing devices and techniques, which eventually leads to new innovations and improvements. |
| | | | | **CO3:**In the present course, the students can gain knowledge on the mechanism of physical bodies upon the action of forces on them, the generation, transmission and the detection of the waves, Optical Phenomena like Interference, diffraction, the principles of lasers and Fibre Optics. |
| | | | | **CO4:**Various chapters establish a strong foundation on the different kinds of characters of several materials and pave a way for them to use in at various technical and engineering |

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| | | | | applications. |
| | | | | **CO5:**Analyze the electromagnetic properties in a current carrying conductor using Stewart Gee's experiment |
| **3** | **I-I** | **CS106ES** | **PROGRAMMING FOR PROBLEM SOLVING** | **CO1:**To write algorithms and to draw flowcharts for solving problems. |
| | | | | **CO2:**To convert the algorithms/flowcharts to C programs. |
| | | | | **CO3:**To code and test a given logic in C programming language. |
| | | | | **CO4:**To decompose a problem into functions and to develop modular reusable code. |
| | | | | **CO5:**To use arrays, pointers, strings and structures to write C programs. |
| 4 | **I-I** | ME104ES | **ENGINEERING GRAPHICS** | **CO1:**Preparing working drawings to communicate the ideas and information. |
| | | | | **CO2:**Read, understand and interpret engineering drawings. |
| | | | | **CO3:**perform free hand sketching of basic geometrical constructions and multiple views of objects |
| | | | | **CO4:**Draw the projections of points, straight lines and plane surfaces in given quadrant |
| | | | | **CO5:**Draw projections and solids and development of surfaces |
| 5 | **I-I** | **PH105BS** | **ENGINEERING PHYSICS LAB** | **CO1:**Understand the importance of vocabulary and sentence structures. |
| | | | | **CO2:**Choose appropriate vocabulary and sentence structures for their oral and written communication. |
| | | | | **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** | **CS106ES** | **PROGRAMMING** | **CO1:**formulate the algorithms for simple problems |

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| | | | **FOR PROBLEM SOLVING LAB** | **CO2:**translate given algorithms to a working and correct program |
| | | | | **CO3:**correct syntax errors as reported by the compilers |
| | | | | **CO4:**identify and correct logical errors encountered during execution |
| | | | | **CO5:**Represent and manipulate data with arrays, strings and structures |
| 7 | **I-I** | ***MC109ES** | **ENVIRONMENTAL SCIENCE** | **CO1:**Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development |
| | | | | **CO2:**Understand the consequences of human actions on the web of life, global economy, and quality of human life. |
| | | | | **CO3:**Develop critical thinking for shaping strategies (scientific, social, economic, administrative, and legal) for environmental protection, conservation of biodiversity, environmental equity, and sustainable development. |
| | | | | **CO4:** Acquire values and attitudes towards understanding complex environmental economic- social challenges, and active participation in solving current environmental problems and preventing the future ones. |
| | | | | **CO5:**Adopt sustainability as a practice in life, society, and industry. |
| 8 | **II-I** | **ME203ES** | **ENGINEERING 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 and rigid body motion. |
| | | | | **CO5:**Solve problems using work energy equations for translation, fixed axis rotation and plane motion and solve problems of vibration. |

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| 9 | **II-I** | **EN109HS** | **ENGINEERING WORKSHOP** | **CO1:**Study and practice on machine tools and their operations |
| | | | | **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 including drilling, material removing, measuring, chiseling |
| | | | | **CO4:**Apply basic electrical engineering knowledge for house wiring practice. |
| | | | | **CO5:**Ability to design and model different prototypes in the carpentry trade such as Cross lap joint, Dove tail joint. |
| 10 | **II-I** | **EN205HS** | **ENGLISH** | **CO1:**Use English Language effectively in spoken and written forms. |
| | | | | **CO2:**Comprehend the given texts and respond appropriately |
| | | | | **CO3:**Communicate confidently in various contexts and different cultures. |
| | | | | **CO4:**Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills. |
| | | | | **CO5:**To develop the ability to appreciate ideas and think critically |
| 11 | **II-I** | **MA201BS** | **MATHEMATICS - II** | **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:**Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped |
| | | | | **CO4:**Evaluate the line, surface and volume integrals and converting them from one to another |
| | | | | **CO5:**To explain the basics of linear algebra including matrix theory, system of linear equations, eigenvalues and eigenvectors. |
| 12 | **II-I** | **CH202BS** | **CHEMISTRY** | **CO1:**The knowledge of atomic, molecular and electronic changes, band theory related to |

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| | | | | conductivity. |
| | | | | **CO2:**The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments. |
| | | | | **CO3:**The required skills to get clear concepts on basic spectroscopy and application to medical and other fields. |
| | | | | **CO4:**The knowledge of configurational and conformational analysis of molecules and reaction mechanisms. |
| | | | | **CO5:**To learn the basics concepts of organic chemistry specially on chemical bonding and physical properties |
| 13 | **II-I** | **CH206BS** | **ENGINEERING CHEMISTRY LAB** | **CO1:**Determination of parameters like hardness and chloride content in water. |
| | | | | **CO2:**Estimation of rate constant of a reaction from concentration – time relationships. |
| | | | | **CO3:**Determination of physical properties like adsorption and viscosity. |
| | | | | **CO4:**Calculation of Rf values of some organic molecules by TLC technique. |
| | | | | **CO5:** Analyse the properties of lubricants viz. Flash & fire point, viscosity, cloud & pour point and their significance. |
| 14 | **II-I** | **EN207HS** | **ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB** | **CO1:**Better understanding of nuances of English language through audio- visual experience and group activities |
| | | | | **CO2:**Neutralization of accent for intelligibility |
| | | | | **CO3:**Speaking skills with clarity and confidence which in turn enhances their employability skills |
| | | | | **CO4:**Competency in analytical skills and problem solving skills |
| | | | | **CO5:**Better pronunciation and accent |
| 15 | **II-I** | **MA301BS** | **PROBABILITY** | **CO1:**Apply the concepts of probability and distributions to some case studies. |

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| | | | **AND STATISTICS** | **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 |
| 16 | **II-I** | **CE301PC** | **SURVEYING AND GEOMATICS** | **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 |
| 17 | **II-I** | **CE303PC** | **ENGINEERING GEOLOGY** | **CO1:**relate the knowledge to the modern equipment and methodologies |
| | | | | **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 |
| 18 | **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 |

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| | | | | 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. |
| 19 | **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. |
| 20 | **II-I** | **CE306PC** | **SURVEYING LAB** | **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 |

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| | | | | for closure error, and express the results in the form of the standard accuracy ratio, i.e. accuracy ratio. |
| 21 | **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. |
| 22 | **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. |
| 23 | **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. |

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| | | | | **CO5:**Gain knowledge on roles and functioning of Election Commission. |
| 24 | **II-II** | **EE401ES** | **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 |
| 25 | **II-II** | **CE402ES** | **BASIC MECHANICAL ENGINEERING FOR CIVIL ENGINEERS** | **CO1:**To understand the mechanical equipment for the usage at civil engineering systems, |
| | | | | **CO2:**To familiarize with the general principles and requirement for refrigeration, manufacturing, |
| | | | | **CO3:**To realize the techniques employed to construct civil engineering systems. |
| | | | | **CO4:**Explain the working of power transmission elements |
| | | | | **CO5:**Describe the basic manufacturing, metal joining and machining processes |
| 26 | **II-II** | **CE403PC** | **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 |
| 27 | **II-II** | **CE404PC** | **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 |

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| | | | | 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 |
| 28 | **II-II** | **CE405PC** | **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. |
| 29 | **II-II** | **CE409PC** | **HYDRAULICS AND HYDRAULIC MACHINERY LABORATORY** | **CO1:**Describe the basic measurement techniques of fluid mechanics and its appropriate application |
| | | | | **CO2:**Interpret the results obtained in the laboratory for various experiments. |
| | | | | **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 |

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| 30 | **II-II** | **EE409ES** | **BASIC ELECTRICAL AND 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. |
| 31 | **II-II** | **CE406PC** | **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. |
| 32 | **II-II** | **CE407PC** | **COMPUTER AIDED CIVIL ENGINEERING DRAWING** | **CO1:**Apply computer aided drafting tools to create 2D and 3D objects |
| | | | | **CO2:**sketch conics and different types of solids |
| | | | | **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 |
| 33 | **II-II** | ***MC409/* MC309** | **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. |

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| | | | | **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. |
| 34 | **III-I** | **CE501** | **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:Formulate** the stiffness matrix methods |
| | | | | **CO5:analyze the beams by matrix methods** |
| 35 | **III-I** | **CE502PC** | **GEOTECHNICAL ENGINEERING** | **CO1:**Characterize and classify the soils |
| | | | | **CO2:**Able to estimate seepage, stresses under various loading conditions and compaction characteristics |
| | | | | **CO3:**Able to analyse the compressibility of the soils |
| | | | | **CO4:**Able to understand the strength of soils under various drainage conditions |
| | | | | **CO5:Able to find out shear strength of soil using lab tests** |
| 36 | **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** one-way and two-way slabs. |
| | | | | **CO5:Design the one-way and two-way slabs.** |

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| 37 | **III-I** | **CE504PC** | **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. |
| 38 | **III-I** | **CE511PE** | **CONCRETE TECHNOLOGY (PROFESSIONAL ELECTIVE – I)** | **CO1:Determine** the properties of concrete ingredients i.e. cement, sand, coarse aggregate by conducting different tests. Recognize the effects of the rheology and early age properties of concrete on its long-term behavior. |
| | | | | **CO2:Apply** the use of various chemical admixtures and mineral additives to design cement-based materials with tailor-made properties |
| | | | | **CO3:Perform** mix design and engineering properties of special concretes such as high-performance concrete, self-compacting concrete, and fibre reinforced concrete. |
| | | | | **CO4:Apply** the use of various chemical admixtures and |
| | | | | **CO5: Apply the use of mineral additives to design cement-based** |
| 39 | **III-I** | **CE208PC** | **ENGINEERING** | **CO1:**Evaluate the economic theories, cost concepts and pricing policies |

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| | | | **ECONOMICS AND ACCOUNTANCY** | **CO2:**Understand the market structures and integration concepts |
| | | | | **CO3:**Understand the measures of national income, the functions of banks and concepts of globalization |
| | | | | **CO4:**Apply the concepts of financial management for project appraisal |
| | | | | **CO5:**Understand accounting systems and analyze financial statements using ratio analysis |
| 40 | **III-I** | **CE506PC** | **HIGHWAY ENGINEERING & CONCRETE TECHNOLOGY LAB** | **CO1:**Categorize the test on materials used Civil Engineering Building & Pavement constructions |
| | | | | **CO2:**To perform the tests on concrete for it characterization |
| | | | | **CO3:**To Design Concrete Mix Proportioning by Using Indian Standard Method. |
| | | | | **CO4:**Examine the tests performed for Bitumen mixes |
| | | | | **CO5:**To prepare a laboratory report |
| 41 | **III-I** | **CE208PC** | **GEOTECHNICAL ENGINEERING LAB** | **CO1:**Determine the specific gravity and Atterberg limits of soil. |
| | | | | **CO2:**Estimate the field density of soil by core cutter and sand replacement methods. |
| | | | | **CO3:**Determine compaction and shear strength parameters of soil. |
| | | | | **CO4:**Evaluate the differential free swell index and swelling pressure of soil. |
| | | | | **CO5:**Obtain the compressibility, permeability parameters and CBR value of soil. |
| 42 | **III-I** | **EN508HS** | **ADVANCE COMMUNICATION SKILLS LAB** | **CO1:**Gathering ideas and information to organize ideas relevantly and coherently. Engaging in debates. |
| | | | | **CO2:**Transferring information from non-verbal to verbal texts and vice-versa. |
| | | | | **CO3:**Participating in group discussions Facing interviews. |
| | | | | **CO4:**Writing project/research reports/technical reports Making oral presentations |
| | | | | **CO5:**Writing formal letters Taking part in social and professional communication |
| 43 | **III-II** | **CE601PC** | **HYDROLOGY** | **CO1:**Compute mean precipitation, infiltration rate and runoff from a catchment area and |

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| | | | **AND WATER RESOURCES ENGINEERING** | work out yield from a well. |
| | | | | **CO2:**Construct unit hydrograph and S-hydrograph, and compute peak flood flow and design flood for hydraulic structures. |
| | | | | **CO3:**Workout reservoir capacity using a mass curve, develop idea about reservoir sedimentation and its control. |
| | | | | **CO4:**Estimate seepage through embankment dam using seepage theory and work out factor of safety of gravity dam for different forces acting on it. |
| | | | | **CO5:**Calculate irrigation water requirement for the given cropping pattern in canal command and design of lined canals |
| 44 | **III-II** | **CE602PC** | **ENVIRONMENTAL ENGINEERING** | **CO1:**Assess characteristics of water and wastewater and their impacts |
| | | | | **CO2:**Estimate quantities of water and waste water and plan conveyance components |
| | | | | **CO3:**Design components of water and waste water treatment plants |
| | | | | **CO4:**Be conversant with issues of air pollution and control |
| | | | | **CO5:Identify sampling and analysis techniques for air quality assessment** |
| 45 | **III-II** | **CE603PC** | **FOUNDATION ENGINEERING** | **CO1:**understand the principles and methods of Geotechnical Exploration |
| | | | | **CO2:**decide the suitability of soils and check the stability of slopes |
| | | | | **CO3:**calculate lateral earth pressures and check the stability of retaining walls |
| | | | | **CO4:**analyse and design the shallow foundations |
| | | | | **CO5:**analyse and design the deep foundations |
| 46 | **III-II** | **CE604PC** | **STRUCTURAL ENGINEERING – II (STEEL)** | **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 |

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| | | | | **CO4:**Analyze and Design the beam and connections. |
| | | | | **CO5:** Identify and Design the various components of welded plate girder including stiffeners |
| 47 | **III-II** | **CE611PE** | **PRESTRESSED CONCRETE (PROFESSIONAL ELECTIVE – II)** | **CO1:**Acquire the knowledge of evolution of process of prestressing. |
| | | | | **CO2:**Acquire the knowledge of various prestressing techniques |
| | | | | **CO3:**Develop skills in analysis design of prestressed structural elements as per the IS codal provisions |
| | | | | **CO4:**Analyze the tension members, compression members. |
| | | | | **CO5:**Design the tension members, compression members. |
| 48 | **III-II** | **CS601OE** | **FUNDAMENTALS OF MANAGEMENT FOR ENGINEERS** | **CO1:**understand the significance of Management in their Profession. |
| | | | | **CO2:**The various Management Functions like Planning, rganizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. |
| | | | | **CO3:**The students can explore the Management Practices in their domain area. |
| | | | | **CO4:**Applications of concepts in practical aspects |
| | | | | **CO5:**Development of managerial skills for engineers |
| 49 | **III-II** | **CE605PC** | **ENVIRONMENTAL ENGINEERING LAB** | **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 aspect of the environment |
| 50 | **III-II** | **CE606PC** | **COMPUTER AIDED DESIGN** | **CO1:**Model the geometry of real-world structure |
| | | | | **CO2:**Represent the physical model of structural element/structure |

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| | | | **LAB** | **CO3:**Perform analysis |
| | | | | **CO4:**Interpret from the Post processing results |
| | | | | **CO5:**Design the structural elements and a system as per IS Codes |
| 51 | **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 |
| 52 | **V-I** | **CE701PC** | **ESTIMATION, COSTING AND PROJECT MANAGEMENT** | **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:**An idea of how to optimize construction projects based on costs |
| | | | | **CO5:**An idea how construction projects are administered with respect to contract structures and issues. |
| 53 | **V-I** | **CE712PE** | **GROUND IMPROVEMENT TECHNIQUES (PE** | **CO1:**Understand the various ground improvement methods. |
| | | | | **CO2:**Assess different compaction methods for ground modification. |
| | | | | **CO3:**Design dewatering systems to reduce the settlements. |

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| | | | **– III)** | **CO4:**Comprehend stabilizations with chemical and grouting techniques. |
| | | | | **CO5:**Understand the principles of soil reinforcement and confinement in engineering constructions. |
| 54 | **V-I** | **CE721PE** | **IRRIGATION AND HYDRAULIC STRUCTURES (PE–IV)** | **CO1:**Know types of water retaining structures for multiple purposes and its key parameters considered for planning and designing |
| | | | | **CO2:**Understand details in any Irrigation System and its requirements |
| | | | | **CO3:**Know, Analyse and Design of a irrigation system components |
| | | | | **CO4:**Know, analyse and design of diversion head works and irrigation projects foundation works |
| | | | | **CO5:**To get knowledge about the discharging of irrigation water from different modules |
| 55 | **V-I** | **CS702OE** | **PYTHON PROGRAMMING (OPEN ELECTIVE - II)** | **CO1:**Learn Syntax and Semantics and create Functions in Python |
| | | | | **CO2:**Handle Strings and Files in Python |
| | | | | **CO3:**Understand Lists, Dictionaries and Regular expressions in Python. |
| | | | | **CO4:**Implement Object Oriented Programming concepts in Python. |
| | | | | **CO5:**Build Web Services and introduction to Network and Database Programming in Python. |
| 56 | **V-I** | **SM702MS** | **PROFESSIONAL PRACTICE, LAW & ETHICS** | **CO1:**understand the importance of professional practice, Law and Ethics in their personal lives |
| | | | | **CO2:**understand the importance of professional practice, Law and Ethics in their professional careers. |
| | | | | **CO3:**The students will learn the rights and responsibilities as an employee |
| | | | | **CO4:**The students will learn the rights and responsibilities as a team member |
| | | | | **CO5:**The students will learn the rights and responsibilities as a global citizen |

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| 57 | **V-II** | **CE813PE** | **AIR POLLUTION (PE – V)** | **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. |
| 58 | **V-II** | **CE821PE** | **AIRPORT, RAILWAYS, AND WATERWAYS (PE – VI)** | **CO1:**An ability to design of runways and taxiways |
| | | | | **CO2:**An ability to understand components of railway |
| | | | | **CO3:**An ability to design the railway track |
| | | | | **CO4:**An ability to design various crossings and signals in Railway Projects |
| | | | | **CO5:**An ability plan the harbors and ports projects including the infrastructure required for new ports and harbors. |
| 59 | **V-II** | **CS803OE** | **DATABASE MANAGEMENT SYSTEMS** | **CO1:**Gain knowledge of fundamentals of DBMS, database design and normal forms |
| | | | | **CO2:**Master the basics of SQL for retrieval and management of data. |
| | | | | **CO3:**Be acquainted with the basics of transaction processing and concurrency control. |
| | | | | **CO4:**Familiarity with database storage structures. |
| | | | | **CO5:**access techniques |