MAHENDRA COLLEGE OF ENGINEERING
(Approved by AICTE, Affiliated to Anna University, Chennai-25)
Chennai Main Road, Minnampalli
Salem – 636106

B.E.CIVIL ENGINEERING

Program Outcomes (POs)

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design / Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

On completion of B.E. Civil Engineering programme, the graduates will be able to

PSO1: Demonstrate proficiency in mathematics and physical sciences and excel in the core areas of civil engineering such as structural, environmental, Geo-technical engineering.

PSO2: Plan, draw detailed drawings, write specifications and prepare cost estimates.

PSO3: Interact with stakeholders effectively and execute quality construction works using modern tools.

MAHENDRA COLLEGE OF ENGINEERING **(Approved by AICTE, Affiliated to Anna University, Chennai-25)** **Chennai Main Road, Minnampalli** **Salem – 636106**
COURSE OUTCOME STATEMENTS FOR B.E.CIVIL ENGINEERING (2013 REGULATION)
SEMESTER 01
1.Course Code and Name : HS6151 - TECHNICAL ENGLISH I

	CO Statements	Knowledge Level
The students should be able to		
1	**Classify** the types of listening and writing skills with acquired knowledge	K2
2	**Demonstrate** speaking skills in various occasions	K2
3	**Compare** the formal and informal writing skills by using the mail and blocks	K2
4	**Apply** the speaking etiquitte to build up communication proficiency	K3
5	**Develop** presentations with the use of LSRW skills	K3
2.Course Code and Name : MA6151 - MATHEMATICS I		
	CO Statements	**Knowledge Level**
The students should be able to		
1	**Solve** the Eigen values and Eigen vectors to diagonalise and reduce a matrix to quadratic form	K3
2	**Identify** the convergences, divergences of infinite series	K3
3	**Solve** evolutes and envelopes of a given curve by using radius of curvature and center of curvature	K3
4	**Identify** the maxima and minima value functions of two variables	K3
5	**Solve** area of plain curves and volume of solid using double and triple integrals	K3

3.Course Code and Name : PH6151 - ENGINEERING PHYSICS I		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Explain the basics of properties of matter and its applications	K2
2	Summarize the concepts of waves and optical devices and their applications in fiber optics	K2
3	Demonstrate the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers	K2
4	Outline the concepts of advanced physics quantum theory and its applications in tunneling microscopes	K2
5	Explain the basics of crystals, their structures and different crystal growth techniques	K2

4.Course Code and Name : CY6151 - ENGINEERING CHEMISTRY I		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Classify the polymers and their utility in the industries and explain the techniques of polymerization and properties of polymers	K2
2	Relate various thermodynamic functions such as enthalpy, entropy, free energy and their importance	K2
3	Explain the photo physical processes such as fluorescence and phosphorescence and various components of UV and IR spectrophotometer	K2
4	Illustrate the phase transitions of one component and two component systems and the types of alloys and their application in industries	K2
5	Outline the synthesis, characteristics and the applications of nano materials	K2

5.Course Code and Name : GE6151- COMPUTER PROGRAMMING		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Describe the function of a Computer and problem solving techniques.	K2
2	Write simple C programs using basic constructs	K3
3	Implement applications to manage data using arrays and strings	K3
4	Apply functions and pointers for solving problems	K3
5	Develop simple applications using structure and union	K3

6.Course Code and Name : GE6152- ENGINEERING GRAPHICS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Demonstrate freehand sketching of basic geometrical constructions and multiple views of objects	K2
2	Develop orthographic projections of points, lines and plane surfaces	K3
3	Construct projections of simple solids and truncated solids	K3
4	Develop projection of sectioned solids and utilize development of surfaces	K3

5	Construct isometric and perspective projections of simple solids	K3

7.Course Code and Name : GE6161- COMPUTER PRACTICES LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Apply the usage of office automation tools.	K2
2	Apply good programming design methods for program development.	K3
3	Design and implement C programs for simple applications.	K3
4	Develop recursive programs.	K3

8.Course Code and Name : GE6162 - ENGINEERING PRACTICES LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Construct carpentry components and pipe connections including plumbing works	K2
2	Make use of welding equipments to join the structures	K3
3	Develop models using sheet metal work	K3
4	Illustrate the working of centrifugal pump and air conditioner	K3

5	Demonstrate basic home electrical works, measurement of the electrical quantities and soldering practices	K3

9.Course Code and Name : GE6163 - PHYSICS AND CHEMISTRY LABORATORY - I		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Make use of spectrometer to find the wavelength of spectral lines, and laser	K3
2	Make use of ultrasonic interferometer and Lee's disc apparatus to find the velocity of sound, compressibility of the liquid and thermal conductivity	K3
3	Demonstrate the estimation of DO content in water sample by Winkler's method and molecular weight of polymer by Ostwald viscometer	K2
4	Experiment with the strength of an acid using pH meter and conductometer	K3
5	Demonstrate the estimation of weak and strong acids in a mixture by conductometer	K2

SEMESTER 02		
1.Course Code and Name : HS6251 - TECHNICAL ENGLISH II		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Develop the communication skills with proper grammar usage	K2
2	Summarize the various advanced technical and non-technical english tools	K2

3	Classify the speaking skills and expression through professional english	K2
4	Apply the interview techniques for career development	K3
5	Outline the use of writing skills to express innovatiove ideas	K3

2.Course Code and Name : MA6251 - MATHEMATICS II		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Apply solenoidal, irrotational vectors and make use of the concepts of Green's, Gauss divergence , Stokes theorem to evaluate single, double and triple integrals	K3
2	Solve simultaneous linear equations and P.I. of Cauchy and Legendre Equation	K3
3	Solve Laplace Transforms of periodic functions and ODE using Inverse Laplace Transform	K3
4	Make use of the properties of analytic functions for verifying C-R equations for determination of Bilinear Transformation	K3
5	Develop the functions of two variables as Taylor's and Laurent's series and Contour integrals by using Cauchy's Integral formula	K3

3.Course Code and Name : PH6251 - ENGINEERING PHYSICS II		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Explain the basics, properties and applications of conducting materials	K2
2	Summarize the properties of semiconducting materials and semiconductor devices.	K2

3	Explain the basics, properties and applications of the magnetic materials and super conducting material	K2
4	Illustrate the concepts, mechanisms and applications of dielectric materials	K2
5	Outline the method of synthesis and explain the properties of Nano materials, SMA, Metallic glasses and Ceramics	K2

4.Course Code and Name : CY6251 - ENGINEERING CHEMISTRY II		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Explain the problems of using hard water in boilers and methods of treatment of water for boiler use	K2
2	Apply the design principles to electro chemical cell. Identify the types of corrosion and the methods of prevention	K3
3	Illustrate the methods of harnessing energy from non-conventional energy sources	K2
4	Classify various engineering materials and explain their importance	K2
5	Relate the significance of solid, liquid and gaseous fuels. Explain the calorific values of fuels and air requirement for combustion in furnaces	K2

5.Course Code and Name : GE6252- BASIC ELECTRICAL AND ELECTRONICS ENGINEERING		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Apply the basic theorems to solve problems in Electrical circuits	K3
2	Classify the different components and function of electrical machines	K2

3	Summarize the characteristics of electronic components	K2
4	Outline the basic concepts of communication engineering	K2
5	Solve design problems in digital electronic circuits	K3

6.Course Code and Name : GE6253- ENGINEERING MECHANICS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Develop the vectorial and scalar representation of forces and moments	K3
2	Solve problems pertaining to rigid bodies in equilibrium	K3
3	Identify the properties of surfaces and solids like centriod and moment of inertia etc.	K3
4	Solve problems pertaining to rigid bodies under the effect of dynamic forces	K3
5	Apply the laws of friction for the solution of simple rigid bodies	K3

7.Course Code and Name : GE6261 - COMPUTER AIDED DRAFTING AND MODELING LABORATORY		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Develop front view and top view of simple solids and objects	K3
2	Construct isometric projection and sectional views of objects and simple solids	K3
3	Construct plan of a residential building	K3
4	Demonstrate the drawing of truss and curves	K2

5	Model simple objects and construct 2-D multi-view drawings from 3-D using drafting software	K3
8.Course Code and Name :GE6262- PHYSICS AND CHEMISTRY LABORATORY - II		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Illustrate the determination of Young's modulus of the beam and moment of inertia and rigidity modules of thin wire Torsion pendulum	K2
2	Make use of Poiseuille's method to determine the coefficient of viscosity of the liquid	K3
3	Illustrate the determination of dispersive power of a prism and the thickness of a thin wire through interference fringes using Air wedge apparatus	K2
4	Experiment with the type, amount of alkalinity, hardness in a given water sample and evaluate the Amount of copper using EDTA method	K3
5	Demonstrate titration by potentiometric redox and conductometric precipitation methods	K2

SEMESTER 03		
1.Course Code and Name : MA6351 - TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS		
	CO Statements	**Knowledge Level**

The students should be able to		
1	Solve differential equations using Fourier series analysis for engineering applications.	K3
2	Utilize Dirichlet's condition for finding the Fourier series of a given function	K3
3	Apply Fourier series to solve one dimensional way, one and two dimensional heat equations.	K3
4	Solve Fourier transform for a given function and make use of them to evaluate certain definite Integrals	K3
5	Solve Z transforms of standard functions and make use of them to solve difference equations	K3
2.Course Code and Name : GE6351 - ENVIRONMENTAL SCIENCE AND ENGINEERING		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Illustrate the concepts of an ecosystem , energy flow and conservation of biodiversity.	K2
2	Explain the causes, effects and control of various types of pollution.	K2
3	Outline the conservation of natural resources.	K2
4	Summarize the social issues of environment and legislative guidelines for disaster management.	K2
5	Relate population growth and its impact on environment and human health.	K2
3.Course Code and Name : CE6301 - ENGINEERING GEOLOGY		
	CO Statements	**Knowledge Level**
The students should be able to		

1	Explain the various geological agents and the processes involved	K2
2	Compare the available minerals on the basis of their properties & behaviour	K2
3	Classify & identify the available rocks in the construction site	K2
4	Interpret the different geological features & their engineering importance	K2
5	Relate the geological investigations and remote sensing in Civil Engineering projects	K2
4.Course Code and Name : CE6302 - MECHANICS OF SOLIDS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Summarize the concepts of stress, strain, thin cylinders and shells	K2
2	Construct the shear force and bending moment diagrams for beams	K3
3	Identify the deflection of beams by different methods	K3
4	Apply the conepts of torsion to circular shafts and helical springs, .	K2
5	Solve the pin jointed plane trusses	K2
5.Course Code and Name : CE6303 - MECHANICS OF FLUIDS		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Summarize the basic properties of fluids	K2

2	Outline the properties of fluids in kinematic and dynamic equilibrium.	K2
3	Classify the various types of flow and losses of flow in pipes.	K2
4	Solve the boundary layer problems	K3
5	Develop dimensional and model analysis for various fluid properties	K3
6.Course Code and Name : CE6304 SURVEYING I		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Outline preliminary surveying by adopting various surveying concepts	K2
2	Summarize the concepts of traversing using compass and plane table surveying	K2
3	Construct a contour plan by the application of leveling techniques	K3
4	Solve the problems relating to cross sectional areas and volumes of earthwork	K3
5	Identify the heights and distances by theodolite surveying	K3
7.Course Code and Name : CE6311 - SURVEY PRACTICAL I		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Compare and contrast the handling of various types of basic survey instruments	K2
2	Construct site plan using plane table surveying	K3

3	Develop tabulation by conducting levelling	K3
4	Develop contour maps	K3
5	Demonstrate the working of theodolite	K2
8.Course Code and Name : CE6312 - COMPUTER AIDED BUILDING DRAWING		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Construct plan, section and elevation of buidings with load bearing walls	K3
2	Construct plan, section and elevation of buidings with sloping roofs	K3
3	Construct plan, section and elevation of RCC framed structures	K3
4	Develop plan, section and elevation of Industrial buildings	K3
5	Model various types of buildings using drafting software	K3

SEMESTER 04		
1.Course Code and Name : MA6459 - NUMERICAL METHODS		
	CO Statements	**Knowledge Level**
The students should be able to		

1	Develop the solution of algebraic and transcentendal system of linear equations	K3
2	Make use of Newton's Formula for interpolation of the values of unknown functions	K3
3	Construct the numerical values of the derivatives and integrals of unknown function	K3
4	Solve first and second order initial value problems	K3
5	Solve Numerical boundary value problems	K3
2.Course Code and Name : CE6401 - Construction Materials		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Compare the properties of most common and advanced building materials	K2
2	Classify the potential applications of lime, cement and aggregates	K2
3	Outline the production of concrete, placing and making of concrete elements	K2
4	Summarize the applications of timbers and other materials	K2
5	Explain the modern materials used for construction	K2
3.Course Code and Name : CE6402 - Strength of Materials		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Make use of energy principles for determination of deflection of determinate beams, frames and trusses	K3

2	Solve propped cantilever, fixed and continuous beams using theorem of three momentequation	K3
3	Identify the load carrying capacity of columns and stresses induced in columns and cylinders.	K3
4	Apply the concept of principal stresses to an element in three dimensional state of stress	K3
5	Examine the stresses due to unsymmetrical bending of beams and curved beams.	K4
4.Course Code and Name : CE6403 - Applied Hydraulic Engineering		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Apply the knowledge of fluid mechanics in addressing problems in open channels	K3
2	Solve problems in gradually varied flow and in steady state condition	K3
3	Solve problems in rapidly varied flows and in steady state conditions	K3
4	Develop characteristics of turbines	K3
5	Develop characteristics of pumps	K3
5.Course Code and Name : CE6404 -Surveying II		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Solve for the height and distances between instrument stations and accessible/inaccessible objects by trignometrical levelling	K3
2	Apply mathematical adjustment of errors involved in surveying measurement	K3

3	Compare electronic surveying (total station) with conventional surveying methods	K2
4	Explain the working principle of GPS, its components, signal structure and error sources	K2
5	Contrast advanced surveying techniques and conventional surveying methods in the field of civil engineering	K2
6.Course Code and Name : CE6405 - Soil Mechanics		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Classify the soil and its engineering properties	K2
2	Summarize the stress concepts in soils	K2
3	Identify the settlement in soils	K3
4	Solve shear strength parameters of soil	K3
5	Compare finite and infinite slopes.	K2
7.Course Code and Name : CE6411 - Strength of Materials Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Analyze the various stresses on mild steel rod by conducting tension and torsion tests	K4

2	Identify deflection test of metals and carriage springs	K3
3	Test for compression strength of wood and helical springs	K4
4	Compare hardness and impact strength of different metals	K4
5	Examine the shear strength of mild steel rod and properties of cement	K4

8.Course Code and Name : CE6412 - Hydraulic Engineering Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Identify the flow in pipes	K3
2	Examine the frictional losses in pipes	K4
3	Develop characteristics of pumps	K3
4	Develop characteristics of turbines	K3
5	Analyze the metacentric height of floating bodies	K4

9.Course Code and Name : CE6413 - Survey Practical II		
	CO Statements	**Knowledge Level**
The students should be able to		

1	Demonstrate the handling of theodolite	K2
2	Illustrate the handling of tacheometer	K2
3	Plan the general field marking for various engineering projects	K3
4	Experiment with setting of curves	K3
5	Make use of triangulation and astronomical surveying	K3

SEMESTER 05		
1.Course Code and Name : CE6501- Structural Analysis I		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Apply the energy and consistent deformation methods to indeterminate frames	K3
2	Develop influence line diagrams for determinate and indeterminate structures with moving loads	K3
3	Analyze bending moment and shear force variants for various types of arches	K4
4	Solve beams and frames using slope-deflection method	K3
5	Solve beams and frames using moment distribution method	K3

2.Course Code and Name : CE6502 - Foundation Engineering		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Outline the appropriate site investigation techniques and suitable foundations	K2
2	Demonstrate settlement and shear failure of shallow foundation	K2
3	Choose safe dimensions for shallow footings	K3
4	Summarize load carrying capacity and settlement of single and pile groups	K2
5	Illustrate stability analysis of retaining walls	K2

3.Course Code and Name : CE6503 -Environmental Engineering I		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Apply the vlarious methods to calculate the total water demand for a town/city	K3
2	Classify the conduits for transportation of water	K2
3	Outline appropriate treatment systems for water available at the source	K2
4	Illustrate the advance treatment methods to treat the water	K2
5	Plan a good water distribution system for an individual building and for a community	K2

4.Course Code and Name : CE6504- Highway Engineering		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Plan the alignment of highways	K2
2	Outline the geometric design of highways	K2
3	Compare flexible and rigid pavements	K2
4	Summarize the properties and testing methods for construction materials	K2
5	Explain about the management, distress evaluation and maintenance of pavements	K2

5.Course Code and Name : CE6505- Design of Reinforced Concrete Elements		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Compare the various design methodologies for the design of RC elements	K2
2	Solve rectangular and flanged beams by limit state method	K3
3	Analyze RC members for combined bending, shear and torsion	K4
4	Apply axial, uniaxial and biaxial eccentric loading to columns	K3

5	Make use of limit state method for footing design	K3

6.Course Code and Name : CE6506 - Construction Techniques, Equipment and Practice		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Classify different construction techniques and summarize the constituents of concrete and its production	K2
2	Summarize the various techniques and practices in masonry construction, flooring and roofing.	K2
3	Explain the various techniques for substructure construction	K2
4	Compare the various methods and techniques involved in the construction of super structures	K2
5	Classify various equipments for the construction of structures	K2

7.Course Code and Name : GE6674- Communication and Soft Skills - Laboratory Based		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Demonstrate reading and writing skills	K2
2	Develop listening and speaking skills	K3
3	Make use of acquired knowledge to take up international examination such as IELTS and TOEFL	K3

4	Apply the interview techniques for career development	K3
5	Illustrate the various aspects of soft skills	K2

8.Course Code and Name : CE6511- Soil Mechanics Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Explain the various index properties of soil	K4
2	Analyze in situ density of soil	K4
3	Summarize compaction characteristics of soil	K2
4	Examine index properties of soil	K4
5	Demonstrate the determination of triaxial compression test and relative density test	K2

9.Course Code and Name : CE6512- Survey Camp		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Demonstrate the various techniques of surveying including modern methods such as total station surveying	K2
2	Make use of theoretical knoledge to solve field problems	K3

3	Construct contour plans	K3

SEMESTER 06		
1. Course Code and Name : CE6601- Design of Reinforced Concrete & Brick Masonry Structures		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Solve the problems relating to reinforced concrete cantilever and counterfort Retaining Walls	K3
2	Apply design principles to rectangular and circular above and below ground level	K3
3	Construct reinforcement detailing for staircase, flat slab, box culvert and road bridge	K3
4	Summarize the concepts of yield line theory	K2
5	Solve the problems relating to axially and eccentrically loaded brick masonry walls	K3
2. Course Code and Name : CE6602 - Structural Analysis II		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Solve statically indeterminate beams and frames by using flexibility matrix method	K2

2	Compare flexibility and stiffness matrix methods for solution of statically indeterminate beams and frames	K3
3	Summarize the concepts of Finite element method of analysis for beams and frames	K2
4	Illustrate plastic analysis for beams and frames	K2
5	Solve curved beams, space trusses and suspension bridges	K3

3. Course Code and Name : CE6603 -Design of Steel Structures		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Outline the Fabrication Process, Types of connections and joints in Steel structures.	K2
2	Design tension members using limit state method	K3
3	Design compression members using limit state method	K3
4	Illustrate the load carrying capacity of steel beams and design procedure of beams	K2
5	Solve the problems and arrive at safe cross section for the elements of the industrial structures like long span trusses, roof truss and gantry girders	K3

4. Course Code and Name : CE6503- Railways, Airport and Harbour Engineering

	CO Statements	Knowledge Level
The students should be able to		
1	Summarize the functions of various components of railway track like rails, sleeper and ballast, gauge etc.	K2
2	Outline the construction and maintenance of tracks	K2
3	Demonstrate the planning & characteristics of air transport and air traffic control	K2
4	Explain the orientation, length and geometric design of runway	K2
5	Illustrate the planning and design of harbour and coastal protection works	K2
5. Course Code and Name : CE6605- Environmental Engineering II		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Summarize & classify the nature of wastewater generated from a town/ city	K2
2	Solve the design problems in sewers	K3
3	Outline the design principles of primary treatment of sewage	K2
4	Apply design principles to secondary treatment units for wastewater	K3
5	Demonstrate the suitable modes of disposal for the treated wastewater without endangering the environment.	K2

6. Course Code and Name : CE6002 - Concrete Technology		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Summarize the properties of various constituents of concrete and tests to ascertain its quality	K2
2	Compare and contrast the various mineral and chemical admixtures used in concrete construction	K2
3	Apply the properties of various constuients in the mix proportion of concrete by BIS method	K3
4	Explain the various properties of fresh and hardened concrete	K2
5	Outline the uses and applications of special types of concrete	K2
7. CE6611- Environmental Engineering Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Examine the pollutant concentration in water and wastewater	K4
2	Experiment with the types and amount of dosage required for the treatment	K3
3	Analyse the conditions needed for the growth of micro-organisms	K4
8. Course Code and Name: CE6612 - Concrete & Highway Laboratory		

	CO Statements	Knowledge Level
The students should be able to		
1	Examine fresh properties of concrete	K4
2	Examine hardened properties of concrete	K4
3	Test for determination of various properties of aggregates	K4
4	Identify various properties of bitumen	K3
5	Analyze the properties of bituminous mixes	K4

SEMESTER 07

1. Course Code and Name : CE6701 - Structural Dynamics and Earthquake Engineering		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Explain the mass-stiffness idealization for deriving equations of motion	K2
2	Solve the Eigen values and mode shapes for SDOF and MDOF systems	K3
3	Outline the causes associated with an earthquake and relate with the estimation of earthquake parameters	K2
4	Demonstrate the performance of various structures under seismic loading	K2
5	Make use of codal provisions for the design of an earthquake resistant structure	K3

2. Course Code and Name : CE6702 - Prestresssed Concrete Structures		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Apply the methods of prestressing to various elements	K3
2	Solve problems in flexural strength and shear in prestressed concrete structural elements	K3
3	Construct reinforcement detailing in various prestressed anchorage zones	K3
4	Identify the stresses in propped and unpropped condition for various prestressed concrete structural elements	K3
5	Summarize the design principles for miscellaneous structures like poles, tank, pipes etc.	K2
3. Course Code and Name : CE6703 - Water Resources and Irrigation Engineering		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Summarize water resources potential of India and Tamil Nadu.	K2
2	Demonstrate water budget and management policies.	K2
3	Illustrate the computation of water requirement for different crops.	K2
4	Explain the design procedure of irrigation canals	K2
5	Classify different irrigation methods and participatory irrigation water management.	K2
4. Course Code and Name : CE6704 - Estimation and Quantity Surveying		

	CO Statements	Knowledge Level
The students should be able to		
1	Experiment with the calculation of quantities of materials required for Buildings and Arches	K3
2	Develop the detailed and abstract estimations for special structures, Roads, Canals etc.,	K3
3	Summarize the preparation of tenders and contracts with reference to the specifications.	K2
4	Explain the basics of valuation of buildings and rent calculation procedures.	K2
5	Explain the preparation of reports for buildings, road work, culvert etc.	K2
5. Course Code and Name : CE6006 - Traffic Engineering and Management		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Analyse traffic problems and plan for traffic systems	K4
2	Compare different types of traffic surveys	K2
3	Design Channels, Intersections, signals and parking arrangements	K4
4	Summarize issues relating to traffic safety and environment	K2
5	Develop Traffic management Systems	K3
6. Course Code and Name : EN6501 - Municipal Solid Waste Management		
	CO Statements	**Knowledge Level**

The students should be able to		
1	Outline the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management.	K2
2	Plan systems for reduction, reuse and recycling of waste.	K3
3	Design systems for storage, collection, transport, processing and disposal of municipal solid waste	K4
4	Summarize the various issues of solid waste management	K2
5	Design sanitary landfills	K4
7. Course Code and Name : CE6711 - Computer Aided Design and Drafting Laboratory		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Design and draw reinforced concrete cantilever and counterfort Retaining Walls	K4
2	Design and draw solid slab and Tee Beam bridges	K4
3	Design and draw circular and rectangular water tanks	K4
4	Design and draw plate girder and truss girder bridges	K4
5	Design and draw hemispherical bottom steel tank	K4
8. Course Code and Name : CE6712 - Design Project		
	CO Statements	**Knowledge Level**

The students should be able to		
1	Analyse problems related to civil engineering	K4
2	Design solutions for problems related to civil engineering	K4
3	Construct plans for structure and reinforcement detailing for various elements	K2

SEMESTER 08

1. Course Code and Name :MG6851 - Principles of Management		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Summarize the evolution of management concepts.	K2
2	Classify the functions and principles of management	K2
3	Plan the use of POM tools for domain specific applications in an organization	K3
4	Demonstrate the application of various motivational theories to enrich the proper leadership qualities in an organization.	K2
5	Summarize the various budgetary Techniques.	K2
2. Course Code and Name :CE6016 - Prefabricated Structures		
	CO Statements	**Knowledge Level**
The students should be able to		

1	Summarize the properties of various materials used in prefabricated units	K2
2	Classify the various components of prefabricated structures	K2
3	Apply the design principles in the prefabricated units	K3
4	Classify the joints provided in prefabricated connections	K2
5	Outline the erection and design of prefabricated elements	K2
3. Course Code and Name : CE6016 - Repair and Rehabilitation of Structures		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Summarize the significance of maintenance and repair strategies of building	K2
2	Interpret the quality of concrete construction and also the effects of environmental conditions on it	K2
3	Classify types of special concrete	K2
4	Explain the suitable techniques for repair and protection methods	K2
5	Compare the various repair and retrofitting techniques for different structural failure.	K2
4. Course Code and Name : CE6811 - Project Work		
	CO Statements	**Knowledge Level**
The students should be able to		
1	Analyze problems in various domains and formulate methodology	K4

2	Develop different solutions and select the optimum solution.	K3
3	Conclude using proper evidence to support them	K4