

## CONSOLIDATED LIST OF COURSE OUTCOMES

### Department of Civil Engineering

Sl. No	Course Code & Course Name	Course Outcome Number	Course Outcome
1	MA101 Calculus	C101.1	To provide some basic tools which are useful in modelling and analysing physical phenomena.
		C101.2	To analyse the physical phenomena involving continuous change of variables.
		C101.3	To evaluate differential and integral calculus of functions of one or more variables and of vector functions.
		C101.4	To evaluate the areas and volumes using integrals
		C101.5	To analyse the application of vector valued functions
		C101.6	To provide basic training in plotting and visualizing graphs of functions and intuitively understanding their properties
2	PH100 Engineering Physics	C102.1	Compute the quantitative aspects of waves and oscillations in engineering systems.
		C102.2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.
		C102.3	Analyse the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.
		C102.4	Apply the knowledge of ultrasonics in non-destructive testing and use the principles of acoustics to explain the nature and characterization of acoustic design and to provide a safe and healthy environment
		C102.5	Apply the comprehended knowledge about laser and fibre optic communication systems in various engineering applications
		C102.6	Using the knowledge of acoustics in designing acoustically important Buildings.
3	BE100 Engineering Mechanics	C103.1	Solve problems dealing with forces and determine the resultant. Also Identify the forces acting on a body and draw the free body diagram
		C103.2	Solve problems on forces acting on a body in space. Also determine the support reactions of beams subjected to concentrated loads and uniformly distributed loads
		C103.3	Determine the centroid and moment of inertia of composite areas.
		C103.4	Analyse the concept of friction to solve problems of bodies placed on rough surfaces and solve problems on support reactions of beams using principle of virtual work.

		<b>C103.5</b>	Use Newton's second law to solve problems on bodies in motion and apply the concept of instantaneous centre to bodies having combined translation and rotation.
		<b>C103.6</b>	Knowledge on types of Vibration and solve problem using the concept of Simple Harmonic Motion
4	BE101-0X Introduction to Civil Engineering	<b>C104.1</b>	The student will be able to explain the importance of Civil Engineering in the infrastructural development of society and they will also be able to plan and set out a building
		<b>C104.2</b>	They will be able to illustrate the types, uses and properties of various building materials likes stones, bricks and tiles
		<b>C104.3</b>	They will be able to impart knowledge on the basic ingredients used for construction including cement, aggregate etc
		<b>C104.4</b>	They will be able to familiarize with the types of masonry used for building construction
		<b>C104.5</b>	They will be able to illustrate the types, uses and properties of various natural and artificial building materials like timber and steel
		<b>C104.6</b>	Students should be able to understand the different components of a building their purposes and method of construction
5	BE103 Introduction to Sustainable Engineering	<b>C105.1</b>	The students should have knowledge about the concept and importance of sustainability
		<b>C105.2</b>	The students should be able to understand different types of pollution and waste generation, their causes, effects and control
		<b>C105.3</b>	The students should be able to understand environmental management standards and environmental impact assessment
		<b>C105.4</b>	The students should be able to understand the concepts of bio mimicking, green engineering, green building, sustainable habitat, sustainable urbanization
		<b>C105.5</b>	Students should have a knowledge of various types of conventional and non-conventional energy sources
		<b>C105.6</b>	Students should be able to understand the role of engineering and technology in sustainable development
6	EE100 Basics of Electrical Engineering	<b>C106.1</b>	Students will be able to acquire fundamental knowledge of Electrical circuits and can solve circuit related problems.
		<b>C106.2</b>	Students will be able to recall and state ideas about magnetic circuits.
		<b>C106.3</b>	Students will be able to explain the fundamentals of AC circuits.
		<b>C106.4</b>	Students will be able to analyse three phase systems.
		<b>C106.5</b>	Students will be able to compare and contrast the various types of renewable energy sources.
		<b>C106.6</b>	Students will be able to identify and differentiate between various AC and DC machines.
7	PH110 Engineering Physics Lab	<b>C107.1</b>	Develop analytical/experimental skills and impart prerequisite hands-on experience for engineering laboratories

		<b>C107.2</b>	Understand the need for precise measurement practices for data recording
		<b>C107.3</b>	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations
		<b>C107.4</b>	Analyse the techniques and skills associated with modern scientific tools such as lasers and fibre optics
		<b>C107.5</b>	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results
		<b>C107.6</b>	To apply the concepts of laser technology in various devices
<b>8</b>	CE 110 Civil Engineering Workshop	<b>C108.1</b>	Student should be able to set out a building using tape
		<b>C108.2</b>	Student should be able to set out a building using cross staff
		<b>C108.3</b>	Student should be able to determine area and mass moment of inertia of
		<b>C108.4</b>	to construct one and a half and two brick walls using English bond
		<b>C108.5</b>	Student should be able to calculate the area and volume of various features of a building
		<b>C108.6</b>	Student should be able to determine the compressive strength of brick and cement mortar cubes using compression testing machine
<b>9</b>	EE 110 Electrical Engineering Workshop	<b>C109.1</b>	Students will be able to recognize supply arrangements and their limitations, standard voltages and their tolerances, safety aspects of electrical systems and importance of protective measures in wiring systems.
		<b>C109.2</b>	Students will identify the types of wires, cables and other accessories used in wiring.
		<b>C109.3</b>	Students should be able to wire up and predict estimate of simple lighting circuits for domestic buildings and distinguish between light and power circuits
		<b>C109.4</b>	Students will be able to measure electrical circuit parameters like current, voltage and power in a circuit.
		<b>C109.5</b>	Students will be able to explain the usage of Multimeters and LCR Q meters
		<b>C109.6</b>	Creating awareness of energy conservation in electrical systems.
<b>10</b>	MA 102 Differential Equations	<b>C110.1</b>	Graduates will be able acquire basic knowledge of homogeneous differential equations and methods of solving them.
		<b>C110.2</b>	Graduates will be able acquire basic knowledge of non-homogeneous differential equations and methods of solving them.
		<b>C110.3</b>	Graduates will be able to apply Fourier series for analysing periodic functions in terms of their frequency components.
		<b>C110.4</b>	Graduates will be able form and solve using partial differential equations

		<b>C110.5</b>	Graduates will be able to Identify, analyse and subsequently solve the distribution of heat problems whose behaviour can be described by differential equations.
		<b>C110.6</b>	Graduates will be able to Identify, analyse and subsequently solve the waves whose behaviour can be described by differential equations.
<b>11</b>	CY100 Engineering Chemistry	<b>C111.1</b>	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
		<b>C111.2</b>	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.
		<b>C111.3</b>	Basic knowledge of Thermal analytical techniques and conductivity measurements. Basic knowledge of chromatographic techniques.
		<b>C111.4</b>	Have a scope in the area of material science. Have knowledge of synthesizing nano materials and their application in industry, carbon nano tube technology in every industry now a days.
		<b>C111.5</b>	Have knowledge of chemical properties of fuels. Know the properties of lubricants.
<b>12</b>	BE110 Engineering Graphics	<b>C112.1</b>	Draw the projection of points and lines located in different quadrants
		<b>C112.2</b>	Prepare multiview orthographic projections of objects by visualizing them in different positions
		<b>C112.3</b>	Draw sectional views and develop surfaces of a given object
		<b>C112.4</b>	Prepare pictorial drawings using the principles of isometric and perspective projections to visualise objects in 3 dimensions.
		<b>C112.5</b>	Convert 3D views to orthographic views and vice versa
		<b>C112.6</b>	Obtain multiview projections and solid models of objects using CAD tools
<b>13</b>	BE102 Design & Engineering	<b>C113.1</b>	Graduates will be able to classify and experiment different stages in design with their significance
		<b>C113.2</b>	Aware of the product oriented and user-oriented aspects that make the design a success.
		<b>C113.3</b>	The students will be able to identify & initiate different creative designs.
		<b>C113.4</b>	Enable the students to analyse the prototype models needed for development of project
		<b>C113.5</b>	Graduates will be able to Select the design requirements for designing various products.
		<b>C113.6</b>	The students can evaluate the product based on intellectual property rights
<b>14</b>	ME 100 Basics of Mechanical Engineering	<b>C114.1</b>	Acquire knowledge on fundamental concepts of thermodynamics and laws of thermodynamics.
		<b>C114.2</b>	Use energy conservation devices from the knowledge of the energy conversion device.
		<b>C114.3</b>	Select and use an appropriate refrigeration and air conditioning systems
		<b>C114.4</b>	Develop and implement basic ideas of the different parts, working of automobile and fundamentals of aerodynamics

		<b>C114.5</b>	Preparation and ability to engage in independent and life-long learning in the context of knowledge on engineering materials.
		<b>C114.6</b>	Select and use the different manufacturing methods
<b>15</b>	EC 100 Basics of Electronics Engineering	<b>C115.1</b>	To understand and identify passive components
		<b>C115.2</b>	Student can identify active components and can design, setup simple circuits using diodes
		<b>C115.3</b>	To understand the basics of BJT and detailed study of its characteristics
		<b>C115.4</b>	To understand and detailed study of JFET&MOSFET
		<b>C115.5</b>	To understand the working of rectifier
		<b>C115.6</b>	Voltage and currents can be measured and monitored using electronic measuring instruments
<b>16</b>	CY110 Engineering Chemistry Lab	<b>C116.1</b>	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses
		<b>C116.2</b>	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs
		<b>C116.3</b>	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds
		<b>C116.4</b>	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis
		<b>C116.5</b>	Learn to design and carry out scientific experiments as well as accurately record and analyse the results of such experiments
		<b>C116.6</b>	Function as a member of a team, communicate effectively and engage in further learning. Also understand how chemistry addresses social, economic and environmental problems and why it is an integral part of curriculum
<b>17</b>	ME 110 Mechanical Engineering Workshop	<b>C117.1</b>	Knowledge achieved to explain the various manufacturing process in the basic mechanical engineering workshop sections- smithy, carpentry, assembling, welding etc.
		<b>C117.2</b>	Identify the various hand tools used in the basic mechanical engineering workshop sections-smithy, carpentry, assembling, welding etc.
		<b>C117.3</b>	Able to choose different measuring devises according to the work.
		<b>C117.4</b>	Ability to name and summarize the operations of various machine tools like lathe, milling, drilling and shaping machines.
		<b>C117.5</b>	Knowledge achieved to disassemble and assemble the machines like IC engines.
		<b>C117.6</b>	Skill achieved to construct models by using basic mechanical workshop sections like welding, moulding, smithy, carpentry etc.
<b>18</b>		<b>C118.1</b>	Graduates will be able to recognize the appropriate methods to solve electronics and communication problems.
		<b>C118.2</b>	Graduates will be able to acquire basic training and skills to solve basic electronics problems.

	EC 110 Electronics Engineering Workshop	<b>C118.3</b>	Graduates will be able to apply the equations and formulas to solve related practical value problems.
		<b>C118.4</b>	Graduates will be able to calculate the problems in Diodes, biasing of transistor, amplifiers, oscillators and regulator circuits.
		<b>C118.5</b>	Graduates will be able to evaluate communication systems like RADAR, GPS, Entertainment Electronics
		<b>C118.6</b>	Graduates will be able to measure current voltage values using equipment and to analyse a waveform
<b>19</b>	MA201 Linear Algebra & Complex Analysis	<b>C201.1</b>	Graduates will be able to identify the analytic functions and harmonic functions.
		<b>C201.2</b>	Graduates will be able to understand the conformal mappings and to find regions that are mapped under certain Transformations
		<b>C201.3</b>	Graduates will be able to evaluate the complex integrals
		<b>C201.4</b>	Graduates will be able to evaluate the complex integrals as an applications of residue theorems
		<b>C201.5</b>	Graduates will be able to understand the concept of vector space, to solve the system of linear equations.
		<b>C201.6</b>	Graduates will be able to and to evaluate the Eigen value, Eigen vectors of a matrix and diagonalize a matrix.
<b>20</b>	CE201 Mechanics of Solids	<b>C202.1</b>	Acquire knowledge about simple stresses and strains and the various elastic constants
		<b>C202.2</b>	Get a knowledge about deformation of solids and about strain energy
		<b>C202.3</b>	Calculate internal forces in members subject to axial loads, shear and bending and plot their distributions
		<b>C202.4</b>	Gain knowledge in theory of simple bending and shear stresses
		<b>C202.5</b>	Transform the state of stress at a point and determine the principal and maximum shear stresses using equations as well as the Mohr's circle and also understand torsion of shafts and springs
		<b>C202.6</b>	Find the slope and deflection of beams and also understand column buckling and calculate critical load and stress
<b>21</b>	CE203 Fluid Mechanics I	<b>C203.1</b>	Understand the basics of fluid flow and pressure in fluids at rest and analyse the condition of stability of a body in a fluid based on relative positions of its centre of buoyancy and metacentre
		<b>C203.2</b>	Describe the kinematics of fluids based on stream function and velocity potential function
		<b>C203.3</b>	Apply Bernoulli's equation to fluid flow problems involving venturi meter, orifice meter, pitot tube and application of momentum principle
		<b>C203.4</b>	Apply Bernoulli's equation to fluid flow problems involving orifices, mouthpieces, notches and weirs
		<b>C203.5</b>	Analyse the flow through pipes and the major and minor energy losses
		<b>C203.6</b>	Understand the concept of development of boundary layer over a long thin plate
<b>22</b>	CE205 Engineering Geology	<b>C204.1</b>	To understand the concept of engineering geology and weathering processes.
		<b>C204.2</b>	To explain the concepts of subsurface water and its engineering significance.

		<b>C204.3</b>	To understand the physical properties and chemical composition of minerals and also to interpret earthquakes in relation to internal structure of the earth.
		<b>C204.4</b>	To identify common rocks based on their physical properties.
		<b>C204.5</b>	To describe the attitude of geological structures and instruments used.
		<b>C204.6</b>	To understand various natural hazards and its mitigation methods.
23	CE207 Surveying	<b>C205.1</b>	Student should be able to understand the basic concepts of conventional surveying including chain, compass and plane table surveying
		<b>C205.2</b>	Student should be able determine the heights of different surfaces and various concepts of contouring.
		<b>C205.3</b>	Should be able to determine earthwork excavation, prepare mass diagrams and understand the basics of theodolite surveying
		<b>C205.4</b>	Students should understand the importance of Triangulation and their applications in surveying
		<b>C205.5</b>	Students should be able to determine the Most Probable Values for various observations
		<b>C205.6</b>	Student should be able understand the basic concepts of astronomical surveying and develop the knowledge of advanced surveying methods including EDM's and Total Station
24	HS210 Life Skills	<b>C206.1</b>	knowledge about concept and importance of sustainability
		<b>C206.2</b>	understand about different types of pollution and waste generation, their causes effects and control
		<b>C206.3</b>	understand environmental management standards and environmental impact assessment
		<b>C206.4</b>	understand the concept of bio mimicking, green Engineering and green building
		<b>C206.5</b>	knowledge about various types of conventional and non-conventional energy sources
		<b>C206.6</b>	understand the role of engineering and technology in sustainable development
25	CE231 Civil Engineering Drafting Lab	<b>C207.1</b>	Student should be able to set out a building using tape
		<b>C207.2</b>	Student should be able to set out a building using cross staff
		<b>C207.3</b>	Student should be able to determine area and mass moment of inertia of
		<b>C207.4</b>	to construct one and a half and two brick walls using English bond
		<b>C207.5</b>	Student should be able to calculate the area and volume of various features o f a building
		<b>C207.6</b>	Student should be able to determine the compressive strength of brick and cement mortar cubes using compression testing machine
26	CE233 Surveying Lab	<b>C208.1</b>	The student shall be able to understand the concept of open traverse surveying and apply the same on the fields.
		<b>C208.2</b>	The student shall be able to understand the concept of Levelling and apply it to find elevations of different points in the field by Collimation Method or Rise and Fall Method.
		<b>C208.3</b>	The student shall be able to determine the angles by Method of Reiteration using Theodolite.

		<b>C208.4</b>	The student shall be able to determine the angles by Method of Repetition using Theodolite.
		<b>C208.5</b>	The student shall be able to understand the meaning of slope distance, horizontal distance and vertical height and its measurement using a Total Station Instrument.
		<b>C208.6</b>	The student shall be able to use resection or method of coordinate for the measurement of area using a Total Station Instrument.
27	MA202 Probability Distributions, Transforms and Numerical Methods	<b>C209.1</b>	Graduates will have a concept of discrete probability density functions
		<b>C209.2</b>	Graduates will have a concept of continuous probability density functions
		<b>C209.3</b>	Graduates will get an idea about the Laplace transforms and will be able to apply them in their engineering branches
		<b>C209.4</b>	Graduates will get an idea about the Fourier transforms and will be able to apply them in their engineering branches
		<b>C209.5</b>	Graduates will have a concept of numerical methods for iteration and interpolation and their applications in solving Engineering problems
		<b>C209.6</b>	Graduates will have a concept of numerical methods to solve system of linear equations and numerical integration, and their applications in solving Engineering problems
28	CE202 Structural Analysis I	<b>C210.1</b>	Analyse trusses and understand displacement response of statically determinate structural systems using energy methods
		<b>C210.2</b>	Understand the application of unit load method and strain energy method for determination of deflection of statically determinate beams, frames & pin jointed trusses
		<b>C210.3</b>	Analyse statically indeterminate structures using strain energy method and method of consistent deformation
		<b>C210.4</b>	Gain knowledge about moving loads and influence lines
		<b>C210.5</b>	Gain knowledge about statically determinate suspension bridges and arches
		<b>C210.6</b>	Gain knowledge about statically indeterminate suspension bridges and arches
29	CE204 Construction Technology	<b>C211.1</b>	Students will be able to understand construction materials, their components and manufacturing processes.
		<b>C211.2</b>	Students will be able to know the properties of concrete and different mix design methods
		<b>C211.3</b>	Students will be able to understand details regarding the building construction and masonry domestic buildings.
		<b>C211.4</b>	Students will be able to define the details regarding the components of building
		<b>C211.5</b>	The students will be able to define and describe the concepts of design material of tall framed load bearing building and servicing
		<b>C211.6</b>	Students will be able to know the failures of structures and reasons.
30	CE206 Fluid Mechanics II	<b>C212.1</b>	The students become able to analyse the hydraulic turbines
		<b>C212.2</b>	The students become able to understand the working of hydraulic pumps



		<b>C212.3</b>	They become capable of analysing open channel flows & designing open channels
		<b>C212.4</b>	The students become capable of computation of critical flow and analysis of hydraulic jump
		<b>C212.5</b>	Students become able to analyse surface profiles and gradually varied flow
		<b>C212.6</b>	Students will be able to understand the concept of dimensional analysis and model analysis
<b>31</b>	CE208 Geotechnical Engineering I	<b>C213.1</b>	The students will be able to understand the basic principles governing soil behaviour
		<b>C213.2</b>	Students can identify the soil based on gradation and different consistency limits
		<b>C213.3</b>	Students will be able to calculate total and effective stress with a knowledge of pore water, also the permeability characteristics of different soils
		<b>C213.4</b>	Students can acquire knowledge in different soil tests and will be able to draw the Mohr circle
		<b>C213.5</b>	Gain knowledge in consolidation and practical applications of consolidation
		<b>C213.6</b>	Students get an idea on slopes, its failures and compaction characteristics of soil
<b>32</b>	HS200 Business Economics	<b>C214.1</b>	knowledge about concept and importance of sustainability
		<b>C214.2</b>	understand about different types of pollution and waste generation, their causes effects and control
		<b>C214.3</b>	understand environmental management standards and environmental impact assessment
		<b>C214.4</b>	understand the concept of bio mimicking, green Engineering and green building
		<b>C214.5</b>	knowledge about various types of conventional and non-conventional energy sources
		<b>C214.6</b>	understand the role of engineering and technology in sustainable development
<b>33</b>	CE232 Materials Testing Lab I	<b>C215.1</b>	To determine the Modulus of Elasticity of steel and wood using UTM
		<b>C215.2</b>	To verify Clerk- Maxwell's Reciprocal Theorem and hence determine the Modulus of elasticity of steel.
		<b>C215.3</b>	To determine the Modulus of rigidity of steel using torsion test, spring test and torsion pendulum
		<b>C215.4</b>	To analyse the toughness of a specimen using Impact testing machine
		<b>C215.5</b>	To test the hardness of a material by Rockwell, Brinell and Vickers Hardness test.
		<b>C215.6</b>	To determine the ultimate shear stress of steel using UTM
<b>34</b>	CE234 Fluid Mechanics Lab	<b>C216.1</b>	Students will be able to understand the different flow measurement equipment and their procedures.
		<b>C216.2</b>	Students will be able to analyse the performance characteristics pumps
		<b>C216.3</b>	Graduates will be able to develop the skill of experimentation techniques for the study of flow phenomena in pipes
		<b>C216.4</b>	Students will be able to analyse the performance characteristics turbines
		<b>C216.5</b>	Graduates will be able to develop the skill of experimentation techniques for the study of flow phenomena in channels

		<b>C216.6</b>	Students will be able to compute the hydraulic coefficients of orifices and mouth pieces under constant head method and time of emptying method.
35	CE301 Design of Concrete Structures I	<b>C301.1</b>	Students will be able to apply the fundamental concepts of WSM and LSM.
		<b>C301.2</b>	Students will be able to use IS code of practice for the design of concrete elements.
		<b>C301.3</b>	Students will be able to design various beam elements of reinforced concrete structures by LSD.
		<b>C301.4</b>	The students will get knowledge about basic design of RC slabs by LSD
		<b>C301.5</b>	The students should be able to design reinforced concrete slabs for shear and torsion by LSD and draw the reinforcement details
		<b>C301.6</b>	The students should be able to design reinforced concrete staircases and various types of columns.
36	CE303 Structural Analysis II	<b>C302.1</b>	Analyse structures using three moment theorems
		<b>C302.2</b>	Analyse structures using slope deflection method
		<b>C302.3</b>	Analyse structures using moment distribution method
		<b>C302.4</b>	Analyse structures using Kane's method
		<b>C302.5</b>	Analyse curved beams in plan
		<b>C302.6</b>	Analyse structures using plastic theory
37	CE305 Geotechnical Engineering II	<b>C303.1</b>	The students will be able to learn stress formation in soil due to point load along with Newmark's chart
		<b>C303.2</b>	Students can calculate lateral earth pressures using different methods
		<b>C303.3</b>	Students will be able to calculate ultimate, safe and allowable bearing capacity of shallow foundations and can understand different shear failures
		<b>C303.4</b>	Students can do the design of combined footings and raft foundations with a knowledge in bearing capacity
		<b>C303.5</b>	Gain knowledge in different piles and role of pile foundations in soil mechanics
		<b>C303.6</b>	Students get an idea on machine foundations and the importance in site investigations using different methods of boring
38	CE307 Geomatics	<b>C304.1</b>	To select proper method for balancing the traverse by understanding traversing, and its various methods.
		<b>C304.2</b>	To distinguish between different types of curves and choose the appropriate one by comprehending basics of curves.
		<b>C304.3</b>	Describe the fundamental theory and concepts of the Global Positioning System
		<b>C304.4</b>	Summarize the GPS surveying methods
		<b>C304.5</b>	Explain the fundamental principles of Remote sensing
		<b>C304.6</b>	To apply and arrive at solutions for various civil engineering aspects using Geographical Information System (GIS) tool.

39	CE309 Water Resources Engineering	<b>C305.1</b>	The students will be able to understand the hydrologic cycle and the mechanism of precipitation, infiltration and their measurement.
		<b>C305.2</b>	The students will be able to compute the amount of runoff generated during a storm using hydrograph analysis
		<b>C305.3</b>	The students will be able to determine the water requirement of crops and irrigation efficiencies.
		<b>C305.4</b>	The students will be able to understand the different stream flow measurement techniques and river training works
		<b>C305.5</b>	The students will be able to understand reservoir planning and compute useful life of a reservoir.
		<b>C305.6</b>	The students will be able to understand the distribution and storage of groundwater and apply the knowledge in their extraction.
40	CE 361 Advanced Concrete Technology	<b>C306A.1</b>	Students will be able to understand the testing of different ingredients of concrete- cement, aggregates as per IS code.
		<b>C306A.2</b>	Students will be able to decide the type of admixtures to be used for concreting based on its properties
		<b>C306A.3</b>	Students will be able to design the concrete mix using ACI and IS code methods
		<b>C306A.4</b>	Students will be able to determine the properties of fresh and hardened of concrete
		<b>C306A.5</b>	Students will be able to determine different properties of concrete by applying non-destructive testing of concrete and also explain the factors affecting durability of concrete
		<b>C306A.6</b>	Students will be able to recommend special concretes depending on their specific applications and special processes and technology for particular types of structure
41	CE 363 Geotechnical Investigation	<b>C306B.1</b>	Students will understand the importance of soil exploration programs.
		<b>C306B.2</b>	Understand different methods of soil exploration and also know the application of plate load test
		<b>C306B.3</b>	Identification of various engineering and index properties of soil using standard penetration test and cone penetration test
		<b>C306B.4</b>	the students will able to apply knowledge of geophysical methods to know the type and properties of soil strata
		<b>C306B.5</b>	Understand different types of samplers and methods of sampling
		<b>C306B.6</b>	Students will be able to determine the properties of rock samples and also determination of load carrying capacity of pile.
42	CE341 Design Project	<b>C307.1</b>	The students will be able to understand the engineering aspects of design with reference to simple products
		<b>C307.2</b>	The students will be able to foster innovation in design of products, processes and systems
		<b>C307.3</b>	The students will be able to develop design that add value to products and solve technical problems
		<b>C307.4</b>	The students will be able to study and present new products in a teamwork
		<b>C307.5</b>	The students will be able to think innovatively about different technologies used in engineering field

		<b>C307.6</b>	The students will be able to study and analyse different problems related to engineering field
43	CE331 Materials Testing Lab II	<b>C308.1</b>	Estimate the various properties of fine and coarse aggregate
		<b>C308.2</b>	Determine strength properties of cement
		<b>C308.3</b>	The students will develop the ability to use the IS codes for the Specification and characteristic study of materials used in the concrete.
		<b>C308.4</b>	Find the fresh and hardened concrete properties
		<b>C308.5</b>	Judge the strength of concrete
		<b>C308.6</b>	Determine the strength of different types of tiles
44	CE333 Geotechnical Engineering Lab	<b>C309.1</b>	Students have thorough knowledge about the procedures of laboratory tests
		<b>C309.2</b>	To determine the physical, index and engineering properties of soils
		<b>C309.3</b>	The students will have the capability to classify soils and behaviour based on test results
		<b>C309.4</b>	They will be able to evaluate the permeability and shear strength of soils
		<b>C309.5</b>	Students will be able to evaluate settlement characteristics of soils
		<b>C309.6</b>	They will be able to evaluate compaction characteristics required for field application
45	CE302 Design of Hydraulic Structures	<b>C310.1</b>	Design of irrigation structures like diversion head works
		<b>C310.2</b>	Design of irrigation canals and introduction to regulators and cross drainage works
		<b>C310.3</b>	Design and drawing of minor irrigation structures such as regulators, cross drainage works and canal falls
		<b>C310.4</b>	Perform the stability analysis of gravity dams
		<b>C310.5</b>	Explain the causes of failure of different types of dams and their design criteria
46	CE304 Design of Concrete Structures II	<b>C311.1</b>	Students will be able to design various types of columns using SP 16.
		<b>C311.2</b>	To get knowledge about types of foundations, principles of Combined footings and design of isolated footing.
		<b>C311.3</b>	Students will be able to design and detail cantilever retaining wall and understand the design principles of Counter fort retaining wall.
		<b>C311.4</b>	The students will be able to design and detail circular slabs and domes.
		<b>C311.5</b>	The students will be able to design rectangular and circular water tanks using IS code.
		<b>C311.6</b>	The students gain knowledge of prestressed concrete fundamentals and analyse pre and post tensioned beams.
47	CE306 Computer Programming and Computational Techniques	<b>C312.1</b>	Students will be able to define the numerical techniques for finding solutions of Transcendental equations and interpolations
		<b>C312.2</b>	Students will be able to describe and analyse functional approximations, numerical integration and solution of simultaneous linear algebraic equations

		<b>C312.3</b>	Students will have a fundamental idea about C++ concept, keywords, identifiers, data types, constants and variables, operators and structures of C++
		<b>C312.4</b>	Students will be able to develop the programs for evaluation of factorial of a number, infinite series, sorting, searching and matrix manipulations
		<b>C312.5</b>	Students will be able to write the programs to solve simple engineering programs using function call by value and function call by reference
		<b>C312.6</b>	Students will be able to write the C++ programs to solve simple engineering programs using Class, objects and concepts like inheritance
<b>48</b>	CE308 Transportation Engineering I	<b>C313.1</b>	The students will be able to conduct Engineering Surveys for highway alignment and design cross sectional elements
		<b>C313.2</b>	The students will be able to design various geometric elements of a highway
		<b>C313.3</b>	Students will be able to determine the characteristics of pavement materials and design flexible pavements
		<b>C313.4</b>	Students will be able to identify the various types and causes of failure in flexible and rigid pavements and conduct traffic engineering studies and analyse data for efficient management of roadway facilities
		<b>C313.5</b>	Students will be able to design various traffic control devices and understand types of intersections and the planning of airports.
		<b>C313.6</b>	Students will be able to design basic airport facilities
<b>49</b>	HS300 Principles of Management	<b>C314.1</b>	To recall and identify the relevance of management concepts
		<b>C314.2</b>	To describe, discuss and relate management techniques adopted within an organization
		<b>C314.3</b>	To apply management techniques for meeting current and future management challenges faced by the organization
		<b>C314.4</b>	To compare the management theories and models critically and to inspect and question its validity in the real world
		<b>C314.5</b>	To assess and modify different theories of management so as to relate it to current management challenges
		<b>C314.6</b>	To apply principles of management in order to execute the role as a manager
<b>50</b>	CE 362 Ground Improvement Techniques	<b>C315.1</b>	An understanding about types of ground improvement techniques and soil distribution in India
		<b>C315.2</b>	Knowledge about various types of grouts and their applications
		<b>C315.3</b>	Knowledge about types of chemical stabilization and their construction method
		<b>C315.4</b>	Understanding about Ground Anchors, Rock Bolts and Soil Nailing
		<b>C315.5</b>	Knowledge about Compaction of soil
		<b>C315.6</b>	Understanding about various methods of dewatering of soil
<b>51</b>		<b>C316.1</b>	Students should be able to find different properties of Bitumen

	CE332 Transportation Engineering Lab	<b>C316.2</b>	Students should be able to select the aggregates to be used in pavement by conducting various tests
		<b>C316.3</b>	Students shall be able to find the strength of given soil sample by conducting CBR test
		<b>C316.4</b>	students will be able to find the binding strength of bitumen
		<b>C316.5</b>	Students will be able to determine the properties of aggregates
		<b>C316.6</b>	Students should be able to determine the specific gravity of soil
52	CE334 Computer Aided Civil Engineering Lab	<b>C317.1</b>	Students able to express the concept of CAD/CAM/CIM and Other terminologies used in the development and manufacturing of a product.
		<b>C317.2</b>	Students able to demonstrate different methods for geometric modelling in CAD.
		<b>C317.3</b>	Students able to evaluate the types of curves used in creating a geometry.
		<b>C317.4</b>	Students able to demonstrate different solid modelling representations used in CAD.
		<b>C317.5</b>	Students able to formulate stiffness matrix to analyse structural and thermal problems
53	CE352 Comprehensive Exam	<b>C317.6</b>	Students analyse structural finite element problems by getting knowledge about various finite element methods.
		<b>C318.1</b>	The student will be confident in analysing the fundamental aspects of structural engineering problem/situation
		<b>C318.2</b>	The student will be confident in understanding the fundamental aspects of fluid mechanics problem/situation
		<b>C318.3</b>	The student will be confident in discussing the fundamental aspects of concrete technology problem/situation
		<b>C318.4</b>	The student will be confident in describing the fundamental aspects of transportation engineering problem/situation
54	CE401 Design of Steel Structures	<b>C318.5</b>	The student will be confident in understanding the fundamental aspects of basic civil engineering problem/situation
		<b>C401.1</b>	Students will be able to design bolted and welded connections
		<b>C401.2</b>	To get knowledge about design tension members and beams using the IS specifications
		<b>C401.3</b>	Students will be able to design columns under axial loads using IS specifications
		<b>C401.4</b>	The students will be able design beams and plate girders
55	CE403 Structural Analysis III	<b>C401.5</b>	To get knowledge about to assess loads on truss and design purlins.
		<b>C401.6</b>	The students gain knowledge of design structural components using timber.
		<b>C402.1</b>	To analyse multi-storied frames using approximate methods
		<b>C402.2</b>	To understand the fundamentals of indeterminacies, flexibility and stiffness of structures
		<b>C402.3</b>	To analyse trusses, continuous beams and rigid frames using flexibility method
		<b>C402.4</b>	To analyse trusses, continuous beams and rigid frames by stiffness method
		<b>C402.5</b>	To analyse continuous beams and rigid frames by direct stiffness method

		<b>C402.6</b>	To understand the basic concepts of structural dynamics
<b>56</b>	CE405 Environmental Engineering I	<b>C403.1</b>	To understand basic principles of water supply engineering & to estimate water demand using population forecasting method
		<b>C403.2</b>	students will become aware of various pollutants affecting water quality
		<b>C403.3</b>	students will know about the different units available in a water treatment plant & design of sedimentation tank
		<b>C403.4</b>	The students will become aware of various filters & design of rapid sand filter
		<b>C403.5</b>	Get the idea about disinfectant, hardness removing methods & miscellaneous methods
		<b>C403.6</b>	Students should be able to understand and design distribution networks in water
		<b>57</b>	CE407 Transportation Engineering II
<b>C404.2</b>	Students will be able to explain the geometric parameters and component of railway track		
<b>C404.3</b>	Students will be able to understand the operations and controlling systems in railways		
<b>C404.4</b>	Students will be able to know the track maintenance and accident control methods		
<b>C404.5</b>	Students will be able to study the setting out and construction of tunnels		
<b>C404.6</b>	Students will be able to illustrate the functions and components of harbours and docks		
<b>58</b>	CE409 Quantity Surveying and Valuation	<b>C405.1</b>	Students will be able to identify the quality and quantity of materials, quantity and classes of skilled and unskilled labours and tools and plants required for the project.
		<b>C405.2</b>	Students will be able to analyse the rate of items of work by working out the quantities of different materials and labours required for execution of various items of work.
		<b>C405.3</b>	Students will be able to estimate the quantities, prepare abstract for various items of works- buildings, septic tanks, culverts, roads etc. by drawing up specifications, bar bending schedule and also prepare the schedule of programming of the project
		<b>C405.4</b>	Students will be able to evaluate the value of real and landed property and rent of lease hold property
<b>59</b>	CE 467 Highway Pavement Design	<b>C406.1</b>	Students will understand the basic principles of waste water engineering, design and construction & create awareness about sewer
		<b>C406.2</b>	understand various sewer appurtenances & characteristics of sewage
		<b>C406.3</b>	to get idea about waste water disposal & various treatment units
		<b>C406.4</b>	to create awareness on secondary treatment system
		<b>C406.5</b>	to create awareness on septic tank & working of various treatment units
		<b>C406.6</b>	To create awareness on various sludge treatment methods & sludge disposal.
<b>60</b>	CE451 Seminar & Project Preliminary	<b>C407.1</b>	Students should analyse a current topic of professional interest and present in before audience
		<b>C407.2</b>	Students should identify an engineering problem, analyse it and propose a work plan to solve it

		<b>C407.3</b>	Students should make models to solve a particular problem
		<b>C407.4</b>	Students should be able to communicate effectively about the current methods or techniques in the field of civil engineering
		<b>C407.5</b>	They must be able to adapt to the recent innovations in the field of civil engineering
		<b>C407.6</b>	Students should have the ability to convince public with their innovations
<b>61</b>	CE431 Environmental Engineering Lab	<b>C408.1</b>	Students will be able to analyse dissolved oxygen content in water
		<b>C408.2</b>	Students will be able to determine the biochemical oxygen demand in water
		<b>C408.3</b>	The students will be able to analyse the chemical characteristics of a given water sample viz. pH, acidity, alkalinity
		<b>C408.4</b>	The students will be able to analyse the physical characteristics of a given water sample viz. colour, turbidity & conductivity
		<b>C408.5</b>	The students will be able to determine the optimum dosage of alum using jar test
		<b>C408.6</b>	To estimate the chemical characteristics of a given water sample viz. chlorides, iron, available chlorine & sulphates content to assess its suitability for drinking purpose
<b>62</b>	CE402 Environmental Engineering II	<b>C409.1</b>	Students will understand the basic principles of waste water engineering, design and construction & create awareness about sewer
		<b>C409.2</b>	understand various sewer appurtenances & characteristics of sewage
		<b>C409.3</b>	to get idea about waste water disposal & various treatment units
		<b>C409.4</b>	to create awareness on secondary treatment system
		<b>C409.5</b>	to create awareness on septic tank & working of various treatment units
		<b>C409.6</b>	To create awareness on various sludge treatment methods & sludge disposal.
<b>63</b>	CE404 Civil Engineering Project Management	<b>C410.1</b>	Students will be able to plan and schedule a construction project
		<b>C410.2</b>	Students will be able to select an appropriate construction equipment for a specific job
		<b>C410.3</b>	Students will be able to familiarize the legal procedures in construction contracts.
		<b>C410.4</b>	Students will be able to formulate suitable quality Management plan for construction
		<b>C410.5</b>	The students will be able to familiarize the safety practices and procedures.
		<b>C410.6</b>	The students will be able to apply principles of ethics in decision making.
<b>64</b>	CE 474 Municipal Solid Waste Management	<b>C411.1</b>	The student will be able to know the different sources and characteristics of wastes
		<b>C411.2</b>	Students will understand the factors affecting waste generation, rates
		<b>C411.3</b>	The students will get the knowledge on waste collection methods and services
		<b>C411.4</b>	Students will be able to know the different processing techniques of wastes



		<b>C411.5</b>	To get a knowledge on disposal of solid waste
		<b>C411.6</b>	To know the different composting techniques
<b>65</b>	IE 488 Total Quality Management	<b>C412.1</b>	To recall and identify the relevance of management concepts
		<b>C412.2</b>	To describe, discuss and relate management techniques adopted within an organization
		<b>C412.3</b>	To apply management techniques for meeting current and future management challenges faced by the organization
		<b>C412.4</b>	To compare the management theories and models critically and to inspect and question its validity in the real world
		<b>C412.5</b>	To assess and modify different theories of management so as to relate it to current management challenges
		<b>C412.6</b>	To apply principles of management in order to execute the role as a manager
<b>66</b>	CE492 Project	<b>C413.1</b>	Students should identify an engineering problem, analyse it and propose a work plan to solve it
		<b>C413.2</b>	Students should have the ability to convince others with their innovations in civil engineering
		<b>C413.3</b>	They must be able to adapt to the recent innovations in the field of civil engineering
		<b>C413.4</b>	Students should make models to solve a particular problem
		<b>C413.5</b>	They must be able to undertake a problem, find solutions and should try to implement
		<b>C413.6</b>	They must have a technical knowledge in their selected area