

**DEPARTMENT OF CIVIL ENGINEERING**

**List of Subjects: (Regulation 2017)**

S.No.	Course code	Subject code	Course Name
<b>Semester I</b>			
1.	C101	HS8151	Communicative English
2.	C102	MA8151	Engineering Mathematics – I
3.	C103	PH8151	Engineering Physics
4.	C104	CY8151	Engineering Chemistry
5.	C105	GE8151	Problem Solving and Python Programming
6.	C106	GE8152	Engineering Graphics
7.	C107	GE8161	Problem Solving and Python Programming Laboratory
8.	C108	BS8161	Physics and Chemistry Laboratory
<b>Semester II</b>			
9.	C109	HS8251	Technical English
10.	C110	MA8251	Engineering Mathematics – II
11.	C111	PH8201	Physics For Civil Engineering
12.	C112	BE8251	Basic Electrical and Electronics Engineering
13.	C113	GE8291	Environmental Science and Engineering
14.	C114	GE8292	Engineering Mechanics
15.	C115	GE8261	Engineering Practices Laboratory
16.	C116	CE8211	Computer Aided Building Drawing
<b>Semester III</b>			
17.	C201	MA8353	Transforms and Partial Differential Equations
18.	C202	CE8301	Strength of Materials I
19.	C203	CE8302	Fluid Mechanics
20.	C204	CE8351	Surveying
21.	C205	CE8391	Construction Materials
22.	C206	CE8392	Engineering Geology
23.	C207	CE8311	Construction Materials Laboratory
24.	C208	CE8361	Surveying Laboratory
25.	C209	HS8381	Interpersonal Skills /Listening and Speaking
<b>Semester IV</b>			
26.	C210	MA8491	Numerical Methods
27.	C211	CE8401	Construction Techniques and Practices
28.	C212	CE8402	Strength of Materials II

29.	C213	CE8403	Applied Hydraulic Engineering
30.	C214	CE8404	Concrete Technology
31.	C215	CE8491	Soil Mechanics
32.	C216	CE8481	Strength of Materials Laboratory
33.	C217	CE8461	Hydraulic Engineering Laboratory
34.	C218	HS8461	Advanced Reading and Writing
<b>Semester V</b>			
35.	C301	CE8501	Design of Reinforced Cement Concrete Elements
36.	C302	CE8502	Structural Analysis I
37.	C303	EN8491	Water Supply Engineering
38.	C304	CE8591	Foundation Engineering
39.	C305	GI8014	Geographic Information System
40.	C306	OAI553	Production technology for Agricultural machinery
41.	C307	CE8511	Soil Mechanics Laboratory
42.	C308	CE8512	Water and Waste Water Analysis Laboratory
43.	C309	CE8513	Survey Camp (2 weeks –During IV Semester)
<b>Semester VI</b>			
44.	C310	CE8601	Design of Steel Structural Elements
45.	C311	CE8602	Structural Analysis II
46.	C312	CE8603	Irrigation Engineering
47.	C313	CE8604	Highway Engineering
48.	C314	EN8592	Waste water Engineering
49.	C315	CE8005	Air pollution and Control Engineering
50.	C316	CE8611	Highway Engineering Laboratory
51.	C317	CE8612	Irrigation and Environmental Engineering Drawing

## Course Outcomes of all subjects

### Semester I

<b>COMMUNICATIVE ENGLISH : C101</b>	
<b>C101.1</b>	Understand clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies
<b>C101.2</b>	Analyzing cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic
<b>C101.3</b>	Create different genres of texts adopting various reading strategies
<b>C101.4</b>	Understand different spoken discourses and different accents
<b>C101.5</b>	Understand intonations of the speaker while communicating as well as development of creative writing.

<b>ENGINEERING MATHEMATICS I : C102</b>	
<b>C102.1</b>	Use both the limit definition and rules of differentiation to differentiate functions. Apply differentiation to solve maxima and minima problems.
<b>C102.2</b>	Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.
<b>C102.3</b>	Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.
<b>C102.4</b>	Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.
<b>C102.5</b>	Apply various techniques in solving differential equations.

<b>ENGINEERING PHYSICS : C103</b>	
<b>C103.1</b>	Gain knowledge on the properties of matter and its applications.
<b>C103.2</b>	Understand the concepts of waves and optical devices and its applications.
<b>C103.3</b>	Analyze the thermal properties of materials and their applications
<b>C103.4</b>	To get knowledge about advanced physics concepts of quantum theory
<b>C103.5</b>	Achieve the knowledge about various crystals structures and its growth techniques.

<b>ENGINEERING CHEMISTRY : C104</b>	
<b>C104.1</b>	Gain knowledge on the water quality parameters.
<b>C104.2</b>	Understand the types of catalysis & Identify the applications of adsorption.
<b>C104.3</b>	Analyse the types of phase in a system & various alloys
<b>C104.4</b>	Evaluate the characteristics of various fuels & its applications.
<b>C104.5</b>	Achieve the knowledge about various energy sources & its applications.

<b>PROBLEM SOLVING AND PYTHON PROGRAMMING : C105</b>	
<b>C105.1</b>	Develop algorithmic solutions to simple computational problems
<b>C105.2</b>	Read, write, execute by hand simple Python programs.
<b>C105.3</b>	Decompose a Python program into functions.
<b>C105.4</b>	Represent compound data using Python lists, tuples, and dictionaries.
<b>C105.5</b>	Read and write data from/to files in Python Programs.

<b>ENGINEERING GRAPHICS: C106</b>	
<b>C106.1</b>	Effectively understand the practical applications of conics, special curves and freehand sketching.
<b>C106.2</b>	Implement the drawing skills in points, lines and planes.
<b>C106.3</b>	Enhance the solid projections in pyramid, prisms, cylinder and cones.
<b>C106.4</b>	Understand clearly the concepts of sectioning and development of solids in pyramid, prisms, cylinder and cones.
<b>C106.5</b>	Improve the engineering knowledge in frustrum & truncated solids, visual ray methods.

<b>PROBLEM SOLVING AND PYTHON PROGRAMMING : C107</b>	
<b>C107.1</b>	Develop algorithmic solutions to simple computational problems, Write, test, and debug simple Python programs.
<b>C107.2</b>	Read, write, execute by handle simple Python programs, Implement Python programs with conditionals and loops.
<b>C107.3</b>	Develop Python programs step-wise by defining functions and calling them.
<b>C107.4</b>	Use Python lists, tuples, dictionaries for representing compound data.
<b>C107.5</b>	Read and write data from/to files in Python

<b>PHYSICS AND CHEMISTRY LABORATORY : C108</b>	
<b>C108.1</b>	Analyse the characteristics of engineering materials.
<b>C108.2</b>	Find out the physical properties of matter.
<b>C108.3</b>	Assess the water quality parameter.
<b>C108.4</b>	Analyse the pH of aqueous solutions.
<b>C108.5</b>	Gain knowledge on chemical properties of liquids.

### Semester II

<b>TECHNICAL ENGLISH : C109</b>	
<b>C109.1</b>	Speak convincingly, express their opinions clearly, initiate a discussion, negotiate, and argue using appropriate communicative strategies.
<b>C109.2</b>	Recognize to frame effective types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing to determine their writing skill.
<b>C109.3</b>	Attribute to read different genres of texts, infer implied meanings and critically analyse and evaluate them for ideas as well as for method of presentations.
<b>C109.4</b>	Listen different spoken excerpts critically and infer unspoken and implied meanings
<b>C109.5</b>	Analyze to participant in a group discussion and understanding technical articles.

<b>ENGINEERING MATHEMATICS II: C110</b>	
<b>C110.1</b>	Eigen values and eigenvectors, Diagonalization of a matrix, Symmetric matrices, Positivedefinite matrices and similar matrices
<b>C110.2</b>	Generalize about vector differentiation, line, surface and volume integrals and theorems involving them.
<b>C110.3</b>	Examine analytic functions and its properties, conformal mapping and its applications.
<b>C110.4</b>	Summarize the concepts of complex integration.
<b>C110.5</b>	Use knowledge of Laplace transform and its properties, inverse Laplace transform to solve linear differential equations.

<b>PHYSICS FOR CIVIL ENGINEERING: C111</b>	
<b>C111.1</b>	Analyze the thermal performance of buildings.
<b>C111.2</b>	Understand and acquire knowledge on the acoustic properties of buildings,.
<b>C111.3</b>	Remember the basic concepts in light designs
<b>C111.4</b>	Understand the properties and performance of engineering materials,
<b>C111.5</b>	Analyse the hazards of buildings.

<b>BASIC ELECTRICAL AND ELECTRONICS ENGINEERING: C112</b>	
<b>C112.1</b>	Students can able to describe and analyse the basic electric circuits and explain the operation of indicating instruments
<b>C112.2</b>	Students can able to understand the construction, operation and characteristics of electrical machines
<b>C112.3</b>	Students can able to expose the operation and applications of electronic devices
<b>C112.4</b>	Students can able to understand and examine the structure of various number systems and its applications in digital circuits.
<b>C112.5</b>	Students can able to discuss the functions of various communication systems

<b>ENVIRONMENTAL SCIENCE AND ENGINEERING: C113</b>	
<b>C113.1</b>	Gain knowledge on public awareness & about the Environment & Ecosystem.
<b>C113.2</b>	Identify the impacts of Pollution.
<b>C113.3</b>	Achieve Sustainable development.
<b>C113.4</b>	Analyze about the social issues in the Environment.
<b>C113.5</b>	Apply the knowledge to tackle the problems of over population.

<b>ENGINEERING MECHANICS C114</b>	
<b>C114.1</b>	Illustrate the vectorial and scalar representation of forces and moments.
<b>C114.2</b>	Analyse the equilibrium of rigid bodies in two dimensions and three dimensions.
<b>C114.3</b>	Evaluate the properties of surfaces and solids.
<b>C114.4</b>	Study the effects of dynamic forces in particle.
<b>C114.5</b>	Determine the friction and the effects by the laws of friction.

<b>ENGINEERING PRACTICES LABORATORY : C115</b>	
<b>C115.1</b>	Plumbing and carpentry areas regard to pipeline joints, household fittings, water supply and sewage works, joints in roofs, doors, windows and furniture.
<b>C115.2</b>	Analyzing the engineering knowledge through welding, machining, sheetmetal categories in gas welding, facing, turning, forming and bending operations.
<b>C115.3</b>	Understanding the assembly works on study of pump, a/c and demonstration works on Smithy, foundry and fitting operations.
<b>C115.4</b>	Perceiving knowledge on various basic in electrical engineering in simple domestic wiring

	circuits and relationship between the various electrical parameters.
<b>C115.5</b>	Comparing and analyzing the performance of basic electronic devices and build a simple electronic circuits and Printed Circuit Boards.

<b>COMPUTER AIDED BUILDING DRAWING: C116</b>	
<b>C116.1</b>	Understand the elevation and sectional views of the paneled and glazed doors and windows
<b>C116.2</b>	obtain the knowledge on the basis work in plan, elevation and section of residential buildings
<b>C116.3</b>	Gain the knowledge on specified skills in plan, section and elevation of building with sloping roof.
<b>C116.4</b>	Developed knowledge on various basic ideas in RCC framed Structures.
<b>C116.5</b>	Recognize the orientation and function of industrial buildings.

### Semester III

<b>Transforms and Partial Differential Equations:C201</b>	
<b>C201.1</b>	Understand how to solve the given standard partial differential equations.
<b>C201.2</b>	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
<b>C201.3</b>	Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
<b>C201.4</b>	Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
<b>C201.5</b>	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

<b>Strength of Materials I:C202</b>	
<b>C202.1</b>	Understand the concepts of stress and strain, principal stresses and principal planes.
<b>C202.2</b>	Determine Shear force and bending moment in beams and understand concept of theory of simple bending.
<b>C202.3</b>	Calculate the deflection of beams by different methods and selection of method for determining slope or deflection.
<b>C202.4</b>	Apply basic equation of torsion in design of circular shafts and helical springs,.
<b>C202.5</b>	Analyze the pin jointed plane and space trusses

<b>Fluid Mechanics:C203</b>	
<b>C203.1</b>	Get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.
<b>C203.2</b>	Understand and solve the problems related to equation of motion.
<b>C203.3</b>	Gain knowledge about dimensional and model analysis.
<b>C203.4</b>	Learn types of flow and losses of flow in pipes.
<b>C203.5</b>	Understand and solve the boundary layer problems.

<b>Surveying:C204</b>	
<b>C204.1</b>	The use of various surveying instruments and mapping
<b>C204.2</b>	Measuring Horizontal angle and vertical angle using different instruments
<b>C204.3</b>	Methods of Leveling and setting Levels with different instruments
<b>C204.4</b>	Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth
<b>C204.5</b>	Concept and principle of modern surveying.

<b>Construction Materials:C205</b>	
<b>C205.1</b>	Compare the properties of most common and advanced building materials.
<b>C205.2</b>	understand the typical and potential applications of lime, cement and aggregates
<b>C205.3</b>	know the production of concrete and also the method of placing and making of concrete elements.
<b>C205.4</b>	understand the applications of timbers and other materials
<b>C205.5</b>	Understand the importance of modern material for construction.

<b>Engineering Geology:C206</b>	
<b>C206.1</b>	Will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.
<b>C206.2</b>	Will get basics knowledge on properties of minerals.
<b>C206.3</b>	Gain knowledge about types of rocks, their distribution and uses.
<b>C206.4</b>	Will understand the methods of study on geological structure.
<b>C206.5</b>	Will understand the application of geological investigation in projects such as dams, tunnels, bridges, roads, airport and harbor

<b>Construction Materials Laboratory:C207</b>	
<b>C207.1</b>	The students will have the required knowledge in the area of testing of construction materials
<b>C207.2</b>	Students able to test the components of construction elements experimentally.
<b>C207.3</b>	Students able to understand the properties of materials used in construction.
<b>C207.4</b>	Students will gain sound practical knowledge in utilizing construction materials in practice.
<b>C207.5</b>	Students acquire knowledge in understanding fresh and hardened properties of concrete.

<b>Surveying Laboratory:C208</b>	
<b>C208.1</b>	Students completing this course would have acquired practical knowledge on using basic instruments for surveying with its accessories.
<b>C208.2</b>	Students gain practical knowledge in setting out works like foundation marking.
<b>C208.3</b>	Students able to handle survey instruments including Theodolite and Tacheometry.
<b>C208.4</b>	Students gain knowledge in using total station and GPS.
<b>C208.5</b>	They acquire adequate knowledge to carryout Triangulation and Astronomical surveying including general field marking for various engineering projects and Location of site etc.

<b>Interpersonal Skills/Listening and Speaking:C209</b>	
<b>C209.1</b>	Listen and respond appropriately.

<b>C209.2</b>	Participate in group discussions
<b>C209.3</b>	Make effective presentations
<b>C209.4</b>	Participate confidently and appropriately in conversations both formal and informal
<b>C209.5</b>	To make effective in students grammar and vocabulary.

### Semester IV

<b>Numerical Methods:C210</b>	
<b>C210.1</b>	Understand the basic concepts and techniques of solving algebraic and transcendental equations.
<b>C210.2</b>	Appreciate the numerical techniques of interpolation and error approximations in various intervals in real life situations.
<b>C210.3</b>	Apply the numerical techniques of differentiation and integration for engineering problems.
<b>C210.4</b>	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
<b>C210.5</b>	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

<b>Construction Techniques and Practices:C211</b>	
<b>C211.1</b>	Know the different construction techniques and structural systems
<b>C211.2</b>	Understand various techniques and practices on masonry construction, flooring, and roofing.
<b>C211.3</b>	Plan the requirements for substructure construction.
<b>C211.4</b>	Know the methods and techniques involved in the construction of various types of super structures
<b>C211.5</b>	Select, maintain and operate hand and power tools and equipment used in the building construction sites.

<b>Strength of Materials II:C212</b>	
<b>C212.1</b>	Determine the strain energy and compute the deflection of determinate beams, frames and trusses using energy principles.
<b>C212.2</b>	Analyze propped cantilever, fixed beams and continuous beams using theorem of three moment equation for external loadings and support settlements.
<b>C212.3</b>	Find the load carrying capacity of columns and stresses induced in columns and cylinders
<b>C212.4</b>	Determine principal stresses and planes for an element in three dimensional state of stress and study various theories of failure
<b>C212.5</b>	Determine the stresses due to Unsymmetrical bending of beams, locate the shear center, and find the stresses in curved beams.

<b>Applied Hydraulic Engineering:C213</b>	
<b>C213.1</b>	Apply their knowledge of fluid mechanics in addressing problems in open channels.
<b>C213.2</b>	Able to identify a effective section for flow in different cross sections.
<b>C213.3</b>	To solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
<b>C213.4</b>	Understand the principles, working and application of turbines.
<b>C213.5</b>	Understand the principles, working and application of pumps.

<b>Concrete Technology:C214</b>	
<b>C214.1</b>	The various requirements of cement, aggregates and water for making concrete
<b>C214.2</b>	The effect of admixtures on properties of concrete
<b>C214.3</b>	The concept and procedure of mix design as per IS method

<b>C214.4</b>	The properties of concrete at fresh and hardened state
<b>C214.5</b>	The importance and application of special concretes.

#### **Soil Mechanics:C215**

<b>C215.1</b>	Classify the soil and assess the engineering properties, based on index properties.
<b>C215.2</b>	Understand the stress concepts in soils
<b>C215.3</b>	Understand and identify the settlement in soils.
<b>C215.4</b>	Determine the shear strength of soil
<b>C215.5</b>	Analyze both finite and infinite slopes.

#### **Strength of Materials Laboratory:C216**

<b>C216.1</b>	The students will have the required knowledge in the area of testing of materials and components of structural elements experimentally.
<b>C216.2</b>	Students gain knowledge about testing of hardness of various materials.
<b>C216.3</b>	To calculate deflection of beams.
<b>C216.4</b>	To find consistency, setting time of cement
<b>C216.5</b>	To acquire knowledge about testing of compressive strength of cement.

#### **Hydraulic Engineering Laboratory:C217**

<b>C217.1</b>	Students will be able to measure flow in pipes .
<b>C217.2</b>	Students will be able to determine frictional losses.
<b>C217.3</b>	The students will be able to develop characteristics of pumps.
<b>C217.4</b>	The students will be able to develop characteristics of turbines.
<b>C217.5</b>	To understand to calculate metacentric height.

#### **Advanced Reading and Writing:C218**

<b>C218.1</b>	Write different types of essays.
<b>C218.2</b>	Write winning job applications.
<b>C218.3</b>	Read and evaluate texts critically.
<b>C218.4</b>	Display critical thinking in various professional contexts.
<b>C218.5</b>	To make them effective in communication.

#### **Semester V**

#### **Design of Reinforced Cement Concrete Elements:C301**

<b>C301.1</b>	Understand the various design methodologies for the design of RC elements.
<b>C301.2</b>	Know the analysis and design of flanged beams by limit state method and sign of beams for shear, bond and torsion.
<b>C301.3</b>	design the various types of slabs and staircase by limit state method.
<b>C301.4</b>	Design columns for axial, uniaxial and biaxial eccentric loadings.
<b>C301.5</b>	Design of footing by limit state method.

#### **Structural Analysis I:C302**

<b>C302.1</b>	Analyze continuous beams, pin-jointed indeterminate plane frames and rigid plane frames by strain energy method
<b>C302.2</b>	Analyse the continuous beams and rigid frames by slope deflection method.
<b>C302.3</b>	Understand the concept of moment distribution and analysis of continuous beams and rigid frames with and without sway.
<b>C302.4</b>	Analyse the indeterminate pin jointed plane frames continuous beams and rigid frames using matrix flexibility method.
<b>C302.5</b>	Understand the concept of matrix stiffness method and analysis of continuous beams, pin jointed trusses and rigid plane frames.

<b>Water Supply Engineering:C303</b>	
<b>C303.1</b>	an insight into the structure of drinking water supply systems, including water transport, treatment and distribution
<b>C303.2</b>	the knowledge in various unit operations and processes in water treatment
<b>C303.3</b>	an ability to design the various functional units in water treatment
<b>C303.4</b>	an understanding of water quality criteria and standards, and their relation to public health
<b>C303.5</b>	the ability to design and evaluate water supply project alternatives on basis of chosen

<b>Foundation Engineering:C304</b>	
<b>C304.1</b>	Understand the site investigation, methods and sampling.
<b>C304.2</b>	Get knowledge on bearing capacity and testing methods.
<b>C304.3</b>	Design shallow footings.
<b>C304.4</b>	Determine the load carrying capacity, settlement of pile foundation.
<b>C304.5</b>	Determine the earth pressure on retaining walls and analysis for stability.

<b>Geographic Information System</b>	
<b>C305.1</b>	Have basic idea about the fundamentals of GIS.
<b>C305.2</b>	Understand the types of data models.
<b>C305.3</b>	Get knowledge about data input and topology.
<b>C305.4</b>	Gain knowledge on data quality and standards.
<b>C305.5</b>	Understand data management functions and data output

<b>Production technology for agricultural machinery:C306</b>	
<b>C306.1</b>	Upon completion of this course, the students can able to apply the different manufacturing process and use this in industry for component production.
<b>C306.2</b>	Students able to understand the basic principles of machining process.
<b>C306.3</b>	Students gain knowledge about welding process.
<b>C306.4</b>	Able to acquire knowledge about advanced manufacturing process.
<b>C306.5</b>	At the outcome of this unit student shall be able to understand the process of utilizing CNC machine and its special features.

<b>Soil Mechanics Laboratory:C307</b>	
<b>C307.1</b>	Students know the techniques to determine index properties.
<b>C307.2</b>	Students know the techniques to determine engineering properties
<b>C307.3</b>	To test shear strength parameters of various types of soil.
<b>C307.4</b>	To test compressibility and permeability by conducting appropriate tests.
<b>C307.5</b>	To calculate consolidation of soil.

<b>Water and Waste Water Analysis Laboratory:C308</b>	
<b>C308.1</b>	Quantify the pollutant concentration in water and waste water
<b>C308.2</b>	Suggest the type of treatment required and amount of dosage required for the treatment
<b>C308.3</b>	Examine the conditions for the growth of micro-organisms
<b>C308.4</b>	The students completing the course will be able to characterize wastewater
<b>C308.5</b>	Students can able to conduct treatability studies.

<b>Survey Camp:C309</b>	
<b>C309.1</b>	To conduct triangulation ,trilateration and rectangulation surveying
<b>C309.2</b>	To conduct trilateration Surveying.

<b>C309.3</b>	To carryout rectangulation surveying
<b>C309.4</b>	Able to plot LS &CS
<b>C309.5</b>	Students able to prepare contour maps with azimuth surveying.

### Semester VI

<b>Design of Steel Structural Elements:C310</b>	
<b>C310.1</b>	Understand the concepts of various design philosophies
<b>C310.2</b>	Design common bolted and welded connections for steel structures
<b>C310.3</b>	Design tension members and understand the effect of shear lag.
<b>C310.4</b>	Understand the design concept of axially loaded columns and column base connections.
<b>C310.5</b>	Understand specific problems related to the design of laterally restrained and unrestrained steel beams.

<b>Structural Analysis II:C311</b>	
<b>C311.1</b>	Draw influence lines for statically determinate structures and calculate critical stress resultants.
<b>C311.2</b>	Understand Muller Breslau principle and draw the influence lines for statically in determinate beams.
<b>C311.3</b>	Analyse of three hinged, two hinged and fixed arches.
<b>C311.4</b>	Analyse the suspension bridges with stiffening girders
<b>C311.5</b>	Understand the concept of Plastic analysis and the method of analyzing beams and rigid frames.

<b>Irrigation Engineering:C312</b>	
<b>C312.1</b>	Have knowledge and skills on crop water requirements.
<b>C312.2</b>	Understand the methods and management of irrigation.
<b>C312.3</b>	Gain knowledge on types of Impounding structures
<b>C312.4</b>	Understand methods of irrigation including canal irrigation.
<b>C312.5</b>	Get knowledge on water management on optimization of water use.

<b>Highway Engineering:C313</b>	
<b>C313.1</b>	Get knowledge on planning and aligning of highway.
<b>C313.2</b>	Geometric design of highways
<b>C313.3</b>	Design flexible and rigid pavements.
<b>C313.4</b>	Gain knowledge on Highway construction materials, properties, testing methods
<b>C313.5</b>	Understand the concept of pavement management system, evaluation of distress and maintenance of pavements.

<b>Waste Water Engineering:C314</b>	
<b>C314.1</b>	An ability to estimate sewage generation and design sewer system including sewage pumping stations
<b>C314.2</b>	The required understanding on the characteristics and composition of sewage, self-purification of streams
<b>C314.3</b>	An ability to perform basic design of the unit operations and processes that are used in sewage treatment
<b>C314.4</b>	Understand the standard methods for disposal of sewage.
<b>C314.5</b>	Gain knowledge on sludge treatment and disposal.

<b>Air pollution and control Engineering:C315</b>	
<b>C315.1</b>	An understanding of the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management
<b>C315.2</b>	Ability to identify, formulate and solve air and noise pollution problems
<b>C315.3</b>	Ability to design stacks and particulate air pollution control devices to meet applicable standards.
<b>C315.4</b>	Ability to select control equipments.
<b>C315.5</b>	Ability to ensure quality, control and preventive measures.

<b>Highway Engineering Laboratory:C316</b>	
<b>C316.1</b>	Student knows the techniques to characterize various pavement materials through relevant tests.
<b>C316.2</b>	Students able to determine properties of aggregates by conducting various tests.
<b>C316.3</b>	Students acquire knowledge to conduct tests on bitumen to study its various properties.
<b>C316.4</b>	They will be able to test and identify the properties of aggregates.
<b>C316.5</b>	They will acquire good knowledge on various bitumen mixes and their properties.

<b>Irrigation and Environmental Engineering Drawing:C317</b>	
<b>C317.1</b>	The students after completing this course will be able to design various units of Municipal water treatment plants and sewage treatment plants.
<b>C317.2</b>	The students after completing this course will be able to draw various units of Municipal water treatment plants and sewage treatment plants.
<b>C317.3</b>	Students will be able to design various irrigation structures
<b>C317.4</b>	They will be able to draw all types of irrigation components.
<b>C317.5</b>	Students acquire sound knowledge on planning, execution and construction of all structures related to irrigation and environmental engineering.