Annamacharya Institute of Technology and Sciences, Tirupati
(Autonomous)
Department of Civil Engineering

AK 20 REGULATION B.Tech-Civil Engineering

Course Name	Course Outcomes
ALGEBRA AND CALCULUS 20ABS9901	**CO1:** Apply the matrix algebra techniques for solving various linear equations.
	CO2: Analyze the linear transformations of quadratic forms and mean value theorems.
	CO3: Apply the fundamental concepts of partial derivatives for multi variable functions.
	CO4: Evaluate the multiple integrals in cartesian, polar, cylindrical, and spherical co-ordinate systems.
	CO5: Evaluate the improper integrals using special functions like Beta and Gamma.
ENGINEERING CHEMISTRY 20ABS9905	**CO1:** Apply the purification technique to remove hardness of water and to check the quality of water
	CO2: Apply the electrochemical principles to the energy storage devices and corrosion prevention techniques
	CO3: Analyze the preparation and applications of polymers and fuels
	CO4: Apply the cement and concrete techniques in manufacturing process for engineering fields
	CO5: Analyze the properties and applications of colloids and nano materials
COMMUNICATIVE ENGLISH 20AHS9901	**CO1:** Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English (Listening and Writing)
	CO2: Apply grammatical structures to formulate sentences and correct word forms (Grammar)
	CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions (Speaking)
	CO4: Evaluate reading/listening texts and to write summaries based on global comprehension of these texts. (Reading and Writing)
	CO5: Create a coherent paragraph interpreting a figure/graph/chart/table (Writing)
ENGINEERING WORKSHOP PRACTICE 20AES0304	**CO1:** Understand workshop tools and operational capabilities
	CO2: Apply wood working skills to prepare different joints.
	CO3: Apply sheet metal operations to prepare different components in real world applications.
	CO4: Apply fitting operations for various applications.
	CO5: Apply basic electrical engineering knowledge for house wiring practice
PROBLEM SOLVING AND PROGRAMMING 20AES0501	**CO1:** Understand the Programming and Algorithms concepts to Perform Basic operations.
	CO2: Apply the problem-solving approaches to generate different algorithms..
	CO3: Understand the various operators to perform mathematical operations
	CO4: Apply the Pointers and Array Techniques to manipulate the data.
	CO5: Analyze the Sorting and Searching Techniques to arrange the data in sorted order.
COMMUNICATIVE ENGLISH LAB 20AHS9902	**CO1:** Evaluate the awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
	CO2: Understanding the different aspects of the language with emphasis on LSRW skills and make use of different strategies in discussions.
	CO3: Apply knowledge of vocabulary and skills in various language learning activities.
	CO4: Analyze speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension
	CO5: Evaluate the acceptable etiquette essentials in social and professional presentations
ENGINEERING CHEMISTRY LAB	**CO1:** Apply the internal and external indicators in volumetric analysis.
	CO2: Analyze the preparation and applications of advanced polymer materials.

20ABS9910	**CO3:** Analyze the mixture of components by chromatographic techniques
	CO4: Apply the analytical and electro analytical technique to measure the strength of acids.
	CO5: Evaluate the physical properties like surface tension, adsorption and viscosity
PROBLEM SOLVING AND PROGRAMMING LAB 20AES0503	**CO1:** Analyze the basics of computer and concepts of C for writing simple programs
	CO2: Analyze the control statements for solving the problems using C.
	CO3: Design the algorithm for implementing complex problems using C.
	CO4: Analyze the arrays to store and retrieve the elements.
	CO5: Apply the different sorting techniques for solving real world problems
DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS 20ABS9906	**CO1:** Analyze the mathematical concepts of ordinary differential equations of higher order.
	CO2: Apply the methods of linear differential equations related to various engineering problems
	CO3: Analyze the partial differential equations of first and higher order
	CO4: Understand the vector differential operators such as gradient, curl, divergent
	CO5: Evaluate the vector integral theorems by using line, surface, and volume integrals
ENGINEERING PHYSICS 20ABS9903	**CO1:** Analyze the fundamental concepts of mechanics and gravitation.
	CO2: Apply the basic principles of acoustics and ultrasonics for engineering problems
	CO3: Analyze the properties and applications of dielectric and magnetic materials.
	CO4: Analyze the fundamentals of Lasers and optical fibers.
	CO5: Analyze the working principles of sensors for engineering problems.
BASICS OF ELECTRICAL &ELECTRONICS ENGINEERING 20AES0202	**CO1:** Apply the concepts of Kirchhoff Laws and the basic theorems for Electrical Circuits.
	CO2: Analyze the operational characteristics of D.C motor, generator, induction motor and transformer.
	CO3: Understand the basic operation of Electrical Power generation and transmission systems.
	CO4: Understand the fundamental concepts of diodes, transistors and op-amps.
	CO5: Analyze the concepts of Number Systems, Logic Gates and Digital Circuits
	CO6: Understand the basic concepts and examples of Communication Systems.
BASICS OF PYTHON PROGRAMMING 20AES0509	**CO1:** Understand the Basic concepts of python programming to build scripts in IDLE.
	CO2: Apply the modularity techniques to invoke user defined functions.
	CO3: Apply the concept of Strings and Lists to perform iterative operations on data.
	CO4: Apply the Mutable and Immutable data types to perform python Programs.
	CO5: Analyze the oops concepts to develop applications with reusability.
ENGINEERING GRAPHICS 20AES0301	**CO1:** Apply the concepts of engineering curves for technical drawing
	CO2: Understand the quadrant system to locate the position of points and projection of lines
	CO3: Analyze the projection of planes as well as solids located in quadrant system
	CO4: Analyze the sectional views and development of surfaces of regular solids
	CO5: Apply orthographic and isometric projections concepts to construct the given object.
BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING LAB 20AES0204	**CO1:** Apply the concepts of Kirchhoff Laws and the basic theorems for Electrical Circuits.
	CO2: Analyze the operational characteristics of D.C motor, generator, induction motor and transformer
	CO3: Understand the basic operation of Electrical Power generation and transmission systems.
	CO4: Analyze the V-I Characteristics of PN and Zener diodes.
	CO5: Evaluate the parameters of rectifiers without & with filters
	CO6: Evaluate the parameters of BJT and FET from their characteristics
ENGINEERING PHYSICS LAB 20ABS9908	**CO1:** Analyze the properties of LASER and optical fibers.
	CO2: Analyze the mechanical behavior of a given material using dynamic methods.
	CO3: Evaluate the basic parameters of a given semiconductor material.

	CO4: Analyze the basic properties of dielectric and magnetic behavior of the given material.
	CO5: Apply the concept of sensors to solve engineering problems.
BASICS OF PYTHON PROGRAMMING LAB 20AES0510	**CO1:** Analyze the basic concepts of Python Programming
	CO2: Apply the loops and conditional statements of python using IDLE and programs.
	CO3: Analyze the compound data using Lists, Tuples and dictionaries using functions.
	CO4: Apply the development applications using python datatypes to read and write data from files
	CO5: Design the solutions using OOPs concepts for real world problems in python
CONSTITUTION OF INDIA 20AMC9902	**CO1:** Understand the historical background of the Constitution making and its importance for building a democratic India.
	CO2: Remember the basic features of Indian Constitution
	CO3: Remember the basic features of Indian Constitution
	CO4: Understand the Powers and functions of Governor, President, and Judiciary.
	CO5: Understand the functions of local administration bodies.
PROBABILITY & STATISTICS, PARTIAL DIFFERENTIAL EQUATIONS 20ABS9913	**CO1:** Understand the discrete and continuous data through statistical methods.
	CO2: Analyze the fundamental laws of probability and its applications.
	CO3: Apply the formulation of null hypothesis to large samples.
	CO4: Apply the techniques for testing of hypothesis for small samples.
	CO5: Analyze the applications of partial differential equations in Cartesian coordinates.
MECHANICS OF MATERIALS 20APC0101	**CO1:** Understand the system of forces and free body diagrams on rigid bodies.
	CO2: Apply the concepts of centroid and moment of inertia for different cross-sections
	CO3: Understand the theory of elastic properties on varying deformable bodies
	CO4: Analyze the concepts of shear force and bending moment for different load conditions.
	CO5: Analyze the displacements of simple beams using slope deflection methods
SURVEYING 20APC0102	**CO1:** Understand the basics of linear and angular measurements
	CO2: Apply the concepts of leveling, contouring and Theodolite survey in field works
	CO3: Apply the techniques of computing of Areas and Volumes in earthworks
	CO4: Analyze the simple horizontal circular curves for buildings and highway culverts
	CO5: Understand the EDM, Total Station and DGPS in the survey systems.
FLUID MECHANICS 20APC0103	**CO1:** Understand the basic characteristics and behavior of fluids
	CO2: Apply the laws of fluid statics and concepts of Buoyancy
	CO3: Apply the law of conservation of mass to differentiate type of flow in a pipe
	CO4: Analyze the discharge of fluid flow in pipes using law of conservation of energy
	CO5: Analyze the energy losses and flow characteristics through closed conduits
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS 20AHSMB01	**CO1:** Understand the fundamentals of managerial economics and demand concept.
	CO2: Understand the production and cost concepts to optimize the output
	CO3: Analyze the price output relationship in different markets.
	CO4: Evaluate the capital budgeting techniques to invest in various projects.
	CO5: Analyze the accounting statements to evaluate the financial performance of business entity.
STRENGTH OF MATERIALS LAB 20APC0104	**CO1:** Apply the engineering principles to analyze the support reactions and bending behavior of beam under different support conditions
	CO2: Analyze the relationship between material elastic properties and the performance of mechanical components.
	CO3: Analyze the behavior of steel under impact load and couple acting on it.
	CO4: Analyze the load-deflection behavior of open-coiled and close-coiled springs under compression

	CO5: Evaluate the compressive strength and failure modes of wood and concrete specimens
SURVEYING LAB **20APC0105**	**CO1:** Apply the triangulation method to measure the area of a given boundary.
	CO2: Apply the traversing method to measure the area of a given boundary.
	CO3: Analyze the elevations on the surface of the ground by levelling methods.
	CO4: Analyze the height, horizontal and vertical angles by theodolite on earth surface.
	CO5: Evaluate the elevations, depressions and distance on the ground surface for preparation of maps.
FLUID MECHANICS LAB **20APC0106**	**CO1:** Analyze the behavior of fluid flow in pipes by Bernoulli's equation.
	CO2: Evaluate the rate of flow through the closed conduits
	CO3: Analyze the Coefficient of discharge for small orifice and external mouthpiece
	CO4: Evaluate the performance of contracted rectangular notch and triangular notch
	CO5: Analyze the frictional losses in various cross sections of pipe by varying pressure
BASICS OF CAD **20APC0107**	**CO1:** Understand the tools of CAD Software
	CO2: Understand of concept of co-ordinate methods.
	CO3: Understand the isometric views
	CO4: Understand the isometric views for brick wall
ENVIRONMENTAL STUDIES **20AMC9903**	**CO1:** Understand the multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.
	CO2: Understand the ecosystem and biodiversity to solve complex environmental problems
	CO3: Apply various types of pollution and solid waste management and related preventive measures
	CO4: Apply rainwater harvesting, watershed management, ozone layer depletion and wasteland reclamation.
	CO5: Understand the population explosion
MATHEMATICAL MODELING & OPTIMIZATION TECHNIQUES **20ABS9922**	**CO1:** Analyze the classifications and stages of mathematical modeling.
	CO2: Apply the techniques to build different mathematical models.
	CO3: Evaluate the linear programming problems by various computational methods.
	CO4: Analyze the best solution of assignment and transportation problems.
	CO5: Apply the techniques to solve problems related to Game theory.
STRENGTH OF MATERIALS **20APC0108**	**CO1:** Apply the simple bending theory for standard cross-sectional beams
	CO2: Analyze the shear stress in beams and combined direct and bending stresses in columns under the eccentric loading
	CO3: Apply the Euler's and Rankine's formula theory to find critical load for different end conditions
	CO4: Analyze the torsion and power transmission through circular shafts
	CO5: Apply the theory of principal stresses and theories of failure in structural members
HYDRAULIC ENGINEERING **20APC0109**	**CO1:** Apply the Laminar and Turbulent flow concept in pipes
	CO2: Analyze the uniform flows in open-channel flow systems.
	CO3: Analyze the non-uniform flows in open-channel flow systems
	CO4: Evaluate the performance of impact of jets on plates and its application in different turbines.
	CO5: Analyze the performance of Centrifugal pumps
STRUCTURAL ANALYSIS-I **20APC0110**	**CO1:** Analyze the fixed beam with yielding of supports
	CO2: Analyze the beams using slope deflection method
	CO3: Analyze the beams using moment distribution methods
	CO4: Apply the energy theorems for analysis of indeterminate structures
	CO5: Analyze the determinate and indeterminate trusses using Castigliano's theorems
CONCRETE	**CO1:** Understand the properties of cement and behavior of admixtures

TECHNOLOGY 20APC0111	**CO2:** Understand the properties of aggregates and manufacturing process of concrete
	CO3: Understand the properties of fresh and hardened concrete
	CO4: Understand NDT testing techniques and engineering properties of concrete
	CO5: Design concrete mix proportioning for economical and durable concrete based on IS standards
UNIVERSAL HUMAN VALUES 20AHS9905	**CO1:** Understand the essentials of human values, self-exploration, happiness and prosperity for value added education.
	CO2: Analyze the harmony in the human being as sentient 'I' and the material 'Body' in various aspects.
	CO3: Apply the nine universal human values in relationships for harmony in the family and orderliness in the society.
	CO4: Evaluate the interconnectedness of four orders of nature and holistic perception of harmony at all levels of existence.
	CO5: Apply the holistic understanding of harmony on professional ethics through augmenting universal human order.
HYDRAULIC MACHINERY LAB 20APC0112	**CO1** Analyze the phenomenon of a hydraulic jump in open channel flow
	CO2 Analyze the impact force exerted by a jet on vanes vertically and inclined.
	CO3 Evaluate the performance characteristics of Pelton wheel and Francis turbines
	CO4 Evaluate the performance of centrifugal and reciprocating pumps by varying pressure
	CO5 Analyze the minor losses in pipe flow systems by determining the coefficient of loss for various pipe fittings.
CONCRETE TECHNOLOGY LAB 20APC0113	**CO1:** Evaluate the quality and suitability of cement for concrete production
	CO2: Analyze the compressive strength of cement mortar by standardized testing procedures
	CO3: Analyze the fresh and hardened properties of concrete
	CO4: Evaluate the quality and suitability of aggregates for concrete production
	CO5: Apply the principles of Non-Destructive Testing (NDT) methods for assessment of structural members
COMPUTER-AIDED CIVIL ENGINEERING DRAWING LAB 20APC0114	**CO1:** Apply the fundamental CAD concepts and commands to practice the exercises.
	CO2: Create the single and multi-storey buildings based on the NBC and BIS guidelines.
	CO3: Evaluate the sectional and elevation views of the building based on the NBC and BIS guidelines
	CO4: Evaluate the detailing of building components based on NBC and BIS guidelines.
	CO5: Evaluate the building component roof trusses using CAD software
LAND SURVEY WITH 2D DRAFTING 20APC0115	**CO1:** Apply the basic concepts of total station to find area and Difference in level.
	CO2: Understand basic concepts of Global positioning system.
	CO3: Understand the basic concepts of Land surveying.
	CO4: Apply the basic concepts of Auto Cad to find Area of a given boundary.
	CO5: Apply the basic concepts of Auto Cad to find draw a site plan
SOIL MECHANICS 20APC0116	**CO1**: Understand the soil formation and index properties of soil
	CO2: Apply the permeability and effective stress principles in soils
	CO3: Apply the analytical methods in stress distribution and principles of soil compaction
	CO4: Analyze the compressibility characteristics and settlements of soil
	CO5: Evaluate the shear strength parameters for analyzing soil behavior.
BUILDING TECHNOLOGY 20APC0117	**CO1:** Understand the properties of basic building materials
	CO2: Understand the types and applications of advanced building material.
	CO3: Understand the construction techniques for different building components
	CO4: Understand the principles of building planning and plumbing services
	CO5: Apply bye laws & regulation in residential building planning

Annamacharya Institute of Technology and Sciences, Tirupati
(Autonomous)
Department of Civil Engineering

ENGINEERING GEOLOGY 20APC0118	**CO1:** Understand the formation of minerals and its uses in construction
	CO2: Understand the classification and properties of rocks
	CO3: Understand the geological strata of rocks
	CO4: Understand the geological strata for construction of dams and reservoirs
	CO5: Understand the concept of RS&GIS
SENSOR NETWORKS 20APE0417	**CO1:** Understand the sensor data acquisition system and architectural of converters
	CO2: Understand the Sensor Measurements for Structural Monitoring
	CO3: Analyze the commonly used sensing technologies and algorithms
	CO4: Apply the piezoelectric transducers for assessing and monitoring infrastructures
	CO5: Apply Fiber optic sensors for assessing and monitoring infrastructures
OPERATIONS RESEARCH 20APC0323	**CO1:** Apply the knowledge of operations research in solving linear programming problems
	CO2: Apply the mathematical procedure for solving the transportation and assignment models related to real world problems
	CO3: Evaluate the decisions to replace the items that deteriorate with time and to solve the game theory models
	CO4: Analyze the available resources based on the priority in solving the sequencing problems
	CO5: Analyze the simulation tools to develop the queuing and other relevant models
MANAGEMENT SCIENCE 20AOE0301	**CO1:** Understand the management principles to take the decisions in all levels for productivity
	CO2: Analyze the available facilities for location of the industrial plant and also deal the ergonomics to improve the efficiency and safety
	CO3: Apply the mathematical knowledge to identify the shortest routes to achieve the goals set by the management and to improve the quality of the products in an industry
	CO4: Understand the materials requirement to minimize the inventory costs and to maximize the profit
	CO5: Apply the knowledge of the human resources principles in motivating the workers in the industry
STRUCTURAL ANALYSIS - II 20APE0101	**CO1:** Analyze the three hinged arches for different loading conditions
	CO2: Analyze the frames using slope deflection and moment distribution method
	CO3: Analyze the beams and frames using Kani's method
	CO4: Analyze the beams using flexibility & stiffness method
	CO5: Apply the plastic analysis concept on beams
WATER HARVESTING AND CONSERVATION 20APE0102	**CO1:** Understand the movement of ground water in fissures and cracks
	CO2: Understand the water conservation methods
	CO3: Understand the techniques of reclamation and reuse of waste water
	CO4: Understand the sustainable practices of watershed management
	CO5: Understand the principles of conservation of water and soil
COST EFFECTIVE HOUSING TECHNIQUES 20APE0103	**CO1:** Apply the concept of housing technique
	CO2: Understand housing programs and projects
	CO3: Understand development and adoption of low-cost housing technology
	CO4: Understand low-cost housing in rural areas
	CO5: Understand housing in disaster prone areas
SOIL MECHANICS LAB 20APC0119	**CO1:** Analyze the classification of soils based on Atterberg Limits and sieve analysis
	CO2: Evaluate the field density of soil using core cutter and sand replacement methods
	CO3: Evaluate the suitability of a soil for foundations and pavements application
	CO4: Evaluate key engineering properties of soils such as strength, compressibility and permeability
	CO5: Analyze the swelling potential of soils and assess their suitability for foundation

	applications.
ENGINEERING GEOLOGY LAB 20APC0120	**CO1:** Apply the physical properties of minerals to real world scenarios
	CO2: Analyze the physical properties of rock samples from the field
	CO3: Evaluate the accuracy and limitations of geological maps based on the data used for their formation
	CO4: Analyze basic strike problems using geological maps and sections
	CO5: Analyze basic dip problems using geological maps and sections
BUILDING PLANNING & DRAWING LAB 20APC0121	**CO1:** Understand the fundamental building design principles and relevant building codes
	CO2: Create the 3D-Single storey building based on the NBC and BIS guidelines
	CO3: Create the 3D-Multi storey building based on the NBC and BIS guidelines
	CO4: Evaluate the detailing of beams and columns in CAD software as per IS code guide lines
	CO5: Evaluate the detailing of slabs in CAD software as per IS code guide lines
PROFESSIONAL ETHICS AND HUMAN VALUES 20AMC9904	**CO1**: Understand the sustained happiness through identifying the essentials of human values and skills.
	CO2: Understand the importance of Values and Ethics in their personal lives and professional careers.
	CO3: Understand the rights and responsibilities as an employee, team member and a global citizen.
	CO4: Understand the importance of trust, mutually satisfying human behavior and enriching interaction with nature.
	CO5: Understand appropriate technologies and management patterns to create harmony in professional and personal life.
ENVIRONMENTAL ENGINEERING 20APC0122	**CO1:** Analyze the quality of water and forecast the water demand
	CO2: Analyze the water treatment techniques and its distribution process
	CO3: Analyze the characteristics of waste water
	CO4: Design of oxidation pond for waste water
	CO5: Design of sludge digestion tanks
HIGHWAY ENGINEERING 20APC0122	**CO1:** Understand planning and alignment of highway.
	CO2: Apply concept of the geometric design for highway.
	CO3: Understand concept of traffic Engineering and its regulations.
	CO4: Understand the design principles of intersections.
	CO5: Design of pavements as per IRC standards.
FOUNDATION ENGINEERING 20APC0124	**CO1:** Understand the principles and methods of Soil Exploration
	CO2: Apply various analytical methods to assess slop stability
	CO3: Apply classical earth pressure theories to check the stability of retaining walls
	CO4: Apply standard methods for bearing capacity and settlement analysis of shallow foundations
	CO5: Evaluate pile capacity and settlement of pile group
DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES 20APE0104	**CO1:** Design various types of beams using IS codes
	CO2: Design the beams to meet the limit state of collapse and serviceability requirements
	CO3: Design the reinforcement for slabs and staircase as per IS Codes **CO4:** Design short and long columns under different bending conditions **CO5:** Design Isolated square and rectangular footing
	CO1: Design various types of beams using IS codes
	CO2: Design the beams to meet the limit state of collapse and serviceability requirements

INTELLIGENT TRANSPORTATION SYSTEMS 20APE0105	**CO1:** Apply the sensor techniques in capturing the data by using GIS
	CO2: Understand the tele communication usage in road networks
	CO3: Apply the various ITS methodologies in the transportation
	CO4: Understand the user needs and services in traffic and travel management
	CO5: Understand the significance of ITS under Indian conditions
REMOTE SENSING AND GIS 20APE0106	**CO1:** Understand principles of aerial photography
	CO2: Understand the concept of remote sensing
	CO3: Understand the concept of geographic information system
	CO4: Analyze the GIS spatial data
	CO5: Apply the concepts of GIS in water resources
STAAD LAB 20APC0125	**CO1:** Analyze the 2-D and 3-D Frames subjected to various loads
	CO2: Analyze the Steel Tabular Truss subjected to various loads
	CO3: Evaluate the retaining wall and simple tower subjected to various loads
	CO4: Evaluate the one way and two-way slabs subjected to various loads
	CO5: Analyze the columns subjected to various loads
ENVIRONMENTAL ENGINEERING LAB 20APC0126	**CO1:** Evaluate the physical characteristics of water
	CO2: Evaluate the chemical characteristics of water
	CO3: Evaluate the biological characteristics of water
	CO4: Analyze the optimum dosage of coagulant
	CO5: Evaluate the quality of surface and ground water
HIGHWAY ENGINEERING LAB 20APC0127	**CO1:** Evaluate the quality and suitability of aggregates for highway applications
	CO2: Evaluate the quality and suitability of bitumen for highway applications
	CO3: Analyze traffic flow characteristics at intersections by conducting traffic volume studies
	CO4: Analyze traffic flow characteristics at mid-blocks by conducting traffic volume studies
	CO5: Apply relevant Indian Standard (IS) codes during laboratory testing procedures
PRINCIPLES OF EFFECTIVE PUBLIC SPEAKING 20AHE9902	**CO1:** Apply the knowledge of principles, concepts and skills learned in speech preparation.
	CO2: Analyze the techniques of knowing audiences and in refining the speech
	CO3: Understand the listening skills and styles in effective listening.
	CO4: Analyze the diverse methods of speech in speech composition
	CO5: Apply the supporting materials and presentation aids in speech preparation.
BIOLOGY FOR ENGINEERING 20AMC9901	**CO1:** Understand the structure of cells and basics in living organisms
	CO2: Understand the role of biomolecules in industry.
	CO3: Understand the functioning of physiology in respiratory system and digestive system.
	CO4: Understand DNA technology in living organisms
	CO5: Apply the biological principles in different technologies for the production of medicines and pharmaceuticals.
ESTIMATION, COSTING AND VALUATION 20APE0107	**CO1:** Understand the different types of estimates and standard specifications
	CO2: Analyze the estimation of different types of buildings and steps
	CO3: Analyze the volume of earth works and quality of reinforcement

	CO4: Understand the type of contracts and tenders
	CO5: Evaluate the rate analysis and valuation of building items
ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT 20APE0108	**CO1:** Understand the methodologies of EIA
	CO2: Understand the impact of development activities and land use
	CO3: Understand the risk and its impact on Vegetation and wild life
	CO4: Understand the preparation of Environment Audit
	CO5: Understand the various environmental acts
RAILWAYS AIRPORT DOCKS AND HARBORS 20APE0109	**CO1:** Understand the permanent way components and its functions in railway engineering
	CO2: Understand the geometric design elements of railway track
	CO3: Understand the Aircraft characteristics and their influence on various design elements of an airport
	CO4: Understand the geometric design parameters of runways and taxi ways
	CO5: Understand the significance and role of ports and harbors
HYDROLOGY & WATER RESOURCES ENGINEERING 20APE0110	**CO1:** Analyze the hydrograph with rainfall data
	CO2: Analyze the ground water resources and significance of irrigation
	CO3: Design irrigation systems based on crop water needs
	CO4: Understand the principles and types of cross drainage works and reservoir planning
	CO5: Design gravity dams under various modes of failure
DESIGN AND DRAWING OF IRRIGATION STRUCTURES 20APE0111	**CO1:** Design the sloping glacises profile based on energy dissipation requirements and hydraulic jump formation
	CO2: Design the weir profile based on discharge capacity, energy dissipation requirements and water surface profile control
	CO3: Design the sluice opening and tower head based on discharge requirements and desired flow control characteristics
	CO4: Design Syphon profile considering hydraulic efficiency and syphon priming requirements
	CO5: Design the regulator opening and control mechanism under desire flow regulation characteristics
WATER SHED AND RIVER BASIN MANAGEMENT 20APE0112	**CO1:** Understand the basic principles of watershed management.
	CO2: Understand the river basin management practices.
	CO3: Understand better different approaches for conservation of water
	CO4: Understand sustainable watershed approach for resources management, prevention of soil erosion
	CO5: Understand Different methods of rainwater harvesting management systems and role of GIS.
DESIGN & DRAWING OF STEEL STRUCTURES 20APE0113	**CO1:** Design of bolt, welded connections and tension members
	CO2: Design compression members
	CO3: Design laterally supported beams

	CO4: Design various components of plate girder
	CO5: Design various components of gantry girder and simple roof truss
ADVANCED STRUCTURAL DESIGN 20APE0114	**CO1:** Design the RCC beams and slabs as per relevant codes
	CO2: Design crack width in RCC beams and Deep Beams
	CO3: Design reinforcement of flat slabs and flat plates
	CO4: Design plain concrete walls and shear walls as per relevant codes
	CO5: Design reinforced concrete members for fire resistance
BRIDGE ENGINEERING 20APE0115	**CO1:** Design box culverts and bridge bearings as per the requirements
	CO2: Design deck slab bridges as per standards
	CO3: Design of T Beam bridges subjected to class AA tracked vehicle load
	CO4: Design of a Deck type welded plate girder
	CO5: Understand various aspects associated with design of Piers and Abutments
COMPUTER NETWORKS 20APC0516	**CO1:** Understand the basics of data communications and networking by using OSI model.
	CO2: Apply the Data link Layer functionalities to solve real world problems
	CO3: Analyze the various routing algorithms and protocols.
	CO4: Analyze the Transport Layer services by using TCP and UDP protocols.
	CO5: Understand the various services protocols offered by application layer.
ENTERPRENURSHIP 20AHSMB02	**CO1:** Understand the concept of Entrepreneurship.
	CO2: Understand the generating ideas for New Ventures and preparation of project report.
	CO3: Analyze various sources of finance to entrepreneurs.
	CO4: Analyze the role of central government and state government in promoting women Entrepreneurship
	CO5: Understand the role of incubations in fostering startups.
INTELLECTUAL PROPERTY RIGHTS 20AHSMB04	**CO1:** Understand the concepts of intellectual property rights
	CO2: Understand the process of acquisition of trade mark rights
	CO3: Understand about the law of copy rights
	CO4: Understand the concepts of Trade secretes
	CO5: Understand the intellectual property laws at the international level
PRESTRESSED CONCRETE 20APE0116	**CO1:** Understand the fundamental principles of Prestressed concrete
	CO2: Analyze the losses of prestress in pretensioned and posttensioned members
	CO3: Design of prestressed beams under flexure and shear considerations
	CO4: Analyze the short- term and long-term deflection of prestressed beams
	CO5: Analyze the prestressing concepts in composite beams

GROUND IMPROVEMENT TECHNIQUES 20APE0117	**CO1:** Understand the grouting techniques and their applications
	CO2: Apply the densification methods in granular and cohesive soils
	CO3: Apply the ground improvement methods to stabilize soil
	CO4: Apply the reinforcement principles of earth wall
	CO5: Apply the techniques for improvement of expansive soils and foundations
REPAIR AND REHABILITATION OF STRUCTURES 20APE0118	**CO1:** Understand the maintenance and causes of deterioration in structures
	CO2: Understand the different NDT techniques for damage assessment
	CO3: Understand the different type of repair materials
	CO4: Apply various repair techniques for concrete structures
	CO5: Apply different strengthening techniques for structural members
ENGLISH FOR RESEARCH PAPER WRITING 20AOE9901	**CO1:** Understand the writing skills and level of readability.
	CO2: Apply the rules, principles for writing abstract and introduction part of research article.
	CO3: Apply the right methods to write the review of literature, results and conclusions
	CO4: Apply the special skills for writing a title, abstract, review and introduction of literature
	CO5: Apply the key skills for results in discussion and conclusion
PROFESSIONAL COMMUNICATION 20AHE9903	**CO1:** Understand the communication skills effectively for professional success
	CO2: Analyze the communication skills clearly and concisely in formal and informal conversations.
	CO3: Apply the information through drafting, editing and presentation
	CO4: Apply the interpersonal skills in appropriate manner towards the growth of best career.
	CO5: Apply the sentence structures using correct vocabulary and without any grammatical errors.
STRUCTURAL ANALYSIS DESIGN SOFTWARE 20APC0129	CO1: Analyze a Building subjected to Various loads as per IS Standards
	CO2: Analyze the Building subjected to Dead and Live loads in Staad Pro
	CO3: Analyze the Building subjected to Wind load in Staad Pro
	CO4: Analyze the Building subjected to Seismic loads in Staad Pro
	CO5: Analyze the Isolated Footing in Staad Foundation