Aditya College of Engineering & Technology

I - I

S. No	Name of the subject	CO Number	Course Outcomes
1	English	CO 1	Identifying the life of people, culture and tradition interpreting the information, speaking English to elicit information, identifying the vocabulary and Nouns
		CO 2	Understanding the responsibility and values, conversing for expressing greetings and leave takings, usage of articles, prepositions
		CO 3	Remembering life and contributions of Stephen Hawking discuss about specific topics practice letter writing, CVs, E-mail etiquette, application of verb forms
		CO 4	Understanding the life of Wangari Maathai, Role plays, use of adjectives and adverbs, vocabulary
		CO 5	Understanding way of life and values, technical writing and presentation, Vocabulary, common errors
		CO 6	Understanding soft skills, recognize Scientific and Technical English
2	Mathematics - I	CO 1	Utilize mean value theorems to real life problems
		CO 2	Able to form differential equation from physical problems and to solve various first order differential equations.
		CO 3	Solve the differential equations related to various engineering fields
		CO 4	Familiarize with functions of several variables which is useful in optimization
		CO 5	Apply double integration techniques in evaluating areas bounded by region
		CO 6	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems
3	Engineering Drawing	CO 1	Understand plane geometry by drawing different engineering curves like ellipse, cycloids, involute etc.
		CO 2	Identify the position of points and lines with use of orthographic projections.
		CO 3	Analyze the location and position of plane figures through orthographic projections.
		CO 4	Analyze the location and position of solid bodies through orthographic projections.
		CO 5	Develop 2D and 3D objects by converting their views
		CO 6	Understand the AutoCAD commands

4	Engineering Physics	CO 1	Identify the applications of Interference, Diffraction and Polarization in engineering.
		CO 2	Describe the construction and working principles of various types of lasers.
		CO 3	Explain the concept of dielectric constant and polarization in dielectric materials.
		CO 4	Apply the concept of magnetism to magnetic devices.
		CO 5	Identify the use of Ultrasonics in different fields.
		CO 6	Analyse the crystalline structure by Bragg's X-ray diffractometer.
5	Engineering Geology	CO 1	To study and identify different types natural materials like rocks & minerals and soil.
		CO 2	Students are able to understand the different geological structures and their impact on civil engineering structure.
		CO 3	Students are able to decide the suitable site selection for civil engineering structures
		CO 4	Students are able to know the different geological hazards and its mitigation
		CO 5	Students are able to understand the different method of geological exploration
		CO 6	To know the importance of geological maps and language helpful for Civil Engineering projects.
6	Engineering Physics	CO 1	Experiment how to pronounce words using the rules they have been taught
		CO 2	Articulate better pronunciation through stress or word accent, intonation, and rhythm.
		CO 3	Acting out about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking.
		CO 4	Experimenting the fluency in spoken English and neutralize mother tongue influence
		CO 5	Mind Mapping of the students to a variety of self-instructional and learner-friendly modes of language learning.
7	Engineering Physics Lab	CO1	Understand the concept of error and its analysis.
		CO2	Compare the theory and correlate with experiment findings.
		CO3	Identify the appropriate application of particular experiment.
		CO4	Understand and apply the fundamentals of wave optics.
		CO5	Develop experimental skills on basic physics experiments.

I - II

1	Mathematics - II (Linear Algebra and numerical Methods)	CO 1	Solve the system of linear algebraic equations using Matrix techniques
		CO 2	Determine the Eigen values and Eigen vectors of a system represented by a matrix
		CO 3	Compute the approximate roots of algebraic and transcendental equations using Iterative methods
		CO 4	Apply various interpolation methods to estimate the unknown values from a known data value
		CO 5	Apply numerical integral techniques to different Engineering problems
		CO 6	Solve the ordinary differential equations of first order with initial conditions using numerical techniques
2	Environmental Science	CO 1	Overall understanding of the natural resources
		CO 2	Basic understanding of the ecosystem and its diversity
		CO 3	Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
		CO 4	An understanding of the environmental impact of developmental activities
		CO 5	Awareness on the social issues and global treaties.
		CO 6	An understanding of the environmental legislation
4	Engineering Mechanics	CO 1	Analyze the Forces and Free Body Diagrams of Coplanar Systems.
		CO 2	Analyze the equations of equilibrium of systems.
		CO 3	Determine displacement of completely constrained bodies by principles of virtual work and solve the mechanics problems associated with friction force.
		CO 4	Evaluate the centroid and moments of Inertia of Composite Figures.
		CO 5	: Determine the paths of velocity and acceleration of rigid bodies in rectilinear and curvilinear motion.
		CO 6	Adapt the concepts of work, energy and particle motion for engineering applications.
5	Engineering Chemistry	CO 1	Analyse the different types of composite plastic materials and interpret the mechanism of polymers.
		CO 2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.
		CO 3	Synthesize advanced nanomaterials and its techniques in engineering. Summarize the techniques that detect and measure changes of state of reaction.
		CO 4	Differentiate petroleum, petrol, synthetic petrol and have knowledge how they are produced. Study alternate fuels and analyse fuel gases.
		CO 5	Analyse the suitable methods for purification and treatment of hard water and brackish water.
		CO 6	Identify chlorination methods in municipal water.

6	Programming for Problem Solving Using C	CO 1	To write algorithms and to draw flowcharts for solving problems, converts both to C program finally compile and debug the programs.
		CO 2	To use different operators, data types and write programs that use two-way/ multi-way selection.
		CO 3	To select the best loop construct for a given problem
		CO 4	To design and implement programs to analyze the different pointer applications
		CO 5	To decompose a problem into functions and to develop modular reusable code
		CO 6	To apply File I/O operation
7	Building Materials and concrete technology	CO 1	Know various engineering properties of building construction materials and suggest their suitability
		CO 2	Identify the functional role of ingredients of concrete and their behaviour in the field.
		CO 3	Realize importance of quality of concrete.
		CO 4	Evaluate ingredients of concrete through lab tests and apply this knowledge to Concrete Mix Design
		CO 5	Acquire and apply fundamental knowledge in the fresh and hardened properties of concrete
		CO 6	Familiarize basic concepts of special concrete and their production and applications.
8	Engineering Chemistry Lab (MECH/CIVIL)	CO1	Understand different types of chemical analysis
		CO2	Experiment volumetric analysis of various classes
		CO3	Use some commonly employed simple instruments

II – I

1	Probability & Statistics	CO1	Classify the concepts of data science and its importance
		CO2	Interpret the association of characteristics and through correlation and regression tools
		CO3	Make use of the concepts of probability and their applications
		CO4	Apply discrete and continuous probability distributions
		CO5	Design the components of a classical hypothesis test
		CO6	Infer the statistical inferential methods based on small and large sampling tests
2	Basic Electrical & Electronics	CO 1	Discuss the operation of DC generator and analyze the characteristics of DC generator
		CO 2	Analyze starting and speed control methods of DC motors along with principle of operation
		CO 3	Draw the equivalent circuit of single phase transformer and also compute efficiency

	Engineering	CO 4	Explain the operation of Synchronous Machines
		CO 5	Analyze the performance and speed – torque characteristics of 3-phase induction motor
		CO 6	Understand the operation of various special machines
3	Strength of Materials-I	CO 1	The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions
		CO 2	The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces
		CO 3	The student will have knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams.
		CO 4	The student will have the knowledge of shear stress distribution across various cross sections of beams
		CO 5	The student will understand calculation of deflections due to various loading conditions.
		CO 6	The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using Lame's equation.
4	Building Materials & Construction	CO 1	The student should be able to identify different building materials and their importance in building construction
		CO 2	The student is expected to differentiate brick masonry, stone masonry construction
		CO 3	The student is expected to understand the use of lime and cement in various constructions.
		CO 4	The student should have learnt the importance of building components.
		CO 5	The student will be able to learn the concept of finishing and understand different types of paints and to construct form work and scaffolding.
		CO 6	The student is expected to know the classification of aggregates, sieve analysis and moisture content usually required in building construction.
5	Surveying	CO 1	To demonstrate the basic surveying skills
		CO 2	To use various surveying instruments.
		CO 3	To perform different methods of surveying
		CO 4	To compute various data required for various methods of surveying.
		CO 5	To integrate the knowledge and produce topographical map.
		CO 6	To calculate areas and volumes
		CO 1	Understand the various properties of fluids and their influence on fluid motion and analyze a variety of problems in fluid statics and dynamics.

		CO 2	Calculate the forces that act on submerged planes and curves.
6	Fluid Mechanics	CO 3	Ability to analyze various types of fluid flows.
		CO 4	Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces
		CO 5	Draw simple hydraulic and energy gradient lines.
		CO 6	Able Measure the quantities of fluid flowing in pipes, tanks and channels.

II -II

		CO 1	The student should be able to identify properties of building stones, bricks and Tiles.
1	Building Planning & Drawing	CO 2	The student is expected to differentiate brick masonry, stone masonry construction
		CO 3	The student is expected to learn the use of lime and cement in various constructions.
		CO 4	The student should have learned to identify different components of buildings.
		CO 5	The student should have learnt the importance of building components and finishing's.
		CO 6	The student is expected to know the classification of aggregates, sieve analysis and moisture content usually required in building construction.
2	Strength of Materials - II	CO 1	The student will be able to understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections.
		CO 2	The student can design shafts subjected to torsion according to theories of failure.
		CO 3	The student will have the knowledge on behavior of columns and struts under different loading conditions.
		CO 4	The student will be able to assess the stability of chimneys, dams and retaining walls under direct loading and bending about both the axis.
		CO 5	The student will be able to assess the behavior of beams under unsymmetrical bending.
		CO 6	The student will be able to assess forces in different types of trusses used in construction.
3	Hydraulics & Hydraulic Machinery	CO 1	Solve uniform open channel flow problems.
		CO 2	Solve non-uniform open channel flow problems
		CO 3	Apply the principals of dimensional analysis and similitude in hydraulic model testing.
		CO 4	Understand how a jet exerts force on different surfaces.
		CO 5	Understand the working principles of various hydraulic machineries

		CO 6	Understand the working principle of centrifugal and reciprocating pumps.
4	Concrete Technology	CO 1	Understand the basic concepts of concrete
		CO 2	Realize the importance of quality of concrete
		CO 3	Familiarize the basic ingredients of concrete and their role in the production of concrete and its behavior in the field.
		CO 4	Test the concrete properties and hardened concrete properties.
		CO 5	Evaluate the ingredients of concrete through lab test results. design the concrete mix by IS code.
		CO 6	Familiarize the basic concepts of special concrete and their production and applications. Understand the behavior of concrete in various environments.
5	Structural Analysis - I	CO 1	Distinguish between the determinate and indeterminate structures.
		CO 2	Estimate the bending moment and shear forces in beams for fixity conditions and to understand the behavior of fixed beams under different loadings.
		CO 3	Analyze the continuous beams using three moment method
		CO 4	Analyze the different types of beams using slope deflection method
		CO 5	To understand the application of energy theorems to find deflections of simple beams and trusses.
		CO 6	Draw the influence line diagrams for various types of moving loads on beams/bridges and analyze the loads in Pratt and Warren trusses when loads of different types and spans are passing over the truss.
6	Transportation Engineering - I	CO 1	Plan highway network for a given area.
		CO 2	Determine Highway alignment and design highway geometrics
		CO 3	Design Intersections and prepare traffic management plans
		CO 4	Judge suitability of pavement materials.
		CO 5	Design of different types of pavements using various methods.
		CO 6	Construct and maintain highways

III - I

		CO 1	To familiarize with the function of management and GLOBE structure
1	Management	CO 2	To provide conceptual knowledge on statistical quality control
		CO 3	To assess functions of marketing and marketing management

		CO 4	To understand the concepts of development of network using PERT and CPM
1	Science	CO 5	To familiarize with the elements of corporate planning process
		CO 6	To understand Basic concepts of contemporary management practice.
2	Engineering Geology	CO 1	Identify and classify the geological minerals and measure the rock strengths of various rocks
		CO 2	Classify and measure the earthquake prone areas to practice the hazard-zonation
		CO 3	Classify, monitor and measure the Landslides and subsidence and prepares, analyses and interpret the Engineering Geologic maps
		CO 4	Analyses the ground conditions through geophysical surveys.
		CO 5	Test the geological material and ground to check the suitability of civil engineering project construction.
		CO 6	Investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc.…
3	Structural Analysis -II	CO 1	Differentiate Determinate and Indeterminate Structures
		CO 2	Carryout lateral Load analysis of structures
		CO 3	Analyze Cable and Suspension Bridge structures
		CO 4	Analyze structures using Moment Distribution Method
		CO 5	Analyze structures using Kani's Method.
		CO 6	Analyze structures using Matrix methods
4	Design & Drawing of Reinforced Concrete Structures	CO 1	Work on different types of design philosophies
		CO 2	Carryout analysis and design of Beams and detailing
		CO 3	Design structures subjected to shear, bond and torsion
		CO 4	Carryout analysis and design of Slabs and detailing
		CO 5	Design different type of Columns
		CO 6	Design of different types of Footings
5	Transportation Engineering - II	CO 1	Identify various parts and functions of permanent way
		CO 2	Determine railway alignment and to design various element of railway track.
		CO 3	To understand the track layout system and electrical signaling system
		CO 4	Understand the planning of an airport.
		CO 5	Design and maintain flexible and rigid pavements for runway.
		CO 6	Understand construction and maintenance of Docks and Harbors

III - II

1	Design & Drawing of Steel Structures	CO 1	The students will be able to understand the types of connections and work with relevant IS codes
		CO 2	Carryout analysis and design of flexural members and detailing
		CO 3	Design of tension members and compression members of different types with connection detailing.
		CO 4	Design of tension members and compression members of different types with connection detailing.
		CO 5	Design of column foundations for different loading combinations.
		CO 6	Design Plate Girder and Gantry Girder with connection detailing and 5. Produce the drawings pertaining to different components of steel structures.
2	Geotechnical Engineering - I	CO 1	The student must know the definition of the various parameters related to soil mechanics and establish their inter-relationships.
		CO 2	The student must know the index properties of the soil and classify it.
		CO 3	The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
		CO 4	The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
		CO 5	The student should be able to know the stress distribution in soils.
		CO 6	Disinfection and removal of hardness, Iron and manganese
3	Environmental Engineering - I	CO 1	Plan and design the water and distribution networks
		CO 2	Identify the water source and select proper intake structure
		CO 3	Characterization of water
		CO 4	Select the appropriate appurtenances in the water supply
		CO 5	Selection of suitable treatment flow for raw water treatments
		CO 6	Disinfection and removal of hardness, Iron and manganese
	Water	CO 1	Have a thorough understanding of the theories and principles governing the hydrologic processes and be able to quantify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related design aspects
		CO 2	Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.

4	Water Resource Engineering -I	CO 3	Be able to develop design storms and carry out frequency analysis and be able to determine storage capacity and life of reservoirs.
		CO 4	Develop unit hydrograph and synthetic hydrograph and be able to estimate flood magnitude and carry out flood routing.
		CO 5	Be able to determine aquifer parameters and yield of wells.
		CO 6	Be able to model hydrologic processes
5	Waste water Management	CO 1	Understand processing of industrial waste water
		CO 2	Understand use of municipal waste water in industries and use of various advanced water treatment processes.
		CO 3	Learn basic theories of Industrial waste water management
		CO 4	Understand various challenges in industrial waste water disposal management.
		CO 5	To understand the manufacturing process and treatment methods of liquid waste from oil refineries, coal and gas-based power plants
		CO 6	To understand the manufacturing process and treatment methods of liquid waste from tanneries, dairy and food processing industries.

IV – I

1	Environmental Engineering - II	CO 1	Plan and design the sewerage system and Select the appropriate appurtenances in the sewerage systems
		CO 2	Adoption of different pumping system and design of building drainage
		CO 3	Analyze sewage and suggest and design suitable treatment system for sewage treatment
		CO 4	Suggesting a suitable secondary treatment given to the waste water before disposing off.
		CO 5	Analyze and design septic tank and how to give various treatment process other than secondary and primary treatment.
		CO 6	Suggest a suitable disposal method with respect to effluent standards.
2	Water Resource Engineering - II	CO 1	Estimate irrigation water requirements and consumptive use of crop.
		CO 2	Design irrigation canals and canal network
		CO 3	Plan and design irrigation canal structures like falls, regulators and cross drainage works.
		CO 4	Plan and design diversion head work
		CO 5	Analyze stability of gravity and earth dams.
		CO 6	Design ogee spillways and energy dissipation works.

3	Geotechnical Engineering - II	CO 1	The student must be able to understand the stability of finite and infinite slopes.
		CO 2	The student must be able to understand the theories of earth retaining structures.
		CO 3	The student must be able to understand the various types of shallow foundations and decide on their location based on soil characteristics.
		CO 4	The student must be able to design Piles based on the principles of bearing capacity.
		CO 5	The student must be able to know the types of well foundations and to design a well foundation.
		CO 6	The student should be able to understand different methods of soil exploration and to file an investigation report.
4	Remote Sensing & GIS Applications	CO 1	Introduce the basic principles of remote sensing and GIS techniques.
		CO 2	Be familiar with ground, air and satellite-based sensor platforms.
		CO 3	Interpret the aerial photographs and satellite imageries.
		CO 4	Create and input special data for GIS applications
		CO 5	Apply RS and GIS concepts in water resources engineering
		CO 6	Applications of various satellite data
5	Ground Improvement Techniques	CO 1	By the end of the course, the student should be able to possess the knowledge of various in-situ densification methods for granular soils and cohesive soils.
		CO 2	The student able to know various dewatering methods and their suitability in field conditions.
		CO 3	The student should acquire the knowledge of various stabilization methods and their application in field.
		CO 4	The student should be in a position to design a reinforced earth embankment and check its stability.
		CO 5	The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.
		CO 6	The student should be able to understand the concepts and applications of grouting.
6	Environmental Impact Assessment & Management	CO 1	Prepare EMP, EIS, and EIA report
		CO 2	Identify the risks and impacts of a project
		CO 3	Selection of an appropriate EIA methodology
		CO 4	Evaluation the EIA report
		CO 5	Estimate the cost benefit ratio of a project

		CO 6	Know the role of stakeholder and public hearing in the preparation of EIA
7	Ground Water Development	CO 1	Estimate aquifer parameters, yield of wells and analyze radial flow towards wells in confined and unconfined aquifers.
		CO 2	Design wells and understand the construction practices.
		CO 3	Interpret geophysical exploration data for scientific source finding of aquifers.
		CO 4	Determine the process of artificial recharge for increasing groundwater potential.
		CO 5	Take effective measures for controlling saline water intrusion.
		CO 6	Apply appropriate measures for groundwater management.

IV - II

		CO 1	The student should be able to identify general items of work in the buildings.
1	Estimation Specification & Contracts	CO 2	The student should be in a position to find the cost of various building components.
		CO 3	The student should be capable of making bar bending schedule of reinforced structures.
		CO 4	The student should be able to understand types of contracts.
		CO 5	To estimate the cost of a building using individual wall method.
		CO 6	To estimate the cost of a building using center line method.
2	Construction Technology & Management	CO 1	Clear view in construction project management and planning, scheduling by different techniques like Critical path method.
		CO 2	Know the concept of PERT and allocation of resources for a project and cost analysis too.
		CO 3	Know about various types of earth work equipment their capacities and economic considerations.
		CO 4	Know about various hoisting equipment's and its usage
		CO 5	Know the methods of production of aggregate products and concreting and usage of machinery required for the works.
		CO 6	Apply the gained knowledge to project management, construction techniques and safety in construction.
	Prestressed	CO 1	Familiarize students with concepts of prestressing
		CO 2	Understand the different methods of prestressing.
		CO 3	Estimate the effective prestress including the short- and long-term losses

3	Prestressed Concrete	CO 4	Analyze and design prestressed concrete beams under flexure and shear
		CO 5	Understand the reverent IS codes provisions for prestressed concrete
		CO 6	Applications of Prestressed concrete
4	Solid and Hazardous Waste Management	CO 1	Design the collection systems of solid waste of a town
		CO 2	Design treatment of municipal solid waste and landfill
		CO 3	Know the transport means and methods of transportation of solid waste.
		CO 4	Characterize the solid waste and design a composting facility for processing and treatment.
		CO 5	Know the criteria for selection of landfill
		CO 6	Know the Method of treatment and disposal of Hazardous wastes.

Aditya College of Engineering & Technology

I - I

S. No	Name of the subject	CO Number	Course Outcomes
1	Mathematics-I (BS1101)	CO 1	utilize mean value theorems to real life problems (L3)
		CO 2	solve the differential equations related to various engineering fields (L3)
		CO 3	familiarize with functions of several variables which is useful in optimization (L3)
		CO 4	Apply double integration techniques in evaluating areas bounded by region (L3)
		CO 5	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems (L5)
2	MATHEMATICS - II (BS1102)	CO 1	develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
		CO 2	solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel (L3)
		CO 3	evaluate approximating the roots of polynomial and transcendental equations by different algorithms (L5)
		CO 4	apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3)
		CO 5	apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations (L3)
		CO 1	The students will be able to • Identifyforces and moments in mechanical systems using scalar and vector techniques • extend Newton's second law for inertial and non-inertial frame of reference • explain simple harmonic motion and damped harmonic motions
		CO 2	The students will be able to • explain how sound is propagated in buildings • analyze acoustic properties of typically used materials in buildings • recognize sound level disruptors and their use in architectural acoustics • Use of ultrasonics in flaw detection using NDT technique

3	ENGINEERING PHYSICS (BS1108)	CO 3	The students will be able to • Understand the elasticity and plasticity concepts • Study different types of moduli and their relation • Analyze the concepts of shearing force and moment of inertia
		CO 4	The students will be able to • Understand the basic concepts of LASER light Sources • Study Differenttypes of laser systems • Identify different types of sensors and their working principles
		CO 5	The students will be able to • explain the concept of dielectric constant and polarization in dielectric materials. • summarize various types of polarization of dielectrics . • interpret Lorentz field and Claussius_Mosotti relation in dielectrics. • classify the magnetic materials based on susceptibility and their temperature dependence. • explain the applications of dielectric and magnetic materials . • Apply the concept of magnetism to magnetic devices.
4	ENIGINEERING MECHANICS (ES1104)	CO 1	The students are to be exposed to the concepts of force and friction , direction and its application.
		CO 2	The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.
		CO 3	The students are to be exposed to concepts of centre of gravity
		CO 4	The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.
		CO 5	The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion. • The students are to be exposed to concepts of work, energy and particle motion
5	ENGINEERING DRAWING (ES1103)	CO 1	To introduce the students to use drawing instruments and to draw polygons, Engg. Curves.
		CO 2	To introduce the students to use orthographic projections, projections of points & simple lines. To
		CO 3	The objective is to make the students draw the projections of the plane inclined toboth the planes.
		CO 4	The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.

		CO 5	The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.
		I - II	
1	ENGLISH (HS1201)	CO 1	At the end of the module, the learners will be able to • understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
		CO 2	ask and answer general questions on familiar topics and introduce oneself/others
		CO 3	employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
		CO 4	recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
		CO 5	form sentences using proper grammatical structures and correct word forms
2	MATHEMATICS-III (BS1203)	CO 1	Interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
		CO 2	Estimate the work done against a field, circulation and flux using vector calculus (L5)
		CO 3	Apply the Laplace transform for solving differential equations (L3).
		CO 4	Find or compute the Fourier series of periodic signals (L3)
		CO 5	Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms (L3) Identify solution methods for partial differential equations that model physical processes (L3)
		CO 1	At the end of this unit, the students will be able to • Outline the properties of polymers and various additives added and different methods of forming plastic materials. • Explain the preparation, properties and applications of some plastic materials. • Interpret the mechanism of conduction in conducting polymers . • Discuss natural and synthetic rubbers and their applications
4	ENGINEERING CHEMISTRY	CO 2	At the end of this unit, the students will be able to • Explain the theory of construction of battery and fuel cells. • Categorize the reasons for corrosion and study some methods of corrosion control.

4	CHEMISTRY (BS1210)	CO 3	At the end of this unit, the students will be able to • Outline the awareness of materials like nanomaterials and fullerenes and their uses. • Explain the techniques that detect and measure changes of state of reaction. • Illustrate the commonly used industrial materials.
		CO 4	At the end of this unit, the students will be able to • Differentiate petroleum, petrol, synthetic petrol and have knowledge how they are produced. • Study alternate fuels. • Analyse flue gases
		CO 5	At the end of this unit, the students will be able to • Explain the impurities present in raw water, problems associated with them and how to avoid them are understood.
5	PROGRAMMING FOR PROBLEM SOLVING USING C (ES1201)	CO 1	Upon the completion of the course the student will learn 1) To write algorithms and to draw flowcharts for solving problems
		CO 2	2) To convert flowcharts/algorithms to C Programs, compile and debug programs
		CO 3	3) To use different operators, data types and write programs that use two-way/ multi-way selection
		CO 4	4) To select the best loop construct for a given problem 5) To design and implement programs to analyze the different pointer applications
		CO 5	6) To decompose a problem into functions and to develop modular reusable code 7) To apply File I/O operations
6	COMPUTER AIDED ENGINEERING DRAWING (ES1207)	CO 1	Student get exposed on working of sheet metal with help of development of surfaces.
		CO 2	Student understands how to know the hidden details of machine components with the help of sections and interpenetrations of solids.
		CO 3	Student shall exposed to modeling commands for generating 2D and 3D objects using computer aided drafting tools which are useful to create machine elements for computer aided analysis.
7	PROGRAMMING FOR PROBLEM SOLVING USING C LAB (ES1202)	CO 1	By the end of the Lab, the student 1) Gains Knowledge on various concepts of a C
		CO 2	2) Able to draw flowcharts and write algorithms.
		CO 3	3) Able design and development of C problem solving skills.
		CO 4	4) Able to design and develop modular programming skills.
		CO 5	5) Able to trace and debug a program

8	ENGINEERING CHEMISTRY LAB (BS1211)	CO1	The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

II – I

1	Complex Variables and Statistical Methods	CO1	At the end of the course students will be able to ● apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic (L3)
		CO2	find the differentiation and integration of complex functions used in engineering problems (L5)
		CO3	make use of the Cauchy residue theorem to evaluate certain integrals (L3)
		CO4	apply discrete and continuous probability distributions (L3)
		CO5	design the components of a classical hypothesis test (L6) infer the statistical inferential methods based on small and large sampling tests (L4)
2	STRENGTH OF MATERIALS - I	CO 1	The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions
		CO 2	The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces
		CO 3	The student will have knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions.
		CO 4	The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using Lame's equation.
3	Fluid	CO 1	Understand the various properties of fluids and their influence on fluid motion and analyze a variety of problems in fluid statics and dynamics.
		CO 2	Calculate the forces that act on submerged planes and curves.
		CO 3	Ability to analyze various types of fluid flows.

3	Mechanics	CO 4	Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces
		CO 5	Able Measure the quantities of fluid flowing in pipes, tanks and channels.
4	SURVEYING AND GEOMETRICS	CO 1	Course will enable the student to: • Apply the knowledge to calculate angles, distances and levels
		CO 2	Identify data collection methods and prepare field notes
		CO 3	Understand the working principles of survey instruments, measurement errors and corrective measures
		CO 4	Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies
5	BUILDING METERIALS, CONSTRUCTION AND PLANNING	CO 1	Upon the successful completion of the course: • The student should be able to identify different building materials and their importance in buildingconstruction.
		CO 2	The student is expected to differentiate brick masonry, stone masonry construction and use of lime and cement in variousconstructions.
		CO 3	The student should have learnt the importance of building components and finishings.
		CO 4	The student is expected to know the classification of aggregates, sieve analysis and moisture content usually required in buildingconstruction.
6	TRANPORTATION ENGINEERING – I	CO 1	Upon the successful completion of this course, the students will be able to: • Plan highway network for a given area.
		CO 2	Determine Highway alignment and design highway geometrics
		CO 3	Design Intersections and prepare traffic management plans
		CO 4	Judge suitability of pavement materials and design flexible and rigid pavements
		CO 1	After completion of this unit student will ● Understand the concept of Indian constitution ● Apply the knowledge on directive principle of state policy ● Analyze the History, features of Indian constitution ● Evaluate Preamble Fundamental Rights and Duties

7	CONSTITUTION OF INDIA	CO 2	After completion of this unit student will ● Understand the structure of Indian government ● Differentiate between the state and central government ● Explain the role of President and Prime Minister ● Know the Structure of supreme court and High court
		CO 3	After completion of this unit student will ● Understand the structure of state government ● Analyze the role Governor and Chief Minister ● Explain the role of state Secretariat ● Differentiate between structure and functions of state secretariat
		CO 4	After completion of this unit student will ● Understand the local Administration ● Compare and contrast district administration role and importance ● Analyze the role of Myer and elected representatives of Municipalities ● Evaluate Zillapanchayat block level organisation

II -II

1	STRENGTH OF MATERIALS - II	CO 1	Upon successful completion of this course, • The student will be able to understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design thesections.
		CO 2	• The student can asses stresses in different engineering applications like shafts, springs, columns and struts subjected to different loadingconditions
2	HYDRAULICS AND HYDRAULIC MACHINERY	CO 1	Upon successful completion of this course the students will be able to: • Solve uniform and non uniform open channel flow problems.
		CO 2	• Apply the principals of dimensional analysis and similitude in hydraulic model testing.
		CO 3	• Understand the working principles of various hydraulic machineries and pumps.
		CO 1	Upon the successful completion of this course, the students will be able to: • Identify and classify the geological minerals • Measure the rock strengths of various rocks
		CO 2	• Classify and measure the earthquake prone areas to practice the hazard zonation • Classify, monitor and measure the Landslides and subsidence

3	ENGINEERING GELOGOY	CO 3	• Prepares, analyses and interpret the Engineering Geologic maps • Analyses the ground conditions through geophysical surveys.
		CO 4	• Test the geological material and ground to check the suitability of civil engineering project construction.
		CO 5	• Investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc.
4	TRANPORTATION ENGINEERING – II	CO 1	At the end of course, Student will be able to a. Design geometrics in a railway track.
		CO 2	b. Plan track layouts and control movement of trains
		CO 3	c. Design airport geometrics and airfield pavements
		CO 4	d. Plan, construct and maintain Docks and Harbours.
5	ENVIRONMENTAL ENGINEERING- I	CO 1	Upon the successful completion of this course, the students will be able to: • Estimation of design population and water demand
		CO 2	• Identify the water source and select proper intakestructure
		CO 3	• Characterization of water for drinking, industry and construction
		CO 4	• Design of water treatment plant for a village/city
		CO 5	• Selection and design of an ideal distribution system
6	Engineering Geology Lab	CO 1	Upon the successful completion of this course, the students will be able to: • Identify Megascopic minerals & their properties.
		CO 2	• Identify Megascopic rocks & their properties.
		CO 3	• Identify the site parameters such as contour, slope & aspect for topography.
		CO 4	• Know the occurrence of materials using the strike & dip problems.
7	Transportation Engineering Lab	CO 1	At the end of the course, the student will be able to a. Test aggregates and judge the suitability of materials for the road construction
		CO 2	b. Test the given bitumen samples and judge their suitability for the road construction
		CO 3	c. Obtain the optimum bitumen content for Bituminous Concrete
		CO 4	d. Determine the traffic volume, speed and parking characteristics.
		CO 5	e. Draw highway cross sections and intersections.
	Essence of Indian Knowledge Traditional /	CO 1	After successful completion of the course the students will be able to 1. Understand philosophy of Indianculture.
		CO 2	2. Distinguish the Indian languages and literature among differencetraditions.

8	Traditional / Professional Ethics and Human Values	CO 3	3. Learn the philosophy of ancient, medieval and modernIndia.
		CO 4	4. Acquire the information about the fine arts inIndia.
		CO 5	5. Know the contribution of scientists of different eras. 6. The essence of Yogic Science for Inclusiveness ofsociety.

III - I

1	STRUCTURAL ANALYSIS	CO 1	Course Outcomes: Upon successful completion of this course the student will be able to, • Distinguish between the determinate and indeterminatestructures.
		CO 2	• Identify the behaviour of structures due to the expected loads, including the moving loads, acting on thestructure.
		CO 3	• Estimate the bending moment and shear forces in beams for different fixity conditions.
		CO 4	• Analyze the continuous beams using various methods -, three moment method, slope deflection method, energytheorems.
		CO 5	• Draw the influence line diagrams for various types of moving loads on beams/bridges.
		CO 6	• Analyze the loads in Pratt and Warren trusses when loads of different types and spans are passing over thetruss.
2	CONCRETE TECHNOLOGY	CO 1	Upon successful completion of this course, student will be able to • understand basic concepts of concrete
		CO 2	• realize importance of quality ofconcrete. • familiarize basic ingredients of concrete and their role in concrete and their behaviour in thefield.
		CO 3	• test fresh concrete properties and hardened concreteproperties.
		CO 4	• evaluate ingredients of concrete through lab tests. design concrete mix by ISmethod.
		CO 5	• familiarize basic concepts of special concrete and their production and applications. understand the behaviour of concrete in variousenvironments.
		CO 1	At the end of the course the students are expected to • be able to quantify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related designaspects
		CO 2	• develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulicstructures.

3	WATER RESOURCES ENGINEERING - I	CO 3	Analyze Cable and Suspension Bridge structures
		CO 4	• ability to develop design storms and carry out frequencyanalysis • be able to determine storage capacity and life ofreservoirs and develop unit hydrograph and synthetic hydrograph.
		CO 5	• be able to estimate flood magnitude and carry out flood routing.
		CO 6	• be able to determine aquifer parameters and yield ofwells. • Ability to develop the hydrological models.
4	ENVIRONMENTAL ENGINEERING - II	CO 1	By the end of successful completion of this course, the students will be able to: Plan and design the sewerage systems by estimating the flow
		CO 2	Design of Plumbing for an apartment, Gated community or Hotels or Individual houses and Select the appropriate appurtenances in the sewerage systems
		CO 3	Estimation of BOD and COD and Suggest a suitable disposal method with respect to effluent standards, and Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river
		CO 4	Analyze sewage and design suitable treatment system for sewage treatment for a village/City.
		CO 5	Design of sewage treatment systems like Septic tank soak pit system and FAB reactor for buildings and understanding tertiary treatment of sewage.
5	PROGRAM ELECTIVE – I e). Construction Technology & Management	CO 1	Upon the successful completion of this course, the students will be able to: a) appreciate the importance of construction planning
		CO 2	b) understand the functioning of various earth moving equipment
		CO 3	c) know the methods of production of aggregate products and concreting and usage of machinery required for the works.
		CO 4	d) apply the gained knowledge to project management and construction techniques
	ENVIRONMENT	CO 1	By the end of successful completion of this course, the students will be able to: a. Identify the air pollutant control devices b. Have knowledge on the NAAQ standards and air emission standards
		CO 2	c. Differentiate the treatment techniques used for sewage and industrial wastewater treatment methods.

6	ENVIRONMENTAL POLLUTION & CONTROL	CO 3	d. Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.
		CO 4	e. Appreciate the methods of environmental sanitation and the management of community facilities without spread of epidemics.
		CO 5	f. Appreciate the importance of sustainable development while planning a project or executing an activity.

III - II

1	DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES	CO 1	At the end of this course the student will be able to • Work on different types of design methods
		CO 2	• Carryout analysis and design of flexural members anddetailing
		CO 3	• Design structures subjected to shear, bond andtorsion
		CO 4	• Design different type of compression members andfootings
2	Water Resources Engineering – II	CO 1	At the end of the course the student will be able to be able to estimate irrigation water requirements
		CO 2	ability to design irrigation canals and canal network plan an irrigation system
		CO 3	design irrigation canal structures
		CO 4	plan and design diversion head works
		CO 5	analyse stability of gravity and earth dams and design ogee spillways and energy dissipation works
3	Geotechnical Engineering - I	CO 1	Upon the successful completion of this course a. The student must know the definition of the various quantities related to soil mechanics and establish their inter-relationships.
		CO 2	b. The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
		CO 3	c. The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
		CO 4	d. The student should be able to apply the above concepts in day-to-day civil engineering practice.
		CO 1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product.

4	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	CO 2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
		CO 3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
		CO 4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis.
		CO 5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
5	PROGRAM ELECTIVE – II a). Pre-stressed Concrete	CO 1	At the end of this course the student will be able to • Understand different methods of prestressing
		CO 2	Estimate effective prestress including short and long termlosses.
		CO 3	Analyze and design prestressed concrete beams under flexure andshear
		CO 4	Understand the relevant IS Code provisions for prestressed concrete
6	ELEMENTS OF CIVIL ENGINEERING	CO 1	At the end of the course the student is familiar a) basics of Civil Engineering concepts
		CO 2	b) the surveying the elevations and mapping
		CO 3	c) the construction materials and elements
		CO 4	d) water resource development and
		CO 5	e) overall infrastructure development

Aditya College of Engineering & Technology

Aditya Nagar, ADB Road, Surampalem - 533437
Department of Civil Engineering-R20 REGULATION
I - I

S. No	Name of the subject	CO Number	Course Outcomes
1	Mathematics-I (BSC1101)	CO 1	utilize mean value theorems to real life problems (L3)
		CO 2	solve the differential equations related to various engineering fields (L3)
		CO 3	familiarize with functions of several variables which is useful in optimization (L3)
		CO 4	Apply double integration techniques in evaluating areas bounded by region (L3)
		CO 5	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2-dimensional and 3-dimensional coordinate systems (L5)
2	COMMUNICATIVE ENGLISH (HSMC1101)	CO 1	understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
		CO 2	ask and answer general questions on familiar topics and introduce oneself/others
		CO 3	employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
		CO 4	recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
		CO 5	form sentences using proper grammatical structures and correct word forms
		CO 1	Explain the need of coherent sources and the conditions for sustained interference (L2). Identify applications of interference in engineering (L3). Analyze the differences between interference and diffraction with applications (L4). Illustrate the concept of polarization of light and its applications (L2). Classify ordinary polarized light and extraordinary polarized light (L2) The different realms of physics and their applications in both scientific and technological systems are achieved through the study of wave optics.

3	ENGINEERING PHYSICS (BSC1102)	CO 2	Explain various types of emission of radiation (L2). Identify lasers as tools in engineering applications (L3). Describe the construction and working principles of various types of lasers (L1). Explain the working principle of optical fibers (L2). Classify the optical fibers based on refractive index profiles and modes of propagation (L2). Identify the applications of optical fibers in medical, communication and other fields (L2). Apply the fiber optic concepts in various fields (L3).
		CO 3	Explain the concept of dielectric constant and polarization in dielectric materials (L2). Summarize various types of polarization of dielectrics (L2). Interpret Lorentz field and Claussius- Mosotti relation in dielectrics (L2). Classify the magnetic materials based on susceptibility and their temperature dependence (L2). Explain the applications of dielectric and magnetic materials (L2). Apply the concept of magnetism to magnetic devices (L3).
		CO 4	Explain sound waves and its propagation/absorption of construction material used in design of buildings (L2). Analyze acoustic parameters of typical materials used in buildings (L4). Recognize sound level disruptors and their application in architectural acoustics (L2). Identify the use of ultrasonics in diversified fields of engineering (L3)
		CO 5	Interpret various crystal systems (L2) and Analyze the characterization of materials by XRD (L4). Identify the important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction technique (L3). Analysis of structure of the crystals by Laue and Powder techniques (L2)
4	ENGINEERING DRAWING (ESC1101)	CO 1	To introduce the students to use drawing instruments and to draw polygons, Engg. Curves.
		CO 2	To introduce the students to use orthographic projections, projections of points & simple lines. To make the students draw the projections of the lines inclined to both the planes.
		CO 3	The objective is to make the students draw the projections of the plane inclined to both the planes.

		CO 4	The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
		CO 5	The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.
5	ENGINEERING GEOLOGY (ESC1102)	CO 1	Identify and classify the geological minerals and Measure the rock strengths of various rocks
		CO 2	Classify and measure the earthquake prone areas to practice the hazard zonation and Classify, monitor and measure the Landslides and subsidence engineering structure.
		CO 3	Prepares, analyses and interpret the Engineering Geologic maps and Analyses the ground conditions through geophysical surveys.
		CO 4	Test the geological material and ground to check the suitability of civil engineering project construction.
		CO 5	Investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc.
1	ENGINEERING GEOLOGY LAB	CO 1	Identify Megascopic minerals & their properties
		CO 2	Identify Megascopic rocks & their properties
		CO 3	Identify the site parameters such as contour, slope & aspect for topography
		CO 4	Know the occurrence of materials using the strike & dip problems
1	BASICS OF CIVIL ENGG. (WORK SHOP) LAB (ESC1103)	CO 1	Identify various components of a building and give lump-sum estimate
		CO 2	Determine distances and irregular areas using conventional survey instruments like chain, tape, cross-staff and compass
		CO 3	Identify different soils, Know various traffic signs & signals, determine centre of gravity and moment of inertia of channel and I-sections and Set out a signal room building as per given plan
		CO 4	Install simple sanitary filling and find discharge/velocity in a water pipe line as density of water
		CO 5	Know to the process of making cement mortar / concrete for nominal mix

I - II

1	Mathematics - II (Linear Algebra and numerical Methods)	CO 1	develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
		CO 2	solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel (L3)
		CO 3	evaluate the approximate roots of polynomial and transcendental equations by different algorithms (L5)
		CO 4	apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3) and apply numerical integral techniques to different Engineering problems (L3)
		CO 5	apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations (L3)
2	ENGINEERING CHEMISTRY (BS1202)	CO 1	Analyze the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers
		CO 2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.
		CO 3	Synthesize nanomaterials for modern advances of engineering technology, Summarize the techniques that detect and measure changes of state of reaction and Illustrate the commonly used industrial materials.
		CO 4	Differentiate petroleum, petrol, synthetic petrol and have knowledge how they are produced and Study alternate fuels and analyse flue gases.
		CO 5	Analyze the suitable methods for purification and treatment of hard water and brackish water.
4	ENIGINEERING MECHANICS (ESC1201)	CO 1	The students are to be exposed to the concepts of force and friction , direction and its application.
		CO 2	The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.
		CO 3	The students are to be exposed to concepts of centre of gravity and the students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.

		CO 4	The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.
		CO 5	The students are to be exposed to concepts of work, energy and particle motion
5	Engineering Chemistry	CO 1	Analyse the different types of composite plastic materials and interpret the mechanism of polymers.
		CO 2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.
		CO 3	Synthesize advanced nanomaterials and its techniques in engineering. Summarize the techniques that detect and measure changes of state of reaction.
		CO 4	Differentiate petroleum, petrol, synthetic petrol and have knowledge how they are produced. Study alternate fuels and analyse fuel gases.
		CO 5	Analyse the suitable methods for purification and treatment of hard water and brackish water.
		CO 6	Identify chlorination methods in municipal water.
6	PROGRAMMING FOR PROBLEM SOLVING USING C (ES1202)	CO 1	To write algorithms and to draw flowcharts for solving problems
		CO 2	To convert flowcharts/algorithms to C Programs, compile and debug programs
		CO 3	To use different operators, data types and write programs that use two-way/ multi-way selection
		CO 4	To select the best loop construct for a given problem and to design and implement programs to analyze the different pointer applications
		CO 5	To decompose a problem into functions and to develop modular reusable code and to apply File I/O operations
7	BUILDING MATERIALS AND CONCRETE TECHNOLOGY (ESC1203)	CO 1	Know various engineering properties of building construction materials and suggest their suitability
		CO 2	Identify the functional role of ingredients of concrete and apply this knowledge to concrete mix design
		CO 3	Acquire and apply fundamental knowledge in the fresh and hardened properties of concrete
8	ENGINEERING CHEMISTRY LAB (BSC1203)	CO1	The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis, redox titrations with different indicators and EDTA titrations
		CO2	They are exposed to a few instrumental methods of chemical analysis.

		CO3	the student is exposed to different methods of chemical analysis and use of some commonly employed instruments.
9	PROGRAMMING FOR PROBLEM SOLVING USING C LAB (ESC1204)	CO1	Gains Knowledge on various concepts of a C language.
		CO2	Able to draw flowcharts and write algorithms.
		CO3	Able design and development of C problem solving skills.
		CO4	Able to design and develop modular programming skills.
		CO5	Able to trace and debug a program
10	BUILDING PLANNING AND COMPUTER AIDED BUILDING DRAWING (ESC1205)	CO1	Perform basic commands of any suitable CAD software to draw 2D drawings
		CO2	Interpret the conventions, signs and symbols from a given drawing.
		CO3	Prepare line plans of residential and public buildings using principles of planning.
		CO4	Prepare submission and working drawing from the given requirement for Load Bearing and Framed structures
11	ENVIRONMENTAL SCIENCE (MC1201)	CO1	Overall understanding of the natural resources.
		CO2	Basic understanding of the ecosystem and its diversity
		CO3	Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
		CO4	An understanding of the environmental impact of developmental activities.
		CO5	Awareness on the social issues, environmental legislation and global treaties.

II – I

1	**MATHEMATICS-III(BSC301)**	CO1	interpret the physical meaning of different operators such as gradient, curl and divergence (L5) and estimate the work done against a field, circulation and flux using vector calculus (L5)
		CO2	apply the Laplace transform for solving differential equations (L3)
		CO3	find or compute the Fourier series of periodic signals (L3)
		CO4	know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms (L3)
		CO5	identify solution methods for partial differential equations that model physical processes (L3)
2	STRENGTH OF MATERIALS - I	CO 1	The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions
		CO 2	The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces
		CO 3	The student will have knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams

		CO 4	The student will have knowledge of bending concepts and calculation of section modulus and for determination of deflections due to various loading conditions
		CO 5	The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using Lame's equation.
3	FLUID MECHANICS	CO 1	Understand the various properties of fluids and their influence on fluid motion and analyse a variety of problems in fluid statics and dynamics.
		CO 2	Calculate the forces that act on submerged planes and curves.
		CO 3	Ability to analyse various types of fluid flows.
		CO 4	Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces.
		CO 5	Able Measure the quantities of fluid flowing in pipes, tanks and channels.
4	SURVEYING AND GEOMETRICS	CO 1	Apply the knowledge to calculate angles, distances and levels
		CO 2	Identify data collection methods and prepare field notes
		CO 3	Understand the working principles of survey instruments, measurement errors and corrective measures
		CO 4	Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies
		CO 5	
5	HIGHWAY ENGINEERING	CO 1	Plan highway network for a given area.
		CO 2	Determine Highway alignment and design highway geometrics
		CO 3	Design Intersections and prepare traffic management plans
		CO 4	Judge suitability of pavement materials
		CO 5	design flexible and rigid pavements
6	CONCRETE TECHNOLOGY LAB	CO 1	Determine consistency, fineness, setting times, specific gravity, soundness ofcement and compressive strength ofcement.
		CO 2	Determine workability of cement concrete by compaction factor, slump and Vee – Beetests
		CO 3	Determine specific gravity of coarse aggregate and fine aggregate by Sieve analysis and determine flakiness and elongation index ofaggregates.
		CO 4	Determine bulking of sand.
		CO 5	Understand non-destructive testing procedures on concrete

6	HIGHWAY ENGINEERING LAB	CO 1	Test aggregates and judge the suitability of materials for the road construction
		CO 2	Test the given bitumen samples and judge their suitability for the road construction
		CO 3	Obtain the optimum bitumen content for Bituminous Concrete
		CO 4	Determine the traffic volume, speed and parking characteristics.
		CO 5	Draw highway cross sections and intersections

II -II

1	COMPLEX VARIABLES AND STATISTICAL METHODS	CO 1	apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic (L3)
		CO 2	find the differentiation and integration of complex functions used in engineering problems (L5)
		CO 3	make use of the Cauchy residue theorem to evaluate certain integrals (L3) and apply discrete and continuous probability distributions (L3)
		CO 4	design the components of a classical hypothesis test (L6)
		CO 5	infer the statistical inferential methods based on small and large sampling tests (L4
2	Strength of Materials - II	CO 1	The student will be able to understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections.
		CO 2	The student can assess stresses in different engineering applications like shafts, springs, columns and struts subjected to different loading conditions
3	Hydraulics & Hydraulic Machinery	CO 1	Solve uniform and non-uniform open channel flow problems.
		CO 2	Apply the principals of dimensional analysis and similitude in hydraulic model testing.
		CO 3	Understand the working principles of various hydraulic machineries and pumps.
4	ENVIRONMENTAL ENGINEERING	CO 1	Select a source based on quality and quantity
		CO 2	Estimate design population and water demand
		CO 3	Design a water treatment plant for a village/city
		CO 4	Design a sewer by estimating DWF and Strom water flow and plumbing system for buildings
		CO 5	Design a Sewage Treatment Plant for a town/city
	MANAGERIAL ECONOMICS	CO 1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product
		CO 2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs

5	ECONOMICS AND FINANCIAL ANALYSIS	CO 3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units
		CO 4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
		CO 5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making
6	EVIRONMENTAL ENGINEERING LAB	CO 1	Estimate some important characteristics of water, wastewater and soil in the laboratory
		CO 2	Draw some conclusion and decide whether the water is suitable for Drinking/Construction / Agriculture/ Industry
		CO 3	Estimate Chloride, EC and Salinity of Soil and suggest their suitability for Construction/Agriculture
		CO 4	Estimation of the strength of the sewage in terms of BOD and COD and Decide whether the water body is polluted or not with reference to the stated parameters in the list of experiments
		CO 5	Demonstration of various instruments used in testing of water and soil and study of Drinking water standards, WHO guidelines, Effluent standards and standards for Construction/ Agriculture/ Industry.