

B. TECH - CIVIL ENGINEERING

Department Vision

To Lead Academics and Research in Civil Engineering Globally.

Department Mission

- To provide high quality education and make the students as ethical, world class professionals.
- To improve the skills of both staff and students with opportunities to innovate and explore knowledge through research projects and consultancy.
- To inculcate the feeling of present needs in students and evoke in them a responsibility to serve the society better.

Program Educational Objectives (PEOs):

PEO1	Graduate will be able to succeed in diversified fields of industry/higher studies by acquiring technical knowledge and contribute to the sustainable development of infrastructure.
PEO2	Graduate will be able to exhibit professionalism and ethics and show ability to accept modern trends by engaging in lifelong learning.
PEO3	Graduate will be able to apply innovative ideas and succeed as a researcher/entrepreneur to serve societal needs.

Program Specific Outcomes (PSO's):

PSO1:	Develop critical aptitude skills and become professional to address any problem of the society.
PSO2:	Acquire practical knowledge by field visits and function effectively with the training of software by means of curriculum.
PSO3:	Effectively communicate with the stakeholders and execute engineering projects with high proficiency.

Program Outcomes(POs):

Engineering Graduates will be able to:

1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work: Function effectively as an individual, and as a member

	or leader in diverse teams, and in multidisciplinary settings.
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course outcomes (Cos) of all courses of all programs offered by the institution

Course Outcomes for First Year First Semester Course	
Course Code: B17 BS 1101	
Course Title: ENGLISH – I	
CO-1	Understand the rudiments of LSRW Skills, comprehension and fluency of speech.
CO-2	Gain confidence and competency in vocabulary and grammar.
CO-3	Listen, speak, read and write effectively in both the academic and non-academic environment.
CO-4	Extend his/her reading skills towards literature.
CO-5	Strengthen his/her analytical and compositional skills.
Course Code: B17 BS 1102	
Course Title: MATHEMATICS – I	
CO-1	Solve linear ordinary differential equations of first order and first degree. Also, will be able to apply the knowledge in simple applications such as Newton's law of cooling, orthogonal trajectories and simple electrical circuits.
CO-2	Solve linear ordinary differential equations of second order and higher order. Also, will be able to apply the knowledge in simple applications such as LCR circuits and Simple harmonic motion.
CO-3	Determine Laplace transform and inverse Laplace transform of various functions.
CO-4	Use Laplace transforms to solve a linear ODE.
CO-5	Calculate total derivative, Jacobian and maxima/minima of functions of two variables.
CO-6	Form partial differential equations and solve some standard types of first order PDEs. Find complimentary function and particular integral of linear higher order homogeneous and non-homogeneous PDEs.
Course Code: B17 BS 1105	
Course Title: ENGINEERING CHEMISTRY	
CO-1	At the end of the course the students learn the advantages and limitations of plastic materials and their use in design.
CO-2	Fuels which are used commonly and their economics, advantages and limitations are discussed.
CO-3	Students gained Knowledge reasons for corrosion and some methods of corrosion control.
CO-4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.
CO-5	Similarly, students understand liquid crystals and semiconductors. Students can gain the building materials, solar materials, lubricants and energy storage devices.

Course Code: B17 ME 1101	
Course Title: ENGINEERING MECHANICS	
CO-1	Determine the resultant of the given force systems.
CO-2	Analyze force systems using equations of equilibrium.
CO-3	Determine centroid, centre of gravity and moment of inertia of areas and bodies.
CO-4	Analyze trusses and simple beams.
CO-5	Distinguish between kinematics and kinetics.
CO-6	Apply the work energy and impulse momentum methods of various engineering problems.
Course Code: B17 ME 1102	
Course Title: ENGINEERING DRAWING	
CO-1	Apply principles of drawing to represent dimensions of an object.
CO-2	Construct polygons and engineering curves.
CO-3	Draw projections of points, lines, planes and solids.
CO-4	Represent the object in 3D view through isometric views.
CO-5	Convert the isometric view to orthographic view and vice versa.
Course Code: B17 CE 1101	
Course Title: ENVIRONMENTAL STUDIES	
CO-1	To bring awareness among the students about the nature and natural ecosystems
CO-2	Sustainable utilization of natural resources like water, land, energy and air
CO-3	Resource pollution and over exploitation of land, water, air and catastrophic (events) impacts of climate change, global warming, ozone layer depletion, marine, radioactive pollution etc to inculcate the students about environmental awareness and safe transfer of our mother earth and its natural resources to the next generation
CO-4	Safe guard against industrial accidents particularly nuclear accidents
CO-5	Constitutional provisions for the protection of natural resources
Course Code: B17 BS 1107	
Course Title: ENGINEERING CHEMISTRY LAB	
CO-1	An understanding of Professional and develop confidence on recent trends.
CO-2	Able to gain technical knowledge of measuring, operating and testing of chemical instruments and equipment's.
CO-3	Acquire ability to apply knowledge of chemistry.
CO-4	Exposed to the real time working environment.
CO-5	Demonstrate the ability to learn Principles, design and conduct experiments.
CO-6	Ability to work on laboratory and multidisciplinary tasks.
Course Code: B17 BS 1108	
Course Title: ENGLISH COMMUNICATION SKILLS LAB- I	
CO-1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
CO-2	Students improve their speaking skills in real contexts.
CO-3	Students learn standard pronunciation and practice it daily discourse.
CO-4	Students give up their communicative barriers.
Course Code: B17 BS 1109	
Course Title: ENGINEERING WORKSHOP & IT WORKSHOP	
PART-A (ENGINEERING WORKSHOP)	
CO-1	Use various tools to prepare basic carpentry and fitting joints.
CO-2	Prepare jobs of various shapes using black smithy.
CO-3	Make basic house wire connections.
CO-4	Fabricate simple components using tin smithy.
PART-B (IT WORKSHOP)	
CO-1	Understand the basic components and peripherals of a computer.
CO-2	To become familiar in configuring a system.

CO-3	Learn the usage of productivity tools.
CO-4	Acquire knowledge about the netiquette and cyber hygiene.
CO-5	Get hands on experience in trouble shooting a system
Course Code: B17 BS 1111	
Course Title: INNER ENGINEERING	
CO-1	To improve his concentration levels and improve his public speaking abilities.
CO-2	To balance his academic and non-academic activities (Work Life Balance).
CO-3	To widen his vision and increase his breadth of perspective in his journey of 4 years.
CO-4	To improve his communications skills, leadership, teamwork and decision-making abilities
CO-5	To inculcate creativity & innovation, planning & organizing as part of their life.
CO-6	Taking responsibility for themselves and people around them.
CO-7	To make their journey more fun and enjoyable.

Course Outcomes for First Year Second Semester Course	
Course Code: B17 BS 1201	
Course Title: ENGLISH – II	
CO-1	To comprehend the speech of people belonging to different backgrounds and regions.
CO-2	Understand the importance of speaking and writing for personal and professional communication and practice it in real contexts.
CO-3	To express fluently and accurately in social discourse.
CO-4	Participate in group activities like role-plays, discussions and debates.
CO-5	Identify the discourse features, and improve intensive and extensive reading skills.
Course Code: B17 BS 1202	
Course Title: MATHEMATICS – II	
CO-1	Find a real root of algebraic and transcendental equations using different methods
CO-2	Know the relation between the finite difference operators. Determine interpolation polynomial for a given data.
CO-3	Evaluate numerically certain definite integrals applying Trapezoidal and Simpson's rules.
CO-4	Solve a first order ordinary differential equation by Euler and RK methods.
CO-5	Find Fourier series of a given function satisfying Dirichlet conditions. Find half range cosine and sine series for appropriate functions.
CO-6	Find Fourier transforms Fourier cosine and sine transforms of appropriate functions and evaluate certain integrals using inverse transforms and Fourier integral.
Course Code: B17 BS 1203	
Course Title: MATHEMATICS – III	
CO-1	Determine rank, and solve a system of linear simultaneous equations numerically using various matrix methods.
CO-2	Determine Eigen values and Eigen vectors of a given matrix Reduce a Quadratic form to its canonical form and classify.
CO-3	Evaluate double integrals over a region and triple integral over a volume.
CO-4	Use the knowledge of Beta and Gamma functions in evaluation of different integrals.
CO-5	Find gradient of a scalar function, divergence and curl of a vector function. Use vector identities for solving problems.
CO-6	Evaluate line, surface and volume integrals by the use of Green's, Stokes' and Gauss divergence theorems.
Course Code: B17 BS 1204	
Course Title: ENGINEERING PHYSICS	
CO-1	Learn the basic concepts of interference and diffraction of light and its

	applications.
CO-2	Understand the science of producing high intensity light beams for technological applications and also understand the propagation of light waves in optical fibers in various applications.
CO-3	Understand the inter relationship of electric and magnetic fields and learn ultrasonics as a tool for technological applications.
CO-4	Learn the behavior of particles at the very microscopic level by using wave nature of particles and understand the behavior of materials and be able to classify them using the band theory of solids.
CO-5	Learn the basics of structures of solid materials and nano material preparation Techniques/methods.
Course Code: B17 CS 1201	
Course Title: COMPUTER PROGRAMMING USING C	
CO-1	Understand the basic terminology used in computer programming.
CO-2	Write, compile and debug programs in C language.
CO-3	Use different data types in a computer program.
CO-4	Design programs involving decision structures, loops and functions.
CO-5	Explain the difference between call by value and call by reference.
CO-6	Understand the dynamics of memory by the use of pointers.
CO-7	Use different data structures and create/update basic data files.
Course Code: B17 CE 1201	
Course Title: BUILDING MATERIALS AND CONSTRUCTION	
CO-1	Define and classify various stones, clay products used in construction sector.
CO-2	Find various types of wood their conversion and relevant BIS testing procedures to be carried out to ascertain the quality of building materials.
CO-3	Identify the major ingredients of construction materials like lime, cement, aggregate and their use in the construction industry.
CO-4	Select different materials for finishing's and various constructions pertaining to masonry works and foundations.
CO-5	Develop the conceptual knowledge of various supports in building construction.
Course Code: B17 EE 1201	
Course Title: CIRCUIT THEORY	
CO-1	Various electrical networks in presence of active and passive elements.
CO-2	Electrical networks with network topology concepts.
CO-3	Magnetic circuit with various dot conventions.
CO-4	R, L, C network with sinusoidal excitation.
CO-5	Three phase AC circuits.
Course Code: B17 EE 1202	
Course Title: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	
CO-1	Able to analyze the various Electrical networks and understand the basics of Magnetic Circuits.
CO-2	Able to understand the operation of DC generators, 3-Point starter and conduct the Swinburne's test.
CO-3	Able to analyze the Performance of Transformers.
CO-4	Able to explain the operation of three phase induction motors and alternator.
CO-5	Able to analyze the operation of Half-wave and Full-wave rectifiers and single stage CE amplifier.
Course Code: B17 BS 1206	
Course Title: ENGINEERING PHYSICS LAB	
CO-1	Students get hands on experience in setting up experiments and using the Instruments/equipment individually.
CO-2	Get introduced to using new/ advanced technologies and understand their significance.
Course Code: B17 BS 1208	

Course Title:ENGLISH COMMUNICATION SKILLS LAB- II	
CO-1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
CO-2	Students enhance their presentation skills.
CO-3	Students participate in group discussions and improve their team skills.
CO-4	Students confidently face the interviews.
Course Code: B17 CS 1204	
Course Title:C PROGRAMMING LAB	
CO-1	Apply and practice logical ability to solve the problems.
CO-2	Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment.
CO-3	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs.
CO-4	Understand and apply the in-built functions and customized functions for solving the problems.
CO-5	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
CO-6	Document and present the algorithms, flowcharts and programs in form of user manuals.
CO-7	Identification of various computer components, Installation of software
Course Code: B17 BS 1210	
Course Title:ENGINEERING PHYSICS - VIRTUAL LABS – ASSIGNMENTS	
CO	Course Outcome: Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper.

Course Outcomes for Second Year First Semester Course	
Course Code: B17 BS 2101	
Course Title:MATHEMATICS – IV	
CO-1	Using the concept of Analytic function in applications including Electrostatics and Fluid dynamics.
CO-2	Finding theoretical solution of certain Elliptic, Parabolic and Hyperbolic partial differential equations.
CO-3	Using Z-transforms to solve linear difference equations with constant coefficients.
CO-4	Fitting of probability frequency distribution to a given data.
CO-5	Using the concepts of sampling theory to analyze data related to some large and small samples.
Course Code: B17 CE 2101	
Course Title:MECHANICS OF SOLIDS	
CO-1	Summarize the behavior of basic materials under the influence of different external loading conditions and support conditions. (K2)
CO-2	Determine shear Force and Bending moments in statically determinate Beams and draw the Diagrams. (K5)
CO-3	Examine the different methods to find slope and deflection of beams subjected to loads(K4)
CO-4	Estimate the principal stresses & strains and torsional stresses in structural members(K3)
CO-5	Evaluate the crippling load for columns with different end conditions. (K5)
Course Code: B17 CE2102	
Course Title:ENVIRONMENTAL ENGINEERING	
CO-1	Explain the quality of water.[K2]
CO-2	Analyze the water quality parameters and compare with the permissible limits. [K4]
CO-3	Summarize the working principles of conventional unit operations of a water

	treatment plant. [K2]
CO-4	Determine the sizes of different unit operations in a water treatment plant. [K5]
CO-5	Assess the suitability of conventional methods and latest membrane processes for different water bodies.[K5]
CO-6	Design a conventional water treatment plant with given specifications for given capacity. [K6]
Course Code: B17 CE 2103	
Course Title:BUILDING PLANNING & DESIGN	
CO-1	Understand various types of buildings and housing concept.
CO-2	Apply the concepts of climatology and orientation of both residential and commercial buildings.
CO-3	Apply the principles of planning and byelaws used for building planning.
CO-4	Recommend appropriate planning for 2 Bed room and 3 Bed room houses.
CO-5	Draw plan, elevation and section for various structures.
CO-6	Design individual rooms with attention to functional and furniture requirements.
Course Code:B17 CE 2104	
Course Title:SURVEYING-I	
CO-1	Appreciate the importance of preparation of Map and Plan for required site with suitable scale.
CO-2	Prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.
CO-3	Judge on which type of instrument to be used for carrying out survey for a specific work
CO-4	Describe different modern instruments used in surveying.
Course Code:B17 CE 2105	
Course Title:ENGINEERING GEOLOGY	
CO-1	The course will provide the students with basic knowledge and understanding in the most central part of engineering geology, rock and soil.
CO-2	Students should develop an appreciation of geologic processes and their influence civil engineering works.
CO-3	The course will give students an overview and an understanding of the engineering properties of rock and soil materials.
CO-4	Based on lectures and exercises, students will gain basic understanding of the importance of engineering geology related to technical issues during construction.
CO-5	Students will develop the ability to perform basic engineering geological assessments and analysis, and to understand the relevance of engineering geology in complex projects in and on solid rock.
Course Code: B17 CE2106	
Course Title:ENGINEERING GEOLOGY LAB	
CO-1	Elucidate the mega-scopic identification of minerals.
CO-2	Categorize the rocks according to mega-scopic description
CO-3	Interpret geological maps
CO-4	Estimate the types of subsurface formation by using geophysical methods
Course Code: B17 CE2107	
Course Title:STRENGTH OF MATERIALS LABORATORY	
CO-1	The student clearly understands the concepts of deciding the shape or type of specimen for assessing the respective strengths against various straining actions.
CO-2	The student can design the specimens for assessing a particular property of the material with the available machines.
CO-3	The student can design the experiments making use of various techniques of load measuring or deformation measuring instruments.
CO-4	The student will be confident to decide the range of the machine and set the machine accordingly by suitable modifications, for results with a finer degree of

	accuracy.
Course Code: B17 CE2108	
Course Title:AUTOCAD FOR CIVIL ENGINEERING	
CO-1	Student's ability to perform basic sketching techniques will improve.
CO-2	Student's ability to use architectural and engineering scales will increase.
CO-3	Student's ability to produce engineered drawings will improve.
CO-4	Student's ability to convert sketches to engineered drawings will increase.
CO-5	Student's will become familiar with office practice and standards.
CO-6	Student's will become familiar with AutoCAD two dimensional drawings.
CO-7	Student's will develop good communication skills and teamwork.
Course Code: B17 BS 2107	
Course Title:ENGLISH PROFICIENCY-I	
CO-1	Improve speaking skills.
CO-2	Enhance their listening capabilities.
CO-3	Learn and practice the skills of composition writing.
CO-4	Enhance their reading and understanding of different texts.
CO-5	Improve their inter-personal communication skills.
CO-6	Be confident in presentation skills.
Course Code: B17 BS 2108	
Course Title:PROFESSIONAL ETHICS & HUMAN VALUES	
CO	By the end of the course student should be able to understand the importance of ethics and values in life and society.

Course Outcomes for Second Year SecondSemester Course	
Course Code: B17 CE2201	
Course Title:STRUCTURAL ANALYSIS – I	
CO-1	Determine deflections in determinate beams by different methods.
CO-2	Evaluate the strain energy for structural members subjected to different loads.
CO-3	Analyze different indeterminate beams for BM and SF by different methods of analysis.
CO-4	Determine reactions, BM & SF in beams subjected to moving loads.
CO-5	Distinguish between thin and thick cylinders and understand different failure theories.
Course Code: B17 CE2202	
Course Title:FLUID MECHANICS- I	
CO-1	Determine the physical properties of fluids and different types of forces acting on a fluid element extended to forces on various gates.
CO-2	Determine the forces that are acting on immersed bodies in static fluids through application of buoyancy and floatation.
CO-3	Determine different types of fluid flows to find out the local and convective accelerations in 1D, 2D flows fields and derive the Laplace equation.
CO-4	Apply conservation principles of mass momentum and energy on fluids through system and control volume approaches.
CO-5	Calculate the force exerted by the fluid on bends, nozzles, plates and vanes by impulse momentum principle.
CO-6	Analyze the steady laminar and turbulent flows through pipes and solve pipe networks for series and parallel pipes to solve two reservoir and three reservoir problems.
Course Code: B17 CE 2203	
Course Title:ENVIRONEMNTAL ENGINEERING – II	
CO-1	Compare water and waste water.
CO-2	Explain principles of conventional treatment process and miscellaneous treatment techniques.
CO-3	Examine the operational differences of each unit process.

CO-4	Interpret the feasible technique required for particular waste water.
CO-5	Determine the size of unit operations using working principles of each.
Course Code: B17 CE 2204	
Course Title: 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 fresh concrete properties and the hardened concrete properties.
CO-5	Evaluate the ingredients of concrete through lab test results.
CO-6	Design the concrete mix by BIS method.
CO-7	Familiarize the basic concepts of special concrete and their production and applications.
CO-8	Understand the behavior of concrete in various environments.
Course Code: B17 CE 2205	
Course Title: SURVEYING – II	
CO-1	Appreciate the importance of Theodolite in Surveying
CO-2	Apply Concepts of Tachometry in Surveying.
CO-3	Construct the Curves in Highways, road construction and canal works.
CO-4	Use the RS and GIS in designing
CO-5	Use the Total Station in Surveying.
Course Code: B17 CE 2206	
Course Title: REMOTE SENSING & GIS	
CO-1	Be familiar with ground, air and satellite-based sensor platforms.
CO-2	Interpret the aerial photographs and satellite imageries
CO-3	Create and input spatial data for GIS application
CO-4	Apply RS and GIS concepts in water resources engineering.
Course Code: B17 CE2207	
Course Title: SURVEYING FIELD WORK	
CO-1	Apply the linear measurement in simple Boundary Surveys.
CO-2	Identify direction of any line using compass survey.
CO-3	Relate the importance of Theodolite in Surveying
CO-4	Apply Concepts of Tachometry in Surveying.
CO-5	Use the Total Station in Surveying.
Course Code: B17 CE2208	
Course Title: FLUID MECHANICS LAB – I	
CO-1	Define and Measure Fluid Properties.
CO-2	Illustrate Flow Measuring Devices used in pipes, channels and Tanks.
CO-3	Analyze characteristics of broad crested weir.
CO-4	Illustrate the characteristics of surface profiles in free and forced vibrations.
CO-5	Compare sharp crested full width and contracted weirs.
Course Code: B17 CE2209	
Course Title: ENGINEERING WORKSHOP & IT WORKSHOP	
CO-1	Fully equipped with various surveying concepts and methods using advanced ground survey equipment's.
CO-2	Carry out profiling and grid levelling, for generation of profiles, contour maps, and earth works computations.
CO-3	Handle the Satellite images and interpret the satellite data.
CO-4	The interpret data can be used to prepare plan for urban development/town planning.
CO-5	Prepare the candidates with National Global employability.
Course Code: B17 BS 2206	
Course Title: ENGLISH PROFICIENCY-II	
CO-1	Develop the skills of taking and making notes.

CO-2	Interpret the pictures appropriately and effectively.
CO-3	Read, comprehend and infer a given piece of writing effectively.
CO-4	Learn and practice the skills of Research writing.
CO-5	Communicate well through various forms of writing.
CO-6	Be confident in giving presentations and dealing with people.

Course Outcomes for Third Year First Semester Course	
Course Code: B17 CE3101	
Course Title: STRUCTURAL ANALYSIS – II	
CO-1	Student should be able to understand and analyse the statically indeterminate trusses by using method of consistent deformation and Castigliano's theorem– II
CO-2	Analyse the statically indeterminate rigid frame by Slope Deflection Method, Moment Distribution Method, Kani's Methods and Column Analogy Method.
CO-3	Analyze three hinged, two hinged arches and cables and suspension bridge with Two hinged and Three hinged Stiffening Girder.
CO-4	Analyse suspension cables support are at the same level and different levels.
CO-5	To develop stiffness matrix and flexibility matrix for two span continuous beams by direct method.
Course Code: B17 CE 3102	
Course Title: REINFORCED CONCRETE STRUCTURES-I	
CO-1	Analyze and design the flexural members.
CO-2	Design the reinforced concrete beams subjected to shear only and also combined action of shear and torsion.
CO-3	Distinguish between the behavior of one way and two-way actions in slab and familiarize to design of two way slabs whose corners restrained and not restrained from lifting up.
CO-4	Design the compression members.
CO-5	Design the footing and staircase.
Course Code: B17 CE 3103	
Course Title: STEEL STRUCTURES-I	
CO-1	Design of simple connections with bolted connections.
CO-2	Design of simple connections with welded connection.
CO-3	Design of tension members subjected to axial force
CO-4	Design of compression axially loaded members as built-up columns
CO-5	Design the laterally supported and unsupported beams as per I.S code.
Course Code: B17 CE 3104	
Course Title: GEOTECHNICAL ENGINEERING-I	
CO-1	Know the fundamental relationships between different parameters of soil mass and classify different types of soils along with identifying their properties(K3).
CO-2	Estimate Effective stresses and permeability of soils(K3).
CO-3	Estimate stress distribution in soil for different Load conditions(K3).
CO-4	Appreciate the processes of compaction and consolidation and apply them to field problems(K3)
CO-5	Identify shear strength parameters for different conditions(K3).
Course Code: B17 CE 3105	
Course Title: FLUID MECHANICS- II	
CO-1	Apply the principles of modelling pumps, turbines, propellers using various dimensionless numbers.
CO-2	Determine discharge and design most economical channel section for uniform flow in open channels.
CO-3	Use momentum and energy principles for design of turbines and pumps.
CO-4	Recommend suitable type of turbines and pumps for the given project.
Course Code: B17 CE 3106	

Course Title:ESTIMATION & QUANTITY SURVEYING	
CO-1	List out various components, estimations and units of measurement for different works
CO-2	Apply the method of building estimate to find out the quantities of various items of work
CO-3	Determine the rate per unit of various items of work and their specifications
CO-4	Explain the estimation of various roads and related items
CO-5	Select various methods to find out the valuation of a property
Course Code: B17 CE3107	
Course Title:ENVIRONMENTAL ENGINEERING LAB	
CO-1	Determine physical properties of water
CO-2	Determine the turbidity and hardness of water
CO-3	Determine COD and BOD of water
CO-4	Estimate concentration of acidity and alkalinity
CO-5	Estimate chloride content of water
Course Code: B17 CE3108	
Course Title:FLUID MECHANICS LAB– II	
CO-1	Determine the coefficient of impact on a flat plate and curved vane by comparing the theoretical and actual forces by impact.
CO-2	Analyze the working of the centrifugal pump and develop the characteristics of power input, head and efficiency under various discharges and plot the characteristic curves.
CO-3	Analyze the working of the reciprocating pump and develop the characteristics of power input and discharge and efficiency under various heads and plot the characteristic curves.
CO-4	Determine the performance characteristics of pelton wheel turbine and develop the characteristic curves of unit discharge, unit power and unit head under varying unit speed.
CO-5	Determine the performance characteristics of Francis turbine and develop the characteristic curves of unit discharge, unit power and unit head under varying unit speed.
Course Code: B17 CE3109	
Course Title:GEOGRAPHIC INFORMATION SYSTEMS LABORATORY	
CO-1	Assign appropriate datum and projection systems for the given data
CO-2	Pre-process the raw data to make it suitable for overlaying with various themes
CO-3	Create thematic layers by using digitization techniques and attaching attribute data
CO-4	Visualize and interpret digital elevation model
Course Code: B17 BS 3101	
Course Title:PROBLEM SOLVING & LINGUISTIC COMPETENCE	
PART-A (Verbal and Soft Skills-I)	
CO-1	Detect grammatical errors in the text/sentences and rectify them while answering their competitive/ company specific tests and frame grammatically correct sentences while writing.
CO-2	Answer questions on synonyms, antonyms and other vocabulary based exercises while attempting CAT, GRE, GATE and other related tests.
CO-3	Use their logical thinking ability and solve questions related to analogy, syllogisms and other reasoning based exercises.
CO-4	Choose the appropriate word/s/phrases suitable to the given context in order to make the sentence/paragraph coherent.
CO-5	Apply soft skills in the work place and build better personal and professional relationships making informed decisions.
Part-B (Quantitative Aptitude –I)	
CO-1	The students will be able to perform well in calculating on number problems and various units of ratio concepts.

CO-2	Accurate solving problems on time and distance and units related solutions.
CO-3	The students will become adept in solving problems related to profit and loss, in specific, quantitative ability.
CO-4	The students will present themselves well in the recruitment process using analytical and logical skills which he or she developed during the course as they are very important for any person to be placed in the industry.
CO-5	The students will learn to apply Logical thinking to the problems of syllogisms and be able to effectively attempt competitive examinations like CAT, GRE, GATE for further studies.
Course Code: B17 BS 3105	
Course Title:IPR & PATENTS	
CO-1	Identify various types of intangible property that an engineering professional could generate in the course of his career.
CO-2	Distinguish between various types of protection granted to Intellectual Property such as Patents, Copy Rights, Trademarks etc.,
CO-3	List the steps involved in getting protection over various types of intellectual property and maintaining them.
CO-4	Take precautions in writing scientific and technical reports without plagiarism.
CO-5	Help micro, small and medium entrepreneurs in protecting their IP and respecting others IP as part of their business processes.
Course Outcomes for Third Year First Semester Course	
Course Code: B17 CE 3201	
Course Title:REINFORCED CONCRETE STRUCTURES – II	
CO-1	Distinguish between the behaviors of cantilever and counter fort retaining walls and design the cantilever and counter fort retaining walls.
CO-2	Design the reinforced concrete circular and rectangular water tanks.
CO-3	Design the reinforced concrete T-beam bridge.
CO-4	Design the piles and pile cap.
CO-5	Design the flats labs
Course Code: B17 CE3202	
Course Title:STEEL STRUCTURES-II	
CO-1	Design of columns bases.
CO-2	Design components of a plate girder with and without stiffeners by using IS: 800-2007 code
CO-3	Design of circular water tank in working stress method.
CO-4	Design of beam-column connections subjected to eccentric shear connections.
CO-5	Design of end bearings.
Course Code: B17 CE3203	
Course Title:GEOTECHNICAL ENGINEERING-II	
CO-1	Plan a detailed soil exploration programme. (K2)
CO-2	Apply various methods for estimating bearing capacity of different types of foundations. (K3)
CO-3	Estimate load capacity of single piles and groups of piles and know the theory aspects of well foundations (K3)
CO-4	Determine the stability of finite and infinite slopes. (K3)
CO-5	Calculate earth pressures on retaining walls using Rankine's and Coulomb's theories (K3)
Course Code: B17 CE 3204	
Course Title: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 and design flexible and rigid pavements
CO-5	Construct and maintain highways
Course Code: B17 CE 3205	
Course Title: AIR POLLUTION AND CONTROL	
CO-1	Explain the classification, sources and effects of air pollution [K2]
CO-2	Explain the different meteorological conditions that influence the dispersion of the pollutants [K2]
CO-3	Illustrate the plume behaviour for different atmospheric stability conditions [K2]
CO-4	Adapt various pollution control equipment's or methods to control the discharge of pollutants [K3]
CO-5	Measure the pollution levels by sampling and analysis [K5].
Course Code: B17 CS3213	
Course Title: DATABASE MANAGEMENT SYSTEMS	
CO-1	Demonstrate the basic elements of a relational database management system.
CO-2	Ability to identify the data models for relevant problems.
CO-3	Ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data.
CO-4	Apply normalization for the development of application software
Course Code: B17 CE3206	
Course Title: ALTERNATIVE ENERGY SOURCES	
CO-1	Summarize the need of renewable sources in Global scenario. [K2]
CO-2	Explain the solar thermal conversion processes. [K2]
CO-3	Explain the wind energy conversion techniques. [K2]
CO-4	Explain the biomass energy conversion methodologies. [K5]
CO-5	Analyze the principle of ocean thermal energy conversion system. [K4]
Course Code: B17 CE 3207	
Course Title: WASTEWATER MANAGEMENT	
CO-1	Define the quality of industrial wastes. [K1]
CO-2	Explain various industrial waste treatment processes. [K2]
CO-3	Outline the advanced treatment techniques available for industrial wastes. [K2]
CO-4	Explain the sludge reduction and disposal methodologies. [K2]
CO-5	Analyse the waste effluent treatment from different case studies. [K4].
Course Code: B17 CE3208	
Course Title: GREEN FUEL TECHNOLOGIES	
CO-1	Classify various types of green fuels. [K2]
CO-2	Examine the production of bio ethanol using fermentation process. [K3]
CO-3	Explain the generation of bio diesel using algae species. [K2]
CO-4	Interpret the production of bio diesel from plant seeds. [K2]
CO-5	Explain the production of biogas from biogas plant. [K2]
Course Code: B17 CE3209	
Course Title: GEOTECHNICAL ENGINEERING LAB	
CO-1	Identify the physical properties of soil and classify various types of soil. (K2)
CO-2	Determine the permeability of soil. (K3)
CO-3	Determine compaction characteristics of soils and estimate in-situ density of soil. (K3)
CO-4	Determine the shear strength parameters of soils by various methods. (K3)
CO-5	Estimate the California Bearing Ratio (CBR) of a soil. (K3)
CO-6	Determine the relative density of a coarse-grained soil. (K3)
Course Code: B17 CE3210	
Course Title: CONCRETE TECHNOLOGY LAB	
CO-1	Conduct test and find consistency and fineness of cement.
CO-2	Examine the specific gravity of cement.
CO-3	Conduct test and determine the setting times of cement.

CO-4	Determine the compressive strength of cement.
CO-5	Determine the specific gravity of coarse aggregate and fine aggregate.
CO-6	Determine the fineness modulus of coarse aggregate and fine aggregate.
CO-7	Determine the bulking of sand.
CO-8	Understand and determine workability of concrete by slump, compaction factor, flow table and Vee – Bee tests.
CO-9	Evaluate hardened properties of concrete like compressive strength, split tensile strength and flexural strength.
Course Code: B17 BS3201	
Course Title:EMPLOYABILITY SKILLS	
Part-A (Verbal Aptitude and Soft Skills-II)	
CO-1	Construct coherent, cohesive and unambiguous verbal expressions in both oral and written discourses.
CO-2	Analyze the given data/text and find out the correct responses to the questions asked based on the reading exercises; identify relationships or patterns within groups of words or sentences
CO-3	Write paragraphs on a particular topic, essays (issues and arguments), e mails, summaries of group discussions, reports, make notes, statement of purpose(for admission into foreign universities), letters of recommendation(for professional and educational purposes).
CO-4	Converse with ease during interactive sessions/seminars in their classrooms, compete in literary activities like elocution, debates etc., raise doubts in class, participate in JAM sessions/versant tests with confidence and convey oral information in a professional manner.
CO-5	Participate in group discussions/group activities, exhibit team spirit, use language effectively according to the situation, respond to their interviewer/employer with a positive mind, tailor make answers to the questions asked during their technical/personal interviews, exhibit skills required for the different kinds of interviews (stress, technical, HR) that they would face during the course of their recruitment process.
Part-B (Quantitative Aptitude-II)	
CO-1	The students will be able to perform well in calculating different types of data interpretation problems.
CO-2	The students will perform efficaciously on analytical and logical problems using various methods.
CO-3	Students will find the angle measurements of clock problems with the knowledge of calendars and clock.
CO-4	The students will skilfully solve the puzzle problems like arrangement of different positions.
CO-5	The students will become good at solving the problems of lines, triangular, volume of cone, cylinder and so on.
Course Code: B17 BS 3202	
Course Title:BASIC CODING	
CO-1	Know about Control Structures, Loop Structures and branching in programming.
CO-2	Know about various searching and sorting methods.
CO-3	Know about Functions, Recursions and Storage Classes.
CO-4	Know about Structures and Unions.
CO-5	Know different Operating System concepts.
CO-6	Differentiate OSI Model Vs. TCP/IP suite.

Course Outcomes for Fourth Year First Semester Course	
Course Code: B17 CE4101	
Course Title:TRANSPORTATION ENGINEERING – II	
CO-1	Illustrate the different types of Components of Railway Engineering

CO-2	Plan the Geometric Design for a Railway Track
CO-3	Characterize the concepts of railway Interlocking and signaling systems
CO-4	Identify the technical issues related to planning and design of airports
CO-5	Distinguish the technical components of harbours
Course Code: B17 CE4102	
Course Title: WATER RESOURCES ENGINEERING-I	
CO-1	Choose major hydrologic components & apply key concepts to several practical areas of engineering hydrology & related design aspects
CO-2	Determine aquifer parameters & yield of wells.
CO-3	Carry out surface & subsurface investigation to locate ground water
CO-4	Determine storage capacity & life of reservoirs
CO-5	Assess the irrigation needs of crops
Course Code: B17 CE4103	
Course Title: PROJECT PLANNING AND MANAGEMENT	
CO-1	Apply the concepts of planning, scheduling and controlling to determine time estimates of the project
CO-2	Estimate the optimum cost –time relationship for the given project network
CO-3	Explain updating and resources allocation methods
CO-4	Make use of contracts and tender bidding procedures required for construction industry
CO-5	Apply the significance of project management for developing managerial skills
Course Code: B17 CE 4104	
Course Title: FINITE ELEMENTS METHODS OF ANALYSIS (Elective-I)	
CO-1	Understand the concepts behind variational methods and weighted residual methods in FEM.
CO-2	Identify the application and characteristics of FEA elements such as bars, beams, 2-D element and axisymmetric element.
CO-3	Develop element characteristic equation procedure and generation of global stiffness equation will be applied.
CO-4	Able to apply Suitable boundary conditions to a global structural equation, and reduce it to a solvable form.
Course Code: B17 CE 4105	
Course Title: SOLID WASTE MANAGEMENT (Elective-I)	
CO-1	Explain the quality of solid wastes.
CO-2	Explain various functional elements of solid waste management.
CO-3	Explain transport and segregation of wastes.
CO-4	Explain the processing, composting and incineration methods of solid wastes .
CO-5	Explain disposal methods of solid wastes.
Course Code: B17 CE 4106	
Course Title: EXPANSIVE SOILS (Elective-I)	
CO-1	Understand the occurrence and effect of expansive soils
CO-2	Understand the clay mineralogy of soil
CO-3	Apply the knowledge of soil mechanics for predicting the heave of the soil
CO-4	Design the foundation of structures for various field conditions
Course Code: B17 CE4107	
Course Title: TRAFFIC ENGINEERING (Elective-I)	
CO-1	Demonstrate the Traffic Characteristics.
CO-2	Identify Highway Capacity and Level of Service
CO-3	Distinguish Parking Studies and Traffic Accident Studies
CO-4	Develop Intersection Design.
CO-5	Classify Traffic Regulations and Signals.
Course Code: B17 CE 4108	
Course Title: PRESTRESSED CONCRETE STRUCTURES (Elective-II)	

CO-1	Calculate the prestressing losses as per IS code provisions
CO-2	Analysis of prestress members and stress in tendons as per IS:1343
CO-3	Designing the Prestressed members for flexural and shear, as per IS code provisions.
CO-4	Analysis of transfer of prestress (pretensioned members) as per code provisions.
Course Code: B17 CE4109	
Course Title:GROUND IMPROVEMENT TECHNIQUES (Elective-II)	
CO-1	Apply in-situ densification methods for improving cohesive and cohesion less soil deposits
CO-2	Apply grouting technique for improving soils
CO-3	Understand the purpose of geotextile and geogrid
CO-4	Apply the concepts of reinforced soil to various structures
CO-5	Understand various soil stabilization techniques
Course Code: B17 CE4110	
Course Title:TRANSPORTATION PLANNING(Elective-II)	
CO-1	Explain about Urban Structure and Transport Systems.
CO-2	Apply Comprehensive Transport Planning Study.
CO-3	Analyze Economic Evaluation of Transport Projects.
CO-4	Apply Transport and Environmental standards.
CO-5	Apply Transport Policy and Management.
Course Code: B17 CE4111	
Course Title:URBAN HYDROLOGY (Elective-II)	
CO-1	Develop intensity duration frequency curves for urban drainage systems
CO-2	Develop design storms to size the various components of drainage systems
CO-3	Apply best management practices to manage urban flooding
CO-4	Prepare master drainage plan for an urbanized area
Course Code: B17 CE4112	
Course Title:HIGHWAY MATERIALS TESTING LAB	
CO-1	Evaluate the quality of Road Aggregates
CO-2	Evaluate the quality of Bitumen
Course Code: B17 CE4113	
Course Title:COMPUTER APPLICATIONS IN CIVIL ENGINEERING LAB	
CO-1	Develop a program which are necessary to classify and evaluate the values
CO-2	Develop an excel sheet for the design of structural elements
CO-3	Model and analyze the beams and plane frames using STAAD

Course Outcomes for FourthYear Second Semester	
Course Code: B17 CE4201	
Course Title:WATER RESOURCE ENGINEERING-II	
CO-1	Analyze gravity and earth dams
CO-2	Design of Irrigation canals
CO-3	Design Spillways and energy dissipation works
CO-4	Design diversion head works
CO-5	Classify river training works
CO-6	Use the principal components of hydroelectric scheme
Course Code: B17 CE4202	
Course Title:ADVANCED STRUCTURAL ANALYSIS(Elective-III)	
CO-1	Determine the fixed end moments of fixed beams with different moment of inertia and member end moments of symmetrical and un symmetrical portal frame by column-analogy method.
CO-2	Determine the member end moments of single bay single storey portal frames by flexibility and stiffness matrix methods
CO-3	Determine the moments of multi-storey frames subjected to vertical loads by substitute frame method and multi-storey frames subjected to lateral loads by

	portal, cantilever and girder factor method.
Course Code: B17 CE4203	
Course Title:ENVIRONMENTAL IMPACT ASSESSMENT (Elective-III)	
CO-1	Explain the elements of EIA and EIS
CO-2	Explain the environmental attributes to be considered for the EIA study
CO-3	Explain the methodologies for EIA and review the relief and rehabilitation works
CO-4	Explain the prediction and assessment of impacts
CO-5	Explain the case studies of EIA
Course Code: B17 CE 4204	
Course Title:EARTH RETAINING STRUCTURES (Elective-III)	
CO-1	Apply the knowledge of lateral earth pressure theories for retaining structures
CO-2	Design the different types of Retaining walls and sheet piles using earth pressure theories.
CO-3	Design the Reinforced soil retaining walls, Braced cuts and cofferdams.
Course Code:B17 CE 4205	
Course Title:PAVEMENT ANALYSIS AND DESIGN (Elective-III)	
CO-1	Classify the factors affecting Pavement Design.
CO-2	Analyze stresses and strains in a flexible pavements.
CO-3	Analyze stresses and strains in Rigid Pavements.
CO-4	Design a Flexible pavement using IRC and AASHTO.
CO-5	Design a Rigid Pavement using IRC and AASHTO.
Course Code:B17 CE 4206	
Course Title:IRRIGATION STRUCTURES DESIGN & DRAWING	
CO-1	Understand the paper - space environment thoroughly
CO-2	Develop the components using 2D & 3D wire frame models through various editing commands
CO-3	Explain assemble of various components of compound solids
CO-4	Design irrigation canal structures
Course Code: B17 CE4208	
Course Title:PROJECT WORK	
CO-1	Identify a current problem through literature/field/case studies Identify the background objectives and methodology for solving the same.
CO-2	Design a technology/ process for solving the problem.
CO-3	Develop a technology/ process for solving the problem.
CO-4	Evaluate that technology/ process at the laboratory level.

B. TECH - COMPUTER SCIENCE AND ENGINEERING

Department Vision

To envision a diverse, stimulating, continually improving academic and research environment to fulfill the needs of the society and to mould students as socially responsible and competent professionals in the field of computer science and engineering.

Department Mission

- To provide a strong theoretical and practical background across the computer science and engineering discipline with an emphasis on software development.
- To impart modern technologies with industrial, academic and research collaboration.
- To inculcate professional behavior, strong ethical values, leadership abilities and impart the skills necessary to continue education for professional growth.

Program Educational Objectives (PEOs):

PEO1	Graduates of the program will become significant component of computer industry with basic and specialized knowledge in computer science and engineering blended with knowledge in mathematics and modern technologies.
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PEO2	Graduates will have adequate knowledge and technical skills for continuous education and research.
PEO3	Graduates are prepared to be socially responsible computing professionals/entrepreneurs by creating necessary environment that fosters the graduate's communication, presentation, teamwork, leadership skills, and professional ethics.

Program Specific Outcomes (PSO's):

PSO1:	Ability to apply in depth problem solving and programming skills.
PSO2:	Ability to do collaborative development of software solutions for trans-disciplinary engineering problems.
PSO3:	Ability to design and integrate hardware and software components for the advancement of technology.

Program Outcomes (POs):

Engineering Graduates will be able to:

1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course outcomes (Cos) of all courses of all programs offered by the institution

Course Outcomes for First Year First Semester Course	
Course Code: B17 BS 1101	
Course Title: ENGLISH – I	
CO-1	Understand the rudiments of LSRW Skills, comprehension and fluency of speech.
CO-2	Gain confidence and competency in vocabulary and grammar.
CO-3	Listen, speak, read and write effectively in both the academic and non- academic environment.
CO-4	Extend his/her reading skills towards literature.
CO-5	Strengthen his/her analytical and compositional skills.
Course Code: B17 BS 1102	
Course Title: MATHEMATICS – I	
CO-1	Solve linear ordinary differential equations of first order and first degree. Also, will be able to apply the knowledge in simple applications such as Newton’s law of cooling, orthogonal trajectories and simple electrical circuits.
CO-2	Solve linear ordinary differential equations of second order and higher order. Also, will be able to apply the knowledge in simple applications such as LCR circuits and Simple harmonic motion.
CO-3	Determine Laplace transform and inverse Laplace transform of various functions.
CO-4	Use Laplace transforms to solve a linear ODE.
CO-5	Calculate total derivative, Jacobian and maxima/minima of functions of two variables.
CO-6	Form partial differential equations and solve some standard types of first order PDEs. Find complimentary function and particular integral of linear higher order homogeneous and non-homogeneous PDEs.
Course Code: B17 BS 1103	
Course Title: MATHEMATICS –II	
CO-1	Find a real root of algebraic and transcendental equations using different methods.
CO-2	Know the relation between the finite difference operators. Determine interpolation polynomial for a given data.
CO-3	Evaluate numerically certain definite integrals applying Trapezoidal and Simpson’s rules
CO-4	Solve a first order ordinary differential equation by Euler and RK methods
CO-5	Find Fourier series of a given function satisfying Dirichlet conditions. Find half range cosine and sine series for appropriate functions.
CO-6	Find Fourier transforms, Fourier cosine and sine transforms of appropriate functions and evaluate certain integrals using inverse transforms and Fourier integral.
Course Code: B17 BS 1104	
Course Title: ENGINEERING PHYSICS	
CO-1	Learn the basic concepts of interference and diffraction of light and its applications.
CO-2	Understand the science of producing high intensity light beams for technological applications and also understand the propagation of light waves in optical fibers in various applications
CO-3	Understand the inter relationship of electric and magnetic fields and learn ultrasonics as a tool for technological applications
CO-4	Learn the behavior of particles at the very microscopic level by using wave nature of particles and understand the behavior of materials and be able to classify them using the band theory of solids.
CO-5	Learn the basics of structures of solid materials and nano material preparation

	Techniques/methods.
Course Code: B17 CS 1101	
Course Title: COMPUTER PROGRAMMING USING C	
CO-1	Understand the basic terminology used in computer programming
CO-2	Write, compile and debug programs in C language.
CO-3	Use different data types in a computer program. Design programs involving decision structures, loops and functions.
CO-4	Explain the difference between call by value and call by reference
CO-5	Understand the dynamics of memory by the use of pointers
CO-6	Use different data structures and create/update basic data files.
Course Code: B17 CE 1101	
Course Title: ENVIRONMENTAL STUDIES	
CO-1	To bring awareness among the students about the nature and natural ecosystems
CO-2	Sustainable utilization of natural resources like water, land, energy and air
CO-3	Resource pollution and over exploitation of land, water, air and catastrophic (events) impacts of climate change, global warming, ozone layer depletion, marine, radioactive pollution etc to inculcate the students about environmental awareness and safe transfer of our mother earth and its natural resources to the next generation
CO-4	Safe guard against industrial accidents particularly nuclear accidents
CO-5	Constitutional provisions for the protection of natural resources
Course Code: B17 BS 1106	
Course Title: ENGINEERING PHYSICS LAB	
CO-1	Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements individually.
CO-2	Students get hands on experience in setting up experiments and using the instruments/equipment
CO-3	Get introduced to using new/ advanced technologies and understand their significance.
Course Code: B17 BS 1108	
Course Title: ENGLISH COMMUNICATION SKILLS LAB- I	
CO-1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
CO-2	Students improve their speaking skills in real contexts.
CO-3	Students learn standard pronunciation and practice it daily discourse.
CO-4	Students give up their communicative barriers.
Course Code: B17 CS 1102	
Course Title: C PROGRAMMING LAB & HARDWARE FUNDAMENTALS (Common to CSE & IT)	
CO-1	Apply and practice logical ability to solve the problems.
CO-2	Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment.
CO-3	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs.
CO-4	Understand and apply the in-built functions and customized functions for solving the problems.
CO-5	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
CO-6	Document and present the algorithms, flowcharts and programs in form of user manuals.
CO-7	Identification of various computer components, Installation of software
Course Code: B17 BS 1110	
Course Title: ENGINEERING PHYSICS VIRTUAL LABS – ASSIGNMENTS (Common to CSE, ECE & IT)	

CO-1	Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper.
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Course Outcomes for First Year Second Semester Course	
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Course Code: B17 BS 1201	
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Course Title: ENGLISH – II	
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CO-1	To comprehend the speech of people belonging to different backgrounds and regions.
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CO-2	Understand the importance of speaking and writing for personal and professional communication and practice it in real contexts.
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CO-3	To express fluently and accurately in social discourse
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CO-4	Participate in group activities like role-plays, discussions and debates.
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CO-5	Identify the discourse features, and improve intensive and extensive reading skills.
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Course Code: B17 BS 1203	
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Course Title: MATHEMATICS – III	
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CO-1	Determine rank, and solve a system of linear simultaneous equations numerically using various matrix methods.
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CO-2	Determine Eigen values and Eigen vectors of a given matrix, Reduce a Quadratic form to its canonical form and classify
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CO-3	Evaluate double integrals over a region and triple integral over a volume.
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CO-4	Use the knowledge of Beta and Gamma functions in evaluation of different integrals.
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CO-5	Find gradient of a scalar function, divergence and curl of a vector function. Use vector identities for solving problems.
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CO-6	Evaluate line, surface and volume integrals by the use of Green's, Stokes and Gauss divergence theorems.
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Course Code: B17 BS 1205	
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Course Title:ENGINEERING CHEMISTRY(Common to CSE, ECE & IT)	
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CO-1	At the end of the course the students learn the advantages and limitations of plastic materials and their use in design.
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CO-2	Fuels which are used commonly and their economics, advantages and limitations are discussed.
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CO-3	Students gained Knowledge reasons for corrosion and some methods of corrosion control.
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CO-4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.
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CO-5	Similarly, students understand liquid crystals and semiconductors. Students can gain the building materials, solar materials, lubricants and energy storage devices.
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Course Code: B17 ME 1201	
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Course Title:ENGINEERING DRAWING(Common to CSE, ECE & IT)	
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CO-1	Apply principles of drawing to represent dimensions of an object.
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CO-2	Construct polygons and engineering curves.
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CO-3	Draw projections of points, lines, planes and solids.
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CO-4	Represent the object in 3D view through isometric views.
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CO-5	Convert the isometric view to orthographic view and vice versa.
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Course Code:B17 CS 1202	
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Course Title:OBJECT-ORIENTEDPROGRAMMINGTHROUGH C++ (Common to CSE & IT)	
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CO-1	Write, compile and debug programs in C++ language. Use different data types in a computer program.
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CO-2	Design programs involving decision structures, loops and functions.
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CO-3	Explain classes and abstract classes and objects, abstraction and encapsulation, inheritance, polymorphism, constructors, access control and overloading.
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CO-4	Solve a given application problem by going through the basic steps of program specifications, analysis, design, implementation and testing within the context of the object-oriented paradigm.
Course Code: B17 EC 1201	
Course Title: ELEMENTS OF ELECTRONICS ENGINEERING (Common to CSE & IT)	
CO-1	Understand the basic concepts of transport of charge carriers in semiconductors, drift and diffusion currents, physical structure, operation, V-I characteristics of semiconductor diode. .
CO-2	Understand the basic concepts of special types of diodes like Zener Diode, LED, Photo Diode and tunnel diode, rectifier circuits with and without filters.
CO-3	Understand the physical structure, operation, input and output characteristics of BJT in CE, CB, CC circuit configurations.
CO-4	Understand the basic concepts of transistor biasing and thermal stabilization.
CO-5	Understand the physical structure, operation, characteristics and circuit models of JFET's and MOSFET's.
Course Code: B17 BS 1207	
Course Title: ENGINEERING CHEMISTRY LAB	
CO-1	An understanding of Professional and develop confidence on recent trends.
CO-2	Able to gain technical knowledge of measuring, operating and testing of chemical instruments and equipment's
CO-3	Acquire ability to apply knowledge of chemistry.
CO-4	Exposed to the real time working environment.
CO-5	Demonstrate the ability to learn Principles, design and conduct experiments.
CO-6	Ability to work on laboratory and multidisciplinary tasks.
Course Code: B17 BS 1208	
Course Title: ENGLISH COMMUNICATION SKILLS LAB- II	
CO-1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
CO-2	Students enhance their presentation skills.
CO-3	Students participate in group discussions and improve their team skills.
CO-4	Students confidently face the interviews.
Course Code: B17 CS 1205	
Course Title: ENGINEERING WORKSHOP & IT WORKSHOP	
CO-1	Explain what constitutes an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.
CO-2	Apply an object-oriented approach to developing applications of varying complexities.
Course Code: B17 BS 1212	
Course Title: INNER ENGINEERING	
CO-1	To improve his concentration levels and improve his public speaking abilities.
CO-2	To balance his academic and non-academic activities (Work Life Balance).
CO-3	To widen his vision and increase his breadth of perspective in his journey of 4 years.
CO-4	To improve his communications skills, leadership, teamwork and decision-making abilities.
CO-5	To inculcate creativity & innovation, planning & organizing as part of their life.
CO-6	Taking responsibility for themselves and people around them.
CO-7	To make their journey more fun and enjoyable.

Course Outcomes for Second Year First Semester Course	
Course Code: B17 CS 2101	
Course Title: DATA STRUCTURES	
CO-1	Describe how arrays, records, linked structures, stacks, queues, trees, and graphs

	are represented in memory and used by algorithms.
CO-2	Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs. Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs. Demonstrate different methods for traversing trees [ABET (a)].
CO-3	Compare alternative implementations of data structures with respect to performance [ABET (a, b, c)].
CO-4	Compare and contrast the benefits of dynamic and static data structures implementations [ABET (a, b, c)].
CO-5	Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack [ABET (a, c)].
CO-6	Discuss the computational efficiency of the principal algorithms for sorting, searching.
Course Code: B17 BS2102	
Course Title:PROBABILITY, STATISITICS& QUEUING THEORY	
CO-1	Identify the random variable as discrete/continuous and analyse it.
CO-2	Predict the distribution suitable for the given data from its moments.
CO-3	Measure the intensity of association between the variables.
CO-4	Fit a best suitable Curve for the given data.
CO-5	Decide the test applicable for giving inference about Population Parameter based on Sample statistic.
CO-6	Make business decisions about the resources needed to provide a service in day-to-day life applications including telecommunication, traffic engineering, computing and the design of factories, shops, offices and hospitals.
Course Code: B17 BS 2103	
Course Title:DISCRETE MATHEMATICAL STRUCTURES	
CO-1	Rewrite the mathematical arguments using logical connectives and quantifiers and verify the validity of the arguments using propositional and predicate logic.
CO-2	Identify and give examples of various types of relations and describe various properties of relations.
CO-3	Solve different counting problems.
CO-4	Solve the recurrence relations which occur in many fields.
CO-5	Utilize the concepts in graphs and Number theory in their fields.
Course Code: B17 CS2102	
Course Title:COMPUTER GRAPHICS	
CO-1	Summarize the application areas of computer graphics.
CO-2	Implement algorithms for scan converting graphic primitives in a graphic package.
CO-3	Apply direct and indirect methods for two-dimensional transformations using matrices.
CO-4	Construct three-dimensional geometric transformations using matrices.
CO-5	Visualize two-dimensional viewing transformations.
CO-6	Produce views of three-dimensional scenes.
CO-7	Visualize the working of I/O devices.
Course Code:B17 CS2103	
Course Title:DIGITAL LOGIC DESIGN	
CO-1	An Ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with his representation.
CO-2	An Ability to understand different Boolean Algebra theorems and apply them for logic functions.
CO-3	An Ability to design the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
CO-4	An Ability to define the following combinational circuits: multiplexer, demultiplexers, encoders/decoders, comparators, arithmetic-logic units and to be able to build simple circuits.

CO-5	An ability to understand asynchronous and synchronous sequential circuits like counters and registers.
CO-6	An ability to understand memories like RAM and ROM, Programmable Logic Devices
Course Code: B17 CS 2104	
Course Title: DATA ANALYSIS AND VISUALIZATION USING PYTHON	
CO-1	Acquire knowledge on Basics of Python.
CO-2	Acquire knowledge on OOP of Python.
CO-3	Acquire knowledge on NumPy and Basics of Statistics.
CO-4	Use library such as Pandas.
CO-5	Acquire knowledge on Graph Visualizations in Python.
CO-6	Acquire knowledge on Data analysis.
Course Code: B17 CS 2105	
Course Title: DATA STRUCTURE SLAB	
CO-1	Student will be able to write programs to implement stacks and queues.
CO-2	Ability to implement various searching and sorting techniques.
CO-3	Ability to implement programs using trees and graphs.
Course Code: B17 CS 2106	
Course Title: DATA ANALYSIS AND VISUALIZATION USING R AND PYTHON LAB	
CO-1	Acquire Programming knowledge on Basics of Python.
CO-2	Acquire Programming knowledge on Searching and sorting using Python.
CO-3	Acquire Programming knowledge on Text and File Handling.
CO-4	Develop Python Programs to Mean, Median, Mode, Correlation, Regression and Probability distributions.
CO-5	Acquire Programming knowledge on NumPy, Pandas Library.
CO-6	Acquire Programming knowledge on Graph Visualizations in Python and Data for Analysis.
Course Code: B17 CS 2107	
Course Title: INDUSTRY ORIENTED TRAINING (R Programming Lab)	
CO-1	Install and find documentation for R functions and libraries. Search for and find domain [1] specific R packages.
CO-2	Use and understand the R data types (vectors, matrices, data frames, strings)
CO-3	Reshape data and use visual exploratory graphics. Practice good data management.
CO-4	Write their own functions in R and break a problem into a set of functions.
CO-5	Be fluent in programming concepts such as functional programming, code reuse, object [1] oriented programming, recursion, regular expressions, and split-transform-recombine data manipulation.
CO-6	Engage in good code and data organization practices and use a consistent programming style
Course Code: B17 BS 2107	
Course Title: ENGLISH PROFICIENCY-I	
CO-1	Improve speaking skills.
CO-2	Enhance their listening capabilities.
CO-3	Learn and practice the skills of composition writing.
CO-4	Enhance their reading and understanding of different texts.
CO-5	Improve their inter-personal communication skills.
CO-6	Be confident in presentation skills.

Course Outcomes for Second Year Second Semester Course	
Course Code: B17 CS 2201	
Course Title: COMPUTER ORGANIZATION	
CO-1	Knowledge about major components of a computer such as processor, memory and

	I/O modules along with their interconnections internally with outside world.
CO-2	Detailed idea about architecture of central processing unit, functions of control unit, memory, I/O devices and their issues.
CO-3	Simple and multiple processor organization and their issues.
Course Code: B17 CS 2202	
Course Title:OPERATINGSYSTEMS	
CO-1	The student understands OS evolution, its structure and services provided by it.
CO-2	Learn process life cycle, process scheduling objectives, policies and mechanisms, process synchronization; inter process communication, deadlocks and other process subsystem related concepts.
CO-3	Learn memory hierarchy, allocation, de-allocation policies and mechanism for main and auxiliary memory; file system design and implementation issues.
CO-4	Investigate UNIX/ LINUX and Windows OS platforms w.r.t similarities and differences in design paradigms.
Course Code: B17 CS 2203	
Course Title:MICROPROCESSORS	
CO-1	Students can able to understand The 8085A μ P. Architecture [K1]
CO-2	Students can learn about 8085 Instruction Set [K2]
CO-3	The Student Develops The Skill Of Writing 8085 Microprocessor Programming [K3]
CO-4	Ability to design semiconductor memories [K2]
CO-5	Students can learn Parallel I/O Interface - 8255 [K2]
CO-6	Students can learn Keyboard/Display Interface - 8279 [K2]
CO-7	Students can able to understand The 8086 μ P. Architecture [K1]
CO-8	Students can learn about 8086 Instruction Set [K1]
CO-9	The Student Develops The Skill Of Writing 80865 Microprocessor Programming [K3]
Course Code: B17 CS 2204	
Course Title:DATA COMMUNICATIONS	
CO-1	Students will have the ability to use Data Communications and Networking Protocols and protocol architectures
CO-2	Students will have the ability to develop communication models for providing data transmission facility
CO-3	Students will have the ability to outline Data Communication terminology
CO-4	Students will have the ability to classify various transmission media
CO-5	Students will have the ability to discriminate various types of signals for data transmission and ability to describe data encoding techniques
CO-6	Students will have the ability to describe data communications interface
CO-7	Students will have the ability to apply various flow control , error control techniques of data link control protocols
CO-8	Students will have the ability to use various data communication terminals and processing hardware
CO-9	Students will have the ability to demonstrate multiplexing techniques
Course Code:B17 CS2205	
Course Title:ADVANCED DATA STRUCTURES	
CO-1	Ability to understand various hashing techniques.
CO-2	Ability to write programs to implement sorting techniques
CO-3	Ability to understand concepts related to graph theory.
Course Code:B17 ME 2207	
Course Title:OPERATIONSRESEARCH	
CO-1	Ability to solve LPP problems using various methods.
CO-2	Ability to solve transportation and assignment problems using several methods.
CO-3	Analyze the PERT and CPM charts.

CO-4	Ability to solve replacement problems and game theory problems.
Course Code: B17 CS 2206	
Course Title:OPERATING SYSTEMSANDUNIX PROGRAMMING LAB	
CO-1	The student practices UNIX commands, Vi editor, shell commands.
CO-2	The student develops skill in writing C programs using system calls for process management; inter process communication and memory management aspects.
CO-3	The student learns shell programming and develops skill for writing scripts for batch level tasks.
Course Code: B17 CS 2207	
Course Title:DIGITAL ELECTRONICS & MICROPROCESSOR LAB	
CO-1	The student understands the logic gates, half adders, full adders and flip-flops to design a circuit.
CO-2	The student develops the skill of writing microprocessor programming.
CO-3	The student understands the interfacing of microprocessor with stepper motor, R-2R ladder.
Course Code: B17 CS 2208	
Course Title:COMPETITIVE PROGRAMMING LAB	
CO-1	Write programs using python programming.
CO-2	Write algorithms.
CO-3	Implement various data Structures.
CO-4	To apply object oriented mechanisms.
CO-5	To Implement various Advance data Structures like AVL trees, B-Trees, Splay trees etc.
Course Code: B17 BS 2204	
Course Title:PROFESSIONAL ETHICS&HUMAN VALUES	
CO-1	By the end of the course student should be able to understand the importance of ethics and values in life and society.
Course Code: B17 BS 2206	
Course Title:ENGLISH PROFICIENCY-II	
CO-1	Develop the skills of taking and making notes
CO-2	Interpret the pictures appropriately and effectively.
CO-3	Read, comprehend and infer a given piece of writing effectively.
CO-4	Learn and practice the skills of Research writing.
CO-5	Communicate well through various forms of writing.
CO-6	Be confident in giving presentations and dealing with people.

Course Outcomes for Third Year First Semester Course	
Course Code: B17 CS 3101	
Course Title:COMPUTER NETWORKS	
CO-1	Distinguish between Circuit Switching and Packet Switching approaches.
CO-2	Apply various concepts of ATM networks .
CO-3	Distinguish between various types of Networks.
CO-4	Apply various Congestion Control Techniques.
CO-5	Know Internetwork Operation.
CO-6	Know various Connection Oriented Transport Control Mechanisms.
Course Code: B17 CS 3102	
Course Title:WEB TECHNOLOGIES	
CO-1	Students will be able to construct web based applications and Identify where data structures are appearing in them.
CO-2	Students will be able to connect java programs to different databases.
CO-3	Students will be able to develop EJB programs.
Course Code: B17 CS 3103	
Course Title:FORMAL LANGUAGES AND AUTOMATA THEORY	

CO-1	Ability to classify machines by their power to recognize languages,
CO-2	Ability to explain finite state machines to solve problems in computing,
CO-3	Ability to explain deterministic and non-deterministic machines,
CO-4	Ability to explain the concepts of Turing Machines, Undesirability, church thesis.
Course Code: B17 CS3104	
Course Title:DATABASE MANAGEMENT SYSTEMS	
CO-1	Generalize the basic concepts of DBMS and RDBMS.
CO-2	Prepare SQL commands for defining, constructing and manipulating databases.
CO-3	Apply conceptual and logical database design using data models.
CO-4	Apply normalization to tables.
CO-5	Manage concurrent transactions.
CO-6	Apply databases Recovery Techniques.
Course Code: B17 CS3105	
Course Title:APPLICATION DEVELOPMENT USING JAVA	
CO-1	Able to do projects for web based and internet applications.
CO-2	Understand multitasking and multiprogramming development
CO-3	Able to do network programming.
CO-4	Able to Construct Web application using Java Server Pages
Course Code: B17 CS 3106	
Course Title:EMBEDDED SYSTEMS	
CO-1	To describe the differences between general computing system and Embedded System.
CO-2	To recognize the classification of Embedded System. .
CO-3	To understand various architectures of Embedded System.
CO-4	To design Real Time Embedded System using the concepts of RTOS.
CO-5	To load embedded software on Host machine.
CO-6	To test Host machine
Course Code: B17 CS 3107	
Course Title:CYBER SECURITY	
CO-1	Cyber Security architecture principles
CO-2	Identifying System and application security threats and vulnerabilities.
CO-3	Identifying different classes of attacks
CO-4	Cyber Security incidents to apply appropriate response
CO-5	Describing risk management processes and practices
CO-6	Evaluation of decision making outcomes of Cyber Security scenarios
Course Code: B17 EC3109	
Course Title:DIGITAL SIGNAL PROCESSING	
CO-1	Describe the DSP fundamental theory and components, Develop an understanding of DSP advantages, limitations and fundamental tradeoffs. Carry-out LTI system analysis using convolution & Z-transform
CO-2	Carryout data analysis & spectrum analysis using FFT
CO-3	Design of IIR digital filters to meet specifications
CO-4	Design of FIR digital filters to meet specifications
CO-5	Knows multi-rate signal processing aspects & DSP applications
Course Code: B17 ME3110	
Course Title:INDUSTRIAL ROBOTICS	
CO-1	Distinguish between fixed automation and programmable automation.
CO-2	Identify various components of robot.
CO-3	Select appropriate type of actuator for a joint.
CO-4	Illustrate robot applications in manufacturing.
CO-5	Analyze kinematics of a robot.
Course Code: B17 CS 3108	

Course Title:DATABASE MANAGEMENT SYSTEMS LAB	
CO-1	The student is exposed to a commercial RDBMS environment such as ORACLE.
CO-2	The student will learn SQL commands for data definition and manipulation.
CO-3	The student applies conceptual design.
CO-4	The student applies Logical data base design.
CO-5	The student takes up a case study and applies the design steps.
Course Code: B17 CS 3109	
Course Title:APPLIATION DEVELOPMENT LAB	
CO-1	Compare and Contrast HTML, DHTML, CSS, JavaScript and other Web technologies.
CO-2	Implement JavaScript Language to perform functionalities at client side validations.
CO-3	Assess and evaluate the role of “WEBSERVERS” for the management and delivery of electronic information.
CO-4	Develop Web based applications by PHP to have an interactive application such as Client Server Architecture.
Course Code: B17 BS 3101	
Course Title:PROBLEM SOLVING & LINGUISTIC COMPETENCE	
Part-A: Verbal and Soft Skills-I	
CO-1	Detect grammatical errors in the text/sentences and rectify them while answering their competitive/ company specific tests and frame grammatically correct sentences while writing.
CO-2	Answer questions on synonyms, antonyms and other vocabulary based exercises while attempting CAT, GRE, GATE and other related tests.
CO-3	Use their logical thinking ability and solve questions related to analogy, syllogisms and other reasoning based exercises.
CO-4	Choose the appropriate word/s/phrases suitable to the given context in order to make the sentence/paragraph coherent.
CO-5	Apply soft skills in the work place and build better personal and professional relationships making informed decisions.
Part-B: Quantitative Aptitude -I	
CO-6	The students will be able to perform well in calculating on number problems and various units of ratio concepts.
CO-7	Accurate solving problems on time and distance and units related solutions.
CO-8	The students will become adept in solving problems related to profit and loss, in specific, quantitative ability.
CO-9	The students will present themselves well in the recruitment process using analytical and logical skills which he or she developed during the course as they are very important for any person to be placed in the industry.
CO-10	The students will learn to apply Logical thinking to the problems of syllogisms and be able to effectively attempt competitive examinations like CAT, GRE, GATE for further studies.
Course Code: B17BS3103	
Course Title:ADVANCED CODING	
CO-1	Acquire coding knowledge on essential of modular programming
CO-2	Acquire Programming knowledge on linked lists
CO-3	Acquire coding knowledge on ADT
CO-4	Acquire knowledge on time complexities of different methods
CO-5	Acquire Programming skill on Java libraries and Collections

**Electronics and Communication Engineering
Department Vision**

Envision a diverse, Stimulating and consistent academic research ambience for the student community and shape them into competent professionals in the field of Electronics and Communication Engineering and cater to the needs of society with a keen sense of environmental consciousness.

Mission:

- Educating the students with the state of the art technologies in Electronics and Communication Engineering to meet the ever growing challenges of the industry.
- Nurturing the spirit of innovation and creativity in the faculty and students in order for them to carry out research in collaboration with research organizations and industry.
- Providing ethical and value based education that promotes activities pertaining to societal needs.

Program Educational Objectives (PEOs):

PEO1	Preparing our graduates for successful careers in design, installation, operation and maintenance of electronic systems and processes.
PEO2	Preparing our graduates to have the ability for lifelong learning by pursuing higher education, research and professional development
PEO3	Preparing our graduates to attain leadership roles in industry, academia and research organizations and innovate continuously.
PEO4	Preparing our graduates to develop management skills and become entrepreneurs.
PEO5	Preparing our graduates as ethical, responsible and value based professionals who work continuously for the benefit of the society.

Program Specific Outcomes (PSO's):

PSO1	Should be able to clearly understand the concepts and applications in the field of Electronics, Electromagnetics and Antennas, Communications, Signal Processing, Networking, Embedded Systems and Semiconductor technology
PSO2	Should be able to associate the learning from courses related to Microelectronics, Signal Processing, Microcomputers, Electromagnetics and Antennas, Embedded and Communication Systems to arrive at solutions to real world problems
PSO3	Should have the capability to comprehend the technological advancements in the usage of modern design tools to analyze and design subsystems and processes for a variety of applications.
PSO4	Should possess the skills to communicate in both oral and written forms, the work already done and the future plans with necessary road maps demonstrating the practices of professional ethics and the concerns for societal and environmental wellbeing.

Program Outcomes (POs):
Engineering Graduates will be able to:

1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustain able development.
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course outcomes (Cos) of all courses of all programs offered by the institution

Course Outcomes for First Year First Semester Course	
Course Code: B17 BS 1101	
Course Title: ENGLISH – I	
CO-1	Understand the rudiments of LSRW Skills, comprehension and fluency of speech.
CO-2	Gain confidence and competency in vocabulary and grammar.
CO-3	Listen, speak, read and write effectively in both the academic and non- academic environment.
CO-4	Extend his/her reading skills towards literature.
CO-5	Strengthen his/her analytical and compositional skills.
Course Code: B17 BS 1102	

Course Title: MATHEMATICS – I	
CO-1	Solve linear ordinary differential equations of first order and first degree. Also will be able to apply the knowledge in simple applications such as Newton’s law of cooling, orthogonal trajectories and simple electrical circuits.
CO-2	Solve linear ordinary differential equations of second order and higher order. Also will be able to apply the knowledge in simple applications such as LCR circuits and Simple harmonic motion.
CO-3	Determine Laplace transform and inverse Laplace transform of various functions.
CO-4	Use Laplace transforms to solve a linear ODE.
CO-5	Calculate total derivative, Jacobian and maxima/minima of functions of two variables.
CO-6	Form partial differential equations and solve some standard types of first order PDEs. Find complimentary function and particular integral of linear higher order homogeneous and non homogeneous PDEs.
Course Code: B17 BS 1103	
Course Title: MATHEMATICS – II	
CO-1	Find a real root of algebraic and transcendental equations using different methods.
CO-2	Know the relation between the finite difference operators. Determine interpolation polynomial for a given data.
CO-3	Evaluate numerically certain definite integrals applying Trapezoidal and Simpson’s rules.
CO-4	Solve a first order ordinary differential equation by Euler and RK methods.
CO-5	Find Fourier series of a given function satisfying Dirichlet conditions. Find half range cosine and sine series for appropriate functions.
CO-6	Find Fourier transforms, Fourier cosine and sine transforms of appropriate functions and evaluate certain integrals using inverse transforms and Fourier integral.
Course Code: B17 BS 1104	
Course Title: ENGINEERING PHYSICS	
CO-1	Learn the basic concepts of interference and diffraction of light and its applications.
CO-2	Understand the science of producing high intensity light beams for technological applications and also understand the propagation of light waves in optical fibers in various applications.
CO-3	Understand the inter relationship of electric and magnetic fields and learn ultrasonic as a tool for technological applications.
CO-4	Learn the behavior of particles at the very microscopic level by using wave nature of particles and understand the behavior of materials and be able to classify them using the band theory of solids.
CO-5	Learn the basics of structures of solid materials and nano material preparation techniques/methods.
CO-6	
Course Code: B17 CS 1101	
Course Title: COMPUTER PROGRAMMING USING C	
CO-1	Understand the basic terminology used in computer programming.
CO-2	Write, compile and debug programs in C language.
CO-3	Use different data types in a computer program.
CO-4	Design programs involving decision structures, loops and functions.
CO-5	Explain the difference between call by value and call by reference.
CO-6	Understand the dynamics of memory by the use of pointers
CO-7	Use different data structures and create/update basic data files.
Course Code: B17 CE 1101	
Course Title: ENVIRONMENTAL STUDIES	
CO-1	To bring awareness among the students about the nature and natural ecosystems

CO-2	Sustainable utilization of natural resources like water, land, energy and air
CO-3	Resource pollution and over exploitation of land, water, air and catastrophic (events) impacts of climate change, global warming, ozone layer depletion, marine, radioactive pollution etc to inculcate the students about environmental awareness and safe transfer of our mother earth and its natural resources to the next generation
CO-4	Safe guard against industrial accidents particularly nuclear accidents
CO-5	Constitutional provisions for the protection of natural resources
Course Code: B17 BS 1106	
Course Title: ENGINEERING PHYSICS LAB	
CO-1	Students get hands on experience in setting up experiments and using the instruments/equipment individually.
CO-2	Get introduced to using new/ advanced technologies and understand their significance.
Course Code: B17 BS 1108	
Course Title: ENGLISH COMMUNICATION SKILLS LAB- I	
CO-1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
CO-2	Students improve their speaking skills in real contexts.
CO-3	Students learn standard pronunciation and practice it daily discourse.
CO-4	Students give up their communicative barriers.
Course Code: B17 CS 1103	
Course Title: C PROGRAMMING LAB	
CO-1	Apply and practice logical ability to solve the problems.
CO-2	Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment.
CO-3	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs.
CO-4	Understand and apply the in-built functions and customized functions for solving the problems.
CO-5	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
CO-6	Document and present the algorithms, flowcharts and programs in form of user manuals.
CO-7	Identification of various computer components, Installation of software
Course Code: B17 BS 1110	
Course Title: ENGINEERING PHYSICS - VIRTUAL LABS-ASSIGNMENTS	
CO-1	Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper.

Course Outcomes for First Year Second Semester Course	
Course Code: B17 BS 1201	
Course Title: ENGLISH – II	
CO-1	To comprehend the speech of people belonging to different backgrounds and regions.
CO-2	Understand the importance of speaking and writing for personal and professional communication and practice it in real contexts.
CO-3	To express fluently and accurately in social discourse.
CO-4	Participate in group activities like role-plays, discussions and debates.
CO-5	Identify the discourse features, and improve intensive and extensive reading skills.
Course Code: B17 BS 1203	
Course Title: MATHEMATICS – III	
CO-1	Determine rank, and solve a system of linear simultaneous equations numerically using various matrix methods.

CO-2	Determine Eigen values and Eigen vectors of a given matrix Reduce a Quadratic form to its canonical form and classify.
CO-3	Evaluate double integrals over a region and triple integral over a volume.
CO-4	Use the knowledge of Beta and Gamma functions in evaluation of different integrals.
CO-5	Find gradient of a scalar function, divergence and curl of a vector function. Use vector identities for solving problems.
CO-6	Evaluate line, surface and volume integrals by the use of Green"s, Stokes" and Gauss divergence theorems.
Course Code: B17 BS 1205	
Course Title:ENGINEERING CHEMISTRY	
CO-1	At the end of the course the students learn the advantages and limitations of plastic materials and their use in design.
CO-2	Fuels which are used commonly and their economics, advantages and limitations are discussed.
CO-3	Students gained Knowledge reasons for corrosion and some methods of corrosion control.
CO-4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.
CO-5	Similarly students understand liquid crystals and semiconductors. Students can gain the building materials, solar materials, lubricants and energy storage devices.
Course Code:B17 ME 1201	
Course Title:ENGINEERING DRAWING	
CO-1	Apply principles of drawing to represent dimensions of an object.
CO-2	Construct polygons and engineering curves.
CO-3	Draw projections of points, lines, planes and solids.
CO-4	Represent the object in 3D view through isometric views.
CO-5	Convert the isometric view to orthographic view and vice versa.
Course Code:B17 CS 1203	
Course Title:DATA STRUCTURES	
CO-1	Apply advanced data structure strategies for exploring complex data structures.
CO-2	Compare and contrast various data structures and design techniques in the area of Performance.
CO-3	Implement all data structures like stacks, queues, trees, lists and graphs and compare their performance and tradeoffs.
CO-4	Implement different operations on trees.
CO-5	Apply graphs to real time applications.
CO-6	Perform sorting using different algorithms.
Course Code:B17 EE 1203	
Course Title:ELEMENTS OF ELECTRICAL ENGINEERING	
CO-1	Able to understand the basics of Magnetic Circuits and Kirchoff"s laws.
CO-2	Able to understand the operation of DC Machines and to conduct different Tests
CO-3	Able to analyze the Performance of Transformers.
CO-4	Able to explain the operation of three phase induction motor.
CO-5	Able to explain the operation of three phase induction motor.
Course Code:B17 EE 1207	
Course Title:ENGINEERING CHEMISTRY LAB	
CO-1	An understanding of Professional and develop confidence on recent trends.
CO-2	Able to gain technical knowledge of measuring, operating and testing of chemical instruments and equipment.
CO-3	Acquire ability to apply knowledge of chemistry.
CO-4	Exposed to the real time working environment.
CO-5	Demonstrate the ability to learn Principles, design and conduct experiments.
CO-6	Ability to work on laboratory and multidisciplinary tasks.
Course Code:B17 BS 1208	

Course Title:ENGLISH COMMUNICATION SKILLS LAB- II	
CO-1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
CO-2	Students enhance their presentation skills.
CO-3	Students participate in group discussions and improve their team skills.
CO-4	Students confidently face the interviews.
Course Code:B17 BS 1209	
Course Title:ENGINEERING WORKSHOP & IT WORKSHOP	
CO-1	Use various tools to prepare basic carpentry and fitting joints.
CO-2	Prepare jobs of various shapes using black smithy.
CO-3	Make basic house wire connections.
CO-4	Fabricate simple components using tin smithy.
Course Code:B17 BS 1212	
Course Title:INNER ENGINEERING	
CO-1	To improve his concentration levels and improve his public speaking abilities.
CO-2	To balance his academic and non-academic activities (Work Life Balance).
CO-3	To widen his vision and increase his breadth of perspective in his journey of 4 years.
CO-4	To improve his communications skills, leadership, teamwork and decision-making abilities.
CO-5	To inculcate creativity & innovation, planning & organizing as part of their life.
CO-6	Taking responsibility for themselves and people around them.
CO-7	To make their journey more fun and enjoyable.
Course Outcomes for Second Year First Semester Course	
Course Code:B17BS2101	
Course Title:MATHEMATICS IV	
CO-1	Using the concept of Analytic function in applications including Electrostatics and Fluidynamics.
CO-2	Finding theoretical solution of certain Elliptic, Parabolic and Hyperbolic partial differential equations.
CO-3	Using Z-transforms to solve linear difference equations with constant coefficients.
CO-4	Fitting of probability frequency distribution to a given data.
CO-5	Using the concepts of sampling theory to analyze data related to some large and small samples.
Course Code:B17BS2101	
Course Title:ELECTRONIC DEVICES AND CIRCUITS	
CO-1	Understand the physical structure, principles of operation, electrical characteristics and circuit models of diodes, BJ's and FE's.
CO-2	Use the concepts of semiconductor physics and electronic devices to design and fabricate simple electronic circuits.
CO-3	Use this knowledge to analyze and design amplifier circuits and oscillator circuits to be used in various applications.
CO-4	Extend the understanding of how electronic circuits and their functions fit into larger electronic systems.
Course Code:B17 EC 2102	
Course Title:SWITCHING THEORY AND LOGIC DESIGN	
CO-1	Understand various basic number systems, codes and basic logic gates.
CO-2	Learn various types of Boolean expressions and theorems and simplifications using K-map and Tabulation methods.
CO-3	Design and analyze combinational circuits using logic gates.
CO-4	Understand basics of Flip-flops, design and analyze sequential circuits using those Flip-flops and gates.
CO-5	Design of all types of counters and understand basics of Synchronous and Asynchronous sequential circuits, and analyze them.
Course Code:B17 EC 2103	

Course Title: SIGNALS AND SYSTEMS	
CO-1	Understand the basic concepts of signals and systems.
CO-2	Analyze the spectral characteristics of Continuous Time and Discrete Time periodic and aperiodic signals using Fourier analysis.
CO-3	Analyze system properties based on impulse response and Fourier analysis.
CO-4	Apply Laplace- transforms for analyzing Continuous -time signals and systems.
CO-5	Apply Z- transforms for analyzing discrete-time signals and systems.
CO-6	Understand the process of sampling and the effects of under sampling.
Course Code: B17 EE 2104	
Course Title: NETWORK ANALYSIS	
CO-1	Gain the knowledge on basic network elements and learn various circuits analyzing techniques
CO-2	Will learn the behavior of energy storing elements (Inductance & Capacitance) in circuits and analyses transient and steady state responses.
CO-3	Will analyze the RLC circuit behavior in detailed.
CO-4	Analyze the performance of periodic waveforms.
CO-5	Gain the knowledge in characteristics of two port network parameters (Z, Y, ABCD, h & g).
Course Code: B17 EC 2104	
Course Title: PROBABILITY THEORY & RANDOM PROCESSES	
CO-1	Understand the axiomatic formulation of modern probability theory.
CO-2	Characterize Probability Models and functions of Random variables based on single and multiple random variables.
CO-3	Evaluate and apply moments and characteristic functions and understand the concept of Inequalities and probabilistic limits.
CO-4	Understand the concept of Random process and determine covariance and spectral density of stationary random processes.
CO-5	Demonstrate the specific applications to Poisson and Gaussian process and representation of low pass and band pass noise models, Analyze the response of random inputs to linear time invariant systems.
Course Code: B17 CE 2107	
Course Title: ELECTRONICS DEVICES AND CIRCUITS LAB	
CO-1	Design and fabricate simple circuits like diode rectifiers with filters for providing dc voltages in electronic circuits.
CO-2	Design and fabricate amplifiers with required gain for use in various communication applications.
CO-3	Design and fabricate simple electronic circuits for everyday applications like traffic control lights using relays, automatic counters using LDRs and Burglar alarms.
CO-4	Design and fabricate simple circuits like diode rectifiers with filters for providing dc voltages in electronic circuits.
Course Code: B17 EE 2106	
Course Title: NETWORKS AND ELECTRICAL TECHNOLOGY LAB	
CO-1	Students will gain the skill to make and experiment with practical electric circuits.
CO-2	Students will be able to measure voltage, current, power in practical electric circuits.
CO-3	Students will know the significance of various theorems and their applications.
CO-4	Students will be able to model devices for circuit analysis.
CO-5	Students will be able to assess the behaviour of different electrical machines.
CO-6	Students will be able to predetermine the efficiency and regulation of different machines.
Course Code: B17 BS 2106	
Course Title: PROGRAMMING SKILLS-I (PYTHON)	
CO-1	Ability to apply object oriented concepts in programming.
CO-2	Ability to define, understand and differentiate different types of data types and apply

	them.
CO-3	Ability to recognize various concepts of python and develops the programs using them and also develop web based application.
Course Code:B17 BS 2107	
Course Title:ENGLISH PROFICIENCY-I	
CO-1	Improve speaking skills.
CO-2	Enhance their listening capabilities.
CO-3	Learn and practice the skills of composition writing.
CO-4	Enhance their reading and understanding of different texts.
CO-5	Improve their inter-personal communication skills.
CO-6	Be confident in presentation skills.
Course Outcomes for Second Year Second Semester Course	
Course Code:B17EC2201	
Course Title:ELECTRONIC CIRCUIT ANALYSIS	
CO-1	Know the equivalent circuit of multistage amplifier and its analysis.
CO-2	Identify the different feedback topologies and analyze them.
CO-3	Explain the principle of oscillator and design different types of sinusoidal oscillators.
CO-4	Define the difference between voltage and power amplifiers and design different classes and know that Tuned amplifiers amplify a narrow band of frequencies and will also be able to analyze them.
CO-5	Identify that Op-amp not only amplifies but also performs different operations and analyze some of its applications.
Course Code:B17 EE 2203	
Course Title:CONTROL SYSTEMS	
CO-1	Students will be able to model electrical and mechanical physical systems by applying laws of physics.
CO-2	Students will be able to represent mathematical models of systems using block diagrams & Signal Flow Graphs and derive their transfer functions.
CO-3	Students will be able to analyze systems in time domain for transient and steady-state behaviour.
CO-4	Students will learn the concept of stability and use RH criterion and Root locus methods for stability analysis.
CO-5	Students will learn to obtain frequency response plots of systems and use them for system analysis and stability assessment.
Course Code:B17 EC 2202	
Course Title:ELECTRO MAGNETIC FIELD THEORY & TRANSMISSION LINES	
CO-1	Ability to apply the knowledge of mathematics, Science and engineering to the Analysis and design of systems involving electric and magnetic fields as well as Electromagnetic Waves.
CO-2	Ability to identify, formulate and solve engineering problems in the area of electric and Magnetic fields and waves.
CO-3	Ability to use Maxwell's equations to solve electromagnetic field problems.
CO-4	Ability to apply the knowledge of electromagnetic fields in practical transmission lines and waveguides.
Course Code:B17 EC 2203	
Course Title:ANALOG COMMUNICATIONS	
CO-1	Understand the need for modulation and the concepts of Amplitude Modulation and Demodulation techniques and evaluate various parameters in time and frequency Domain.
CO-2	Understand the concepts of Angle Modulation and Demodulation techniques and Evaluate various parameters of Angle modulated waveform in Time and Frequency Domain

CO-3	Analyze and compare the performance of various analog modulation techniques in the presence of noise.
CO-4	Analyze different characteristics of transmitters.
CO-5	Analyze different characteristics of receivers.
Course Code: B17 EC 2204	
Course Title: COMPUTER ARCHITECTURE AND ORGANIZATION	
CO-1	Understand how computers represent and manipulates data.
CO-2	Develop the general architecture design of a digital computer.
CO-3	Learn the art of Microprogramming.
CO-4	Develop independent learning skills to interface main memory & I/O.
Course Code: B17 BS 2201	
Course Title: MANAGEMENT SCIENCE	
CO-1	Create awareness about the concepts like Evolution of Management thought, functions & principles of management.
CO-2	Provide all round information to the students about matters related to concepts & functions related to Marketing.
CO-3	Acquire in-depth knowledge about the concepts and functions of HRM.
CO-4	Understand about aspects of Production Management and Financial Management
	Gain knowledge about Strategy formulation & implementation, SWOT analysis in order to compete with the competition & to gain competency advantage.
Course Code: B17 EC 2207	
Course Title: ANALOG ELECTRONIC CIRCUITS LAB WITH SIMULATION	
CO-1	Acquire a basic knowledge on simple applications of operational amplifier.
CO-2	Observe the amplitude and frequency responses of negative feedback amplifier and two stages RC coupled amplifier.
CO-3	Design and test sinusoidal oscillators.
CO-4	Design and test a power amplifier.
CO-5	Design, construct and take measurement of the analog electronic circuits to compare experimental results in the laboratory with theoretical analysis.
CO-6	Use Multisim to test their electronic design.
Course Code: B17 EC 2208	
Course Title: ANALOG COMMUNICATION LAB	
CO-1	Design and implement modulation and demodulation circuits for amplitude modulation technique.
CO-2	Design and implement modulation and demodulation circuits for frequency modulation technique.
CO-3	Design second order passive and active filters for various frequency bands.
CO-4	Construct the circuit and study the characteristics of different transmitter and receiver circuits such as Harmonic generator, RF Amplifier, IF Amplifier, pre-emphasis and de-emphasis.
Course Code: B17 BS 2205	
Course Title: PROGRAMMING SKILLS-II (JAVA)	
CO-1	Ability to define different procedural and object oriented concepts and will be able to differentiate between them.
CO-2	Ability to define, understand and differentiate different types of arrays and apply them.
CO-3	Ability to recognize various concepts of java and develops the programs using them.
CO-4	Ability to identify and differentiate the various features of AWT components to construct container based programs
Course Code: B17 BS 2204	
Course Title: PROFESSIONAL ETHICS & HUMAN VALUES	
CO-1	By the end of the course student should be able to understand the importance of ethics and values in life and society.

Course Outcomes for Third Year First Semester Course	
Course Code: B17 EC 3101	
Course Title: PULSE AND DIGITAL CIRCUITS	
CO-1	Understand the applications of Integrator, differentiator circuits.
CO-2	Design of different clipping circuits and understand the applications clamper circuits.
CO-3	Analyze different Bi-stable, Monostable, Astable Multivibrators and Schmitt trigger for various applications.
CO-4	Understand Different Time Base Generators.
CO-5	Analyze synchronization techniques for sweep circuits and to understand different logic families; realize logic gates using diodes and transistors.
Course Code: B17 EC 3102	
Course Title: LINEAR ICS AND APPLICATIONS	
CO-1	Understand the external behaviour and characteristics of operational amplifier.
CO-2	Design and analyze linear and non-linear circuits using operational amplifier.
CO-3	Design and analyze oscillators and active filters using operational amplifier.
CO-4	Design and analyze various applications using IC 565 and IC 555.
CO-5	Understand the operation of Analog to Digital and Digital to Analog Converters.
Course Code: B17 EC 3103	
Course Title: ELECTRONIC MEASUREMENTS AND INSTRUMENTATION	
CO-1	Evaluate basics of measurement systems, principle of basic meter
CO-2	Evaluate how a signal can be generated using different types of meters.
CO-3	Investigate a signal / waveform with different oscillators.
CO-4	Use bridges of many types and measure appropriate parameters
CO-5	Design different transducers for measurement of different parameters.
Course Code: B17 EC 3104	
Course Title: DIGITAL COMMUNICATION	
CO-1	Understand the basic concepts of sampling and digital communication systems.
CO-2	Understand the concept of binary and M-ary modulation techniques.
CO-3	Understand the problems of noise and can design any digital communication system for the real time environment.
CO-4	Designing of optimal receiver and understanding the concept of probability of error.
CO-5	Analyze the error performance of two digital modulation techniques and understand the concept of spread spectrum communication system
Course Code: B17 EC 3105	
Course Title: ANTENNAS & PROPAGATION	
CO-1	Understand Radiation mechanism and functions of antennas, identify antenna parameters derive expressions for antenna parameters .
CO-2	Analyze and design wire and aperture antennas for different applications.
CO-3	Analyze and design Antenna arrays.
CO-4	Capable of performing various antenna measurements and come up with conclusions about antenna parameters and performance
CO-5	Identify characteristics of radio wave propagation and be able to design different types of communication links for different frequency bands
Course Code: B17 EC 3106	
Course Title: COMPUTER NETWORK ENGINEERING	
CO-1	Explain basic computer network principles and layers of the OSI model and TCP/IP.
CO-2	Explain the concepts of transmission media, switching and multiplexing techniques.
CO-3	Explain and analyze the error control and flow control methods.
CO-4	Explain different multiple access control protocols and IEEE standards for LANs and MANs
CO-5	Identify the different types of connecting devices and explain the basic concepts of congestion control algorithms and internetworking.
CO-6	Explain TCP and UDP header formats

Course Code: B17 EC 3107	
Course Title: LINEAR INTEGRATED CIRCUITS & PULSE CIRCUITS LAB WITH SIMULATION	
CO-1	Design and conduct experiments on RC low pass and high pass circuits.
CO-2	Observe operation of UJT Sweep Generator.
CO-3	Design and test different types of Multi vibrators
CO-4	Acquire a basic knowledge on simple applications of operational amplifier.
CO-5	Design, construct Schmitt trigger using operational amplifier.
CO-6	Use Multisim to test their electronic designs.
Course Code: B17 EC 3108	
Course Title: DIGITAL IC'S LABORATORY WITH SIMULATION	
CO-1	Synthesize, simulate and implement a digital design in a configurable digital circuit with computer supported aid tools and digital trainer kit.
CO-2	Acquire Knowledge of analysis and synthesis of combinational and sequential circuits with simulators and digital trainer kits.
CO-3	Build high level programming (HDL programming) skills for digital circuits.
CO-4	Adapt digital circuits to electronics and telecommunication field.
Course Code: B17BS310	
Course Title: PROBLEM SOLVING & LINGUISTIC COMPETENCE	
PART-A (Verbal and Soft Skills-I)	
CO-1	Detect grammatical errors in the text/sentences and rectify them while answering their competitive/ company specific tests and frame grammatically correct sentences while writing.
CO-2	Answer questions on synonyms, antonyms and other vocabulary based exercises while attempting CAT, GRE, GATE and other related tests.
CO-3	Use their logical thinking ability and solve questions related to analogy, syllogisms and other reasoning based exercises.
CO-4	Choose the appropriate word/s/phrases suitable to the given context in order to make the sentence/paragraph coherent.
CO-5	Apply soft skills in the work place and build better personal and professional relationships making informed decisions.
Part-B (Quantitative Aptitude –I)	
CO-1	The students will be able to perform well in calculating on number problems and various units of ratio concepts.
CO-2	Accurate solving problems on time and distance and units related solutions.
CO-3	The students will become adept in solving problems related to profit and loss, in specific, quantitative ability.
CO-4	The students will present themselves well in the recruitment process using analytical and logical skills which he or she developed during the course as they are very important for any person to be placed in the industry.
CO-5	The students will learn to apply Logical thinking to the problems of syllogisms and be able to effectively attempt competitive examinations like CAT, GRE, and GATE for further studies.
Course Code: B17 BS 3102	
Course Title: BASIC CODING	
CO-1	Know about Control Structures, Loop Structures and branching in programming.
CO-2	Know about various searching and sorting methods.
CO-3	Know about Functions, Recursions and Storage Classes.
CO-4	Know about Structures and Unions.
CO-5	Know different Operating System concepts.
CO-6	Differentiate OSI Model Vs. TCP/IP suite.
Course Outcomes for Third Year Second Semester Course	

Course Code: B17EC3201	
Course Title: MICROPROCESSORS AND ITS APPLICATIONS	
CO-1	Understand and analyze architecture of the 8085 microprocessor
CO-2	Be familiar with the 8085 Assembly Language Programming
CO-3	Be familiar with Hardware and software requirements in interfacing and designing 8085 microprocessor based products for practical applications
CO-4	Understand and analyze architecture of the 8086 microprocessor
CO-5	Be familiar with the 8086 Assembly Language Programming
Course Code: B17EC3202	
Course Title: MICROWAVE ENGINEERING	
CO-1	Explain the working principle of different passive waveguide components used at microwave frequencies.
CO-2	Apply the properties of scattering matrix for solving the scattering matrix of different passive microwave components for both ideal and practical considerations and analyze their operation.
CO-3	Understand the conceptual and operational characteristics of different microwave Tube circuits
CO-4	Explain the operational characteristics of different microwave solid state devices.
CO-5	Understand and implement different experimental procedures involving measurement of microwave parameters
Course Code: B17EC3203	
Course Title: VLSI DESIGN	
CO-1	Apply the Concept of design rules during the layout of a circuit.
CO-2	Model and simulate digital VLSI systems using hardware design language.
CO-3	Synthesize digital VLSI systems from register-transfer or higher level descriptions
CO-4	Understand current trends in semiconductor technology, and how it impacts scaling and performance.
CO-5	Understand the basic concepts of FPGA and low power VLSI design
Course Code: B17 EC 3204	
Course Title: DIGITAL SIGNAL PROCESSING	
CO-1	Describe the DSP fundamental theory and components, Develop an understanding of DSP advantages, limitations and fundamental tradeoffs. Carry-out LTI system analysis using convolution & Z-transform
CO-2	Carryout data analysis & spectrum analysis using FFT
CO-3	Design of IIR digital filters to meet specifications
CO-4	Design of FIR digital filters to meet specifications
CO-5	Knows multi-rate signal processing aspects & DSP applications
Course Code: B17EC3205	
Course Title: RADAR ENGINEERING	
CO-1	Able to understand the basic working principles of various Radars.
CO-2	Apply various mathematical equations to measure the Range and angle information of the targets from the radar.
CO-3	Analyze and design of radar signals, MTI, Pulse Doppler radar and various tracking Radars
CO-4	Analyze various Radar systems, advantages, limitations and their applications.
CO-5	Analyze various Navigational Aids like LORAN, DECCA and VOR.
Course Code: B17EC3206	
Course Title: MICROCONTROLLERS	
CO-1	Understand instruction execution sequence with clock.
CO-2	Gain comprehensive knowledge about architecture and addressing modes of 8051
CO-3	Learn the art of programming in assembly language for various embedded system applications.
CO-4	Develop independent learning skills to interface memory and PPI with 8051

CO-5	Create the IO interfacing techniques with 8051
Course Code: B17CS3214	
Course Title: OOPS THROUGH JAVA	
CO-1	Understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
CO-2	Write, compile, execute and troubleshoot Java programming for networking concepts.
CO-3	Build Java Application for distributed environment.
CO-4	Design and Develop multi-tier applications.
CO-5	Identify and Analyze Enterprise applications
Course Code: B17CS3215	
Course Title: DATA MINING	
CO-1	Understand stages in building a Data Warehouse
CO-2	Understand the need and importance of preprocessing techniques
CO-3	Understand the need and importance of Similarity and dissimilarity techniques
CO-4	Analyze and evaluate performance of algorithms for Association Rules.
CO-5	Analyze Classification and Clustering algorithms
Course Code: B17ME3210	
Course Title: INDUSTRIAL ROBOTICS	
CO-1	Identify various robot configuration and components,
CO-2	Select appropriate actuators and sensors for a robot based on specific application
CO-3	Carry out kinematic and dynamic analysis for simple serial kinematic chains.
CO-4	Perform trajectory planning for a manipulator by avoiding obstacles
Course Code: B17EE3209	
Course Title: POWER ELECTRONICS	
CO-1	Explain the principle of operation of thyristor, modern power semiconductor devices and necessity of series and parallel connection of thyristors.
CO-2	Explain the operation of Firing and Commutation techniques.
CO-3	Evaluate the phase controlled rectifiers with different loads.
CO-4	Analyse different Choppers, Cyclo-converter and AC voltage Controller configurations.
CO-5	Investigate harmonic reduction techniques for inverters based on PWM techniques
Course Code: B17EC3207	
Course Title: BIO MEDICAL ENGINEERING	
CO-1	Possess the basic mathematical skills necessary to analyze ECG and EEG signals.
CO-2	Possess the basic scientific skills necessary to analyze ECG and EEG signals
CO-3	Possess the basic computational skills necessary to analyze ECG and EEG signals.
CO-4	Apply classical and modern filtering and compression techniques for ECG and EEG Signals
CO-5	Develop a thorough understanding on basics of ECG and EEG feature extraction.
Course Code: B17CS3216	
Course Title: ARTIFICIAL NEURAL NETWORKS	
CO-1	This Course introduces Artificial Neural Networks and Learning Rules and Learning method.
CO-2	Feed forward and Feedback Neural Networks are introduced
CO-3	Applications of Neural Networks in different areas are introduced.

B. TECH –ELECTRICAL & ELECTRONICS ENGINEERING

Department Vision

Transforming the individuals into globally competent Electrical Engineers to accomplish the technological needs of the society.

Department Mission

- Establishing world class infrastructure in Electrical Engineering.
- Adopting continuous improvement methods in content delivery and assessment.
- Facilitating industry institution interaction in teaching & learning, consultancy and research activities to fulfil the technological needs of the society.
- Encouraging the faculty and students to carry out innovative research and practicing ethical standards.
- Motivating the students for active participation in co-curricular and extracurricular activities.

Program Educational Objectives (PEOs):

PEO I: Graduates will be technically sound to have vibrant careers in core & IT sector.

PEO II: Graduates will compete, sustain, lead and enhance in competitive world.

PEO III: Graduates will serve the nation by solving technical problems with professional ethics and social responsibility

Program Specific Outcomes (PSO's)

PSO 1 :

The ability to analyse, design and implement power systems, power electronics, control systems using software systems.

PSO 2 :

The ability to apply project management techniques to electrical & Electronics systems & to utilize applied differential equations, matrices, different transform methods, discrete mathematics in support to the program.

A) PROGRAM OUTCOMES

Engineering Graduates will be able to:

- PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for, sustainable development.
- PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes for First Year First Semester Course		
Course Title & Code	#	Statement
ENGLISH – I & B17 BS 1101	CO1	Understand the rudiments of LSRW Skills, comprehension and fluency of speech.
	CO2	Gain confidence and competency in vocabulary and grammar.
	CO3	Listen, speak, read and write effectively in both the academic and non-academic environment.
	CO4	Extend his/her reading skills towards literature.
	CO5	Strengthen his/her analytical and compositional skills.
MATHEMATICS – I & B17 BS 1102	CO1	Solve linear ordinary differential equations of first order and first degree. Also will be able to apply the knowledge in simple applications such as Newton's law of cooling, orthogonal trajectories and simple electrical circuits.
	CO2	Solve linear ordinary differential equations of second order and higher order. Also will be able to apply the knowledge in simple applications such as LCR circuits and Simple harmonic motion.
	CO3	Determine Laplace transform and inverse Laplace transform of various functions.
	CO4	Use Laplace transforms to solve a linear ODE.
	CO5	Calculate total derivative, Jacobian and maxima/minima of functions of two variables.
	CO6	Form partial differential equations and solve some standard types of first order PDEs. Find complimentary function and particular integral of linear higher order homogeneous and non homogeneous PDEs.
ENGINEERING CHEMISTRY & B17 BS 1105	CO1	At the end of the course the students learn the advantages and limitations of plastic materials and their use in design.
	CO2	Fuels which are used commonly and their economics, advantages and limitations are discussed.
	CO3	Students gained Knowledge reasons for corrosion and some methods of corrosion control.
	CO4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.
	CO5	Similarly students understand liquid crystals and semi conductors. Students can gain the building materials , solar materials, lubricants and energy storage devices.
ENGINEERING MECHANICS & B17 ME 1101	CO1	Determine the resultant of the given force systems.
	CO2	Analyze force systems using equations of equilibrium.
	CO3	Determine centroid, center of gravity and moment of inertia of areas and bodies.
	CO4	Analyze trusses and simple beams.
	CO5	Distinguish between kinematics and kinetics.
	CO6	Apply the work energy and impulse momentum methods of various engineering problems.

ENGINEERING DRAWING & B17 ME 1102	CO1	Apply principles of drawing to represent dimensions of an object.
	CO2	Construct polygons and engineering curves.
	CO3	Draw projections of points, lines, planes and solids.
	CO4	Represent the object in 3D view through isometric views.
	CO5	Convert the isometric view to orthographic view and vice versa.
ENVIRONMENTAL STUDIES & B17 CE 1101	CO1	To bring awareness among the students about the nature and natural ecosystems
	CO2	Sustainable utilization of natural resources like water, land, energy and air
	CO3	Resource pollution and over exploitation of land, water, air and catastrophic (events) impacts of climate change, global warming, ozone layer depletion, marine, radioactive pollution etc to inculcate the students about environmental awareness and safe transfer of our mother earth and its natural resources to the next generation
	CO4	Safe guard against industrial accidents particularly nuclear accidents
	CO5	Constitutional provisions for the protection of natural resources
ENGINEERING CHEMISTRY LAB & B17 BS 1107	CO1	An understanding of Professional and develop confidence on recent trends.
	CO2	Able to gain technical knowledge of measuring, operating and testing of chemical instruments and equipments.
	CO3	Acquire ability to apply knowledge of chemistry.
	CO4	Exposed to the real time working environment.
	CO5	Demonstrate the ability to learn Principles, design and conduct experiments.
	CO6	Ability to work on laboratory and multidisciplinary tasks.
ENGLISH COMMUNICATION SKILLS LAB- I & B17 BS 1108	CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
	CO2	Students improve their speaking skills in real contexts.
	CO3	Students learn standard pronunciation and practice it daily discourse.
	CO4	Students give up their communicative barriers.
ENGINEERING WORKSHOP & IT WORKSHOP & B17 BS 1109		PART-A (ENGINEERING WORKSHOP)
	CO1	Use various tools to prepare basic carpentry and fitting joints.
	CO2	Prepare jobs of various shapes using black smithy.
	CO3	Make basic house wire connections.
	CO4	Fabricate simple components using tin smithy.
		PART-B (IT WORKSHOP)
	CO1	Understand the basic components and peripherals of a computer. □
CO2	To become familiar in configuring a system.	

	CO3	Learn the usage of productivity tools. □
	CO4	Acquire knowledge about the netiquette and cyber hygiene. □
	CO5	Get hands on experience in trouble shooting a system
INNER ENGINEERING & B17 BS 1111	CO1	To improve his concentration levels and improve his public speaking abilities.
	CO2	To balance his academic and non-academic activities (Work Life Balance).
	CO3	To widen his vision and increase his breadth of perspective in his journey of 4 years.
	CO4	To improve his communications skills, leadership, teamwork and decision-making abilities
	CO5	To inculcate creativity & innovation, planning & organizing as part of their life.
	CO6	Taking responsibility for themselves and people around them.
	CO7	To make their journey more fun and enjoyable.

Course Outcomes for First Year Second Semester Course		
Course Title & Code	#	Statement
ENGLISH – II & B17 BS 1201	CO1	To comprehend the speech of people belonging to different backgrounds and regions.
	CO2	Understand the importance of speaking and writing for personal and professional communication and practice it in real contexts.
	CO3	To express fluently and accurately in social discourse.
	CO4	Participate in group activities like role-plays, discussions and debates.
	CO5	Identify the discourse features, and improve intensive and extensive reading skills.
MATHEMATICS – II & B17 BS 1202	CO1	Find a real root of algebraic and transcendental equations using different methods
	CO2	Know the relation between the finite difference operators. Determine interpolation polynomial for a given data.
	CO3	Evaluate numerically certain definite integrals applying Trapezoidal and Simpson's rules.
	CO4	Solve a first order ordinary differential equation by Euler and RK methods.
	CO5	Find Fourier series of a given function satisfying Dirichlet conditions. Find half range cosine and sine series for appropriate functions.
	CO6	Find Fourier transforms Fourier cosine and sine transforms of appropriate functions and evaluate certain integrals using inverse transforms and Fourier integral.
MATHEMATICS – III & B17 BS 1203	CO1	Determine rank, and solve a system of linear simultaneous equations numerically using various matrix methods.
	CO2	Determine Eigen values and Eigen vectors of a given matrix Reduce a Quadratic form to its canonical form and classify.
	CO3	Evaluate double integrals over a region and triple integral over a volume.
	CO4	Use the knowledge of Beta and Gamma functions in evaluation of different integrals.
	CO5	Find gradient of a scalar function, divergence and curl of a vector function. Use vector identities for solving problems.
	CO6	Evaluate line, surface and volume integrals by the use of Green's, Stokes' and Gauss divergence theorems.
ENGINEERING PHYSICS	CO1	Learn the basic concepts of interference and diffraction of light and its applications.
	CO2	Understand the science of producing high intensity light beams for technological applications and also understand the propagation of light waves in optical fibers in various applications.

& B17 BS 1204	CO3	Understand the inter relationship of electric and magnetic fields and learn ultrasonic's as a tool for technological applications
	CO4	Learn the behavior of particles at the very microscopic level by using wave nature of particles and understand the behavior of materials and be able to classify them using the band theory of solids.
	CO5	Learn the basics of structures of solid materials and nano material preparation Techniques/methods.
COMPUTER PROGRAMMING USING C & B17 CS 1201	CO1	Understand the basic terminology used in computer programming
	CO2	Write, compile and debug programs in C language.
	CO3	Use different data types in a computer program.
	CO4	Design programs involving decision structures, loops and functions.
	CO5	Explain the difference between call by value and call by reference
	CO6	Understand the dynamics of memory by the use of pointers
	CO7	Use different data structures and create/update basic data files.
CIRCUIT THEORY & B17 EE 1201	CO1	Various electrical networks in presence of active and passive elements.
	CO2	Electrical networks with network topology concepts.
	CO3	Magnetic circuit with various dot conventions.
	CO4	R, L, C network with sinusoidal excitation.
	CO5	Three phase AC circuits.
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING & B17 EE 1202	CO1	Able to analyze the various Electrical networks and understand the basics of Magnetic Circuits.
	CO2	Able to understand the operation of DC generators,3-Point starter and conduct the Swinburne's test.
	CO3	Able to analyze the Performance of Transformers.
	CO4	Able to explain the operation of three phase induction motors and alternator.
	CO5	Able to analyze the operation of Half-wave and Full-wave rectifiers and single stage CE amplifier.

ENGINEERING PHYSICS LAB & B17 BS 1206	CO1	Students get hands on experience in setting up experiments and using the Instruments/equipment individually.
	CO2	Get introduced to using new/ advanced technologies and understand their significance.
ENGLISH COMMUNICATION SKILLS LAB- II & B17 BS 1208	CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
	CO2	Students enhance their presentation skills.
	CO3	Students participate in group discussions and improve their team skills.
	CO4	Students confidently face the interviews.
C PROGRAMMING LAB & B17 CS 1204	CO1	Apply and practice logical ability to solve the problems.
	CO2	Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment.
	CO3	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs.
	CO4	Understand and apply the in-built functions and customized functions for solving the problems.
	CO5	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
	CO6	Document and present the algorithms, flowcharts and programs in form of user manuals.
	CO7	Identification of various computer components, Installation of software
ENGINEERING PHYSICS - VIRTUAL LABS – ASSIGNMENTS & B17 BS 1210	CO1	Course Outcome: Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper.

Course Outcomes for second year courses (2-1)		
Course Title & code	#	Course outcomes
MATHEMATIC S IV & B17BS2101	CO1	Using the concept of Analytic function in applications including Electrostatics and Fluid dynamics.
	CO2	Finding theoretical solution of certain Elliptic, Parabolic and Hyperbolic partial differential equations.
	CO3	Using Z-transforms to solve linear difference equations with constant coefficients.
	CO4	Fitting of probability frequency distribution to a given data.
	CO5	Using the concepts of sampling theory to analyze data related to some large and small samples.
ELECTRONIC DEVICES AND CIRCUITS B17 CE 2101	CO1	Understand the physical structure, principles of operation, electrical characteristics and circuit models of diodes, BJT's and FET's.
	CO2	Use the concepts of semiconductor physics and electronic devices to design and fabricate simple electronic circuits.
	CO3	Use this knowledge to analyze and design amplifier circuits and oscillator circuits to be used in various applications.
	CO4	Extend the understanding of how electronic circuits and their functions fit into larger electronic systems.
NETWORK ANALYSIS AND SYNTHESIS B17EE2101	CO1	Students will learn the theorems for Analyzing complex networks.
	CO2	Students will outline the significance of energy storing elements (Inductance & Capacitance) in circuits and study transient behavior of responses.
	CO3	Students will learn to apply Laplace transform technique for circuit analysis and know its advantages.
	CO4	Students will learn to apply two-port network analysis for devices like amplifiers, transmission lines.
	CO5	Students will learn to apply the concept of positive real functions and the synthesis procedure for RC, LC, RL & RLC networks.
ELECTRO MAGNETIC FIELD THEORY B17EE2102	CO1	Find the electrostatic and magneto static fields for different configurations.
	CO2	Apply various principles and laws to estimate the effect of electric and magnetic fields.
	CO3	Distinguish between the effects of electrostatic and magneto static fields.
	CO4	Apply Maxwell's equations for static and time varying fields.
	CO5	Analyze the EM wave in different domains and compute average power density
ELECTRICAL	CO1	Illustrate the characteristics of measuring instruments (K3)

MEASUREMENTS & INSTRUMENTS B17EE2103	CO2	Discriminate measuring instruments based on their principle & operation (K4)
	CO3	Calculate power and energy in 1 ϕ , 3 ϕ & polyphase circuits (K3)
	CO4	Measure electrical parameters using a bridge (K3)
	CO5	Find magnetic measurements using Ballistic Galvanometers and Flux meters. (K4)
ENGINEERING ECONOMICS B17BS2104	CO1	Provide detailed insight about origin & definitions of economics & enlighten the students about demand analysis.
	CO2	Illustration about applications of cost Concepts & analysis of breakeven point.
	CO3	Understand about various types of Market Structure and Pricing practices implemented by the organization.
	CO4	Infuse knowledge about different Economic systems & Business cycles.
	CO5	Enlighten the students regarding the aspects of Depreciation & Financial Accounting.
NETWORKS & MEASUREMENTS LAB B17EE2105	CO1	Students will gain the skill to make and experiment with practical electric circuits.
	CO2	Students will be able to measure voltage, current, power in practical electric circuits.
	CO3	Students will know the significance of various theorems and their applications.
	CO4	Students will be able to assess the behavior of electric circuits.
	CO5	Students will be able to calibrate single phase energy meter, voltmeter & wattmeter
	CO6	Students will be able to measure resistance, inductance & capacitance.
ELECTRONICS DEVICES AND CIRCUITS LAB 2105	CO1	Design and fabricate simple circuits like diode rectifiers with filters for providing dc voltages in electronic circuits.
	CO2	Design and fabricate amplifiers with required gain for use in various communication applications.
	CO3	Design and fabricate simple electronic circuits for everyday applications like traffic control lights using relays, automatic counters using LDRs and Burglar alarms.
PROGRAMMING		Ability to apply object oriented concepts in programming.

(PYTHON) B17 BS 2106		and applythem.
	CO3	Ability to recognize various concepts of python and develops the programs using them and also develop web basedapplication.
ENGLISH PROFICIENCY-I & B17 BS 2107	CO1	Improve speaking skills.
	CO2	Enhance their listening capabilities.
	CO3	Learn and practice the skills of composition writing.
	CO4	Enhance their reading and understanding of different texts.
	CO5	Improve their inter-personal communication skills.
	CO6	Be confident in presentation skills.
PROFESSIONAL ETHICS & HUMAN VALUES & B17 BS 2108		By the end of the course student should be able to understand the importance ofethics and values in life and society.

Course Outcomes for second year courses (2-2)		
Course Title & code	#	Course outcomes
ELECTRICAL MACHINES-I B17EE2201	CO1	Identify the concepts of electro mechanical energy conversion.[K2]
	CO2	Describe the concepts of construction, operating principle, different types of DC machines and transformers, effects on DC machine and parallel operation of DC generators.[K2]
	CO3	Interpret the characteristics of DC machines. [K3]
	CO4	Discriminate different types of speed control methods of DC motors. [K4]
	CO5	Examine the performance of DC machines and transformers by different testing methods.[K4]
	CO6	Discriminate different types of transformer connections[K4]
SIGNALS & SYSTEMS B17EE2202	CO1	Characterize and analyze the properties of continuous and discrete time signals and systems. [K2]
	CO2	Apply the convolution for continuous time signals and discrete time signals.
	CO3	Evaluate the Fourier Series of periodic signals.[K1]
	CO4	Determine the Fourier Transform and Z-Transform of different type"s of signals and make use of their Properties.[K1]
	CO5	Convert a continuous time signal to the discrete time domain and reconstruct using the sampling theorem.[K2]
ELECTRONIC CIRCUIT ANALYSIS B17EC2205	CO1	Know the equivalent circuit of multistage amplifier and its analysis.[K3]
	CO2	Identify the different feedback topologies and analyze them.[K1]
	CO3	Explain the principle of oscillator and design different types of sinusoidal oscillators.[K3]
	CO4	Define the difference between voltage and power amplifiers and design different classes and know that Tuned amplifiers amplify a narrow band of frequencies and will also be able to analyze them.[K1,K2,K3]
	CO5	Identify that Op-amp not only amplifies but also performs different operations and analyze some of its applications.[K1,K2]
PRIME MOVERS & PUMPS B17ME2206	CO1	Understand the concepts of hydrodynamic force of jets on stationary and moving flat inclined and curved vanes.
	CO2	Apply the concepts of momentum equation for finding the forces acting on the vanes of the turbines.

	CO3	Calculate the performance of different types of internal combustion engines.
	CO4	Apply the Otto, Diesel cycles for finding the performance of S.I and C.I engines. Understand the working principle of steam turbines and gas turbines.
	CO5	To impart the knowledge of various types of pumps, their constructional features, working and performance.
	CO6	To impart the knowledge of various types of turbines and the performance characteristics of hydraulic turbines
LINEAR INTEGRATED AND PULSE CIRCUITS B17ME2210	CO1	Understand the applications of Op-amps
	CO2	Design different active filters and oscillators
	CO3	Understand the applications of 555 Timers and IC regulators
	CO4	Understand the applications of integrator, differentiator, clippers and clamper circuits.
	CO5	Design different multi vibrators for various applications.
MANAGEMENT SCIENCE B17BS2201	CO1	Create awareness about the concepts like Evolution of Management thought, functions & principles of management.
	CO2	Provide all round information to the students about matters related to concepts & functions related to Marketing.
	CO3	Acquire in-depth knowledge about the concepts and functions of HRM.
	CO4	Understand about aspects of Production Management and Financial Management.
	CO5	Gain knowledge about Strategy formulation & implementation, SWOT analysis in order to compete with the competition & to gain competency advantage.
THERMAL PRIME MOVERS LAB B17ME2210	CO1	Explain the working principle of different types of IC Engines and illustrate the valve timing and port diagrams of an IC Engines.
	CO2	Determine the viscosities of oil samples, Flash and Fire point values of fuels.
	CO3	Perform the load, Morse, Heat balance and economical speed test on IC Engines.
	CO4	Discuss the working principle of different types of hydraulic turbines

	CO5	Illustrate the working principle of centrifugal and reciprocating pumps:
LINEAR INTIGRATED CIRCUITS & PULSE DIGITAL CIRCUTS LAB WITH SIMULATION (B17EC2209)	CO1	Design and conduct experiments on RC low pass and high pass circuits.
	CO2	Observe operation of UJT Sweep Generator.
	CO3	Design and test different types of Multivibrators
	CO4	Acquire a basic knowledge on simple applications of operational amplifier.
	CO5	Design, construct Schmitt trigger using operational amplifier.
	CO6	Use Multisim to test their electronic designs.
	CO7	Design and test different types of Multiplexers and counters.
PROGRAMMING SKILLS-II (JAVA) B17 BS 2205	CO1	Ability to define different procedural and object oriented concepts and will be able to differentiate between them.
	CO2	Ability to define, understand and differentiate different types of arrays and apply them.
	CO3	Ability to recognize various concepts of java and develops the programs using them.
	CO4	Ability to identify and differentiate the various features of AWT components to construct container based programs.
	CO5	Ability to describe and explain the concept of networking.
ENGLISH PROFICIENCY-II : : B17 BS 2107	CO1	Develop the skills of taking and making notes.
	CO2	Interpret the pictures appropriately and effectively.
	CO3	Read, comprehend and infer a given piece of writing effectively.
	CO4	Learn and practice the skills of Research writing.
	CO5	Communicate well through various forms of writing.
	CO6	Be confident in giving presentations and dealing with people.

Course Outcomes final year courses (3-1)		
Course Title & code	#	Course outcomes
ELECTRICAL MACHINES-II B17EE3101	CO1	Understand the concepts of construction, operating principle and starting methods of AC machines.
	CO2	Perform various tests on AC Machines
	CO3	Analyze the performance of different AC machines in the concepts of torque and power factor correction.

MICROPROCESSOR & MICROCONTROLLER B17EE3102	CO1	Understand the fundamentals of 8085 Microprocessor and microcontroller based systems.
	CO2	Familiarize with the instruction set and assembly level programming.
	CO3	Illustrate how the different peripherals (8255, 8253 etc.)
	CO4	Distinguish and analyze the properties of Microprocessors & Microcontrollers.
	CO5	Apply knowledge on interfacing microcontrollers for some real time applications.
ELECTRICAL POWER GENERATION, TRANSMISSION & DISTRIBUTION & B17EE3103	CO1	Describe the power generation from different energy sources.
	CO2	Demonstrate different tariffs of generation, Inductance & Capacitance of transmission lines.
	CO3	Analyze the various transmission and distribution systems under various conditions.
CONTROL SYSTEMS B17EE3104	CO1	Model electrical and mechanical physical systems by applying laws of physics
	CO2	Represent mathematical models of systems using block diagrams & Signal Flow Graphs and derive their transfer functions
	CO3	Analyze systems in time domain for transient and steady-state behavior
	CO4	Learn the concept of stability and use RH criterion and Root locus methods for stability analysis.
	CO5	Learn to obtain frequency response plots of systems and use them for system analysis and stability assessment.
DIGITAL ELECTRONICS AND LOGIC DESIGN B17EE3105	CO1	Understand the concepts of basic number system and Boolean
	CO2	Apply the Boolean algebra for framing the simplified expression.
	CO3	Analyze the combinational & sequential circuits using simple logic gates and PLD & PLA.
NON-CONVENTIONAL ENERGY SOURCES B17EE3106	CO1	Identify the need for Renewable energy
	CO2	Recognize the ways of collection of solar energy.
	CO3	Apply the knowledge of wind energy to estimate the

		energypotential.
	CO4	Apply the knowledge of ocean, waves and tides to estimate their energypotential.
	CO5	Understand the concepts behind geo-thermal energy and bio energy.
ELECTRICAL MACHINES-I LAB B17EE3107	CO1	Analyze characteristics of various types of generators & motors which will help in Understanding of machines under variousconditions.
	CO2	Compare Speed control of dc motors which will be useful in variousindustries.
	CO3	Determine testing of machines will given idea in testing side in various industries.
MICROPROCESSOR AND MICRO CONTROLLER LAB B17EE3108	CO1	Evaluate the programs using basic fundamentals of 8085 Microprocessor& 8051 Microcontroller.
	CO2	Develop different programs on extended version like 8086microprocessor.
	CO3	Design programs for interfacing circuits like traffic controller, LED display board, Motor controllersetc.
	CO4	Utilize their knowledge practically in PLC designs companies. Ex: Govt.sector& Private sectors
PROBLEM SOLVING & LINGUISTIC COMPETENCE & B17BS3101		PART-A (Verbal and Soft Skills-I)
	CO1	Detect grammatical errors in the text/sentences and rectify them while answering their competitive/ company specific tests and frame grammatically correct sentences while writing.
	CO2	Answer questions on synonyms, antonyms and other vocabulary based exercises while attempting CAT, GRE, GATE and other related tests.
	CO3	Use their logical thinking ability and solve questions related to analogy, syllogisms and other reasoning based exercises.
	CO4	Choose the appropriate word/s/phrases suitable to the given context in order to make the sentence/paragraph coherent.
	CO5	Apply soft skills in the work place and build better personal and professional relationships making informed decisions.
		Part-B (Quantitative Aptitude –I)

	CO1	The students will be able to perform well in calculating on number problems and various units of ratio concepts.
	CO2	Accurate solving problems on time and distance and units related solutions.
	CO3	The students will become adept in solving problems related to profit and loss, in specific, quantitative ability.
	CO4	The students will present themselves well in the recruitment process using analytical and logical skills which he or she developed during the course as they are very important for any person to be placed in the industry.
	CO5	The students will learn to apply Logical thinking to the problems of syllogisms and be able to effectively attempt competitive examinations like CAT, GRE, GATE for further studies.
IPR & PATENTS & B17BS3105	CO1	Identify various types of intangible property that an engineering professional could generate in the course of his career.
	CO2	Distinguish between various types of protection granted to Intellectual Property such as Patents, Copy Rights, Trademarks etc.,
	CO3	List the steps involved in getting protection over various types of intellectual property and maintaining them.
	CO4	Take precautions in writing scientific and technical reports without plagiarism.
	CO5	Help micro, small and medium entrepreneurs in protecting their IP and respecting others IP as part of their business processes.
B17BS3102 BASIC CODING	CO1	Know about Control Structures, Loop Structures and branching inprogramming.
	CO2	Know about various searching and sortingmethods.
	CO3	Know about Functions, Recursions and StorageClasses.
	CO4	Know about Structures and Unions.
	CO5	Know different Operating Systemconcepts.
	CO6	Differentiate OSI Model Vs. TCP/IPsuite
Course Outcomes final year courses (3-2)		
Course Title & code	#	Course outcomes
ADVANCED CONTROL SYSTEMS	CO1	Know the various components and usage of eachcomponent.
	CO2	Derive stat space model for a given systems and Apply the concept

B17EE3201		of Observability and Controllability for LTI system.
	CO3	Apply Z- transform in Engineering application related to digital control systems.
	CO4	Design classical controller based on bode plots and modern controllers based on the state space techniques
	CO5	Test the digital system which is useful after designing a particular system with respect to the stability point of view.
POWER ELECTRONICS B17EE3202	CO1	Explain the principle of operation of thyristor, modern power semiconductor devices and necessity of series and parallel connection of thyristors.
	CO2	Explain the operation of Firing and Commutation techniques.
	CO3	Evaluate the phase controlled rectifiers with different loads.
	CO4	Analyze different Choppers, Cyclo-converter and AC voltage Controller configurations.
	CO5	Investigate harmonic reduction techniques for inverters based on PWM techniques
POWER SYSTEM ANALYSIS AND STABILITY B17EE3203	CO1	Understand single line diagram, reactance diagram of the power system.
	CO2	Apply different load flow techniques to solve power system problems.
	CO3	Analyse different types of faults in a power system
	CO4	Analyse steady state and transient stability problems of power system.
DIGITAL SIGNAL PROCESSING B17 EE 3204	CO1	Analyse difference equations of linear time-invariant systems and Evaluate the transfer functions using Z transforms.
	CO2	Represent signals mathematically in continuous and discrete-time, and in the frequency domain.
	CO3	Solve the linear and circular convolutions of discrete-time sequences.
	CO4	Understand the Discrete-Fourier Transform (DFT) and the FFT algorithms, relate it to the DTFT.
	CO5	Design IIR & FIR filters
POWER SYSTEM	CO1	Identify the need for protection and know various devices for

PROTECTION B17EE3205		protection and terminology used in protection.
	CO2	Discriminate the constructional details with operation principle of various types of fuses, circuit breakers, relays, lightning arresters and their applications.
	CO3	Apply the arc quenching methods to various types of circuit breakers.
	CO4	Apply various relays to various types of power system equipment like alternator, transformer and feeders and distinguish between an electromagnetic relay and a static relay.
	CO5	Identify the different causes for over voltages and choose various protection devices against overvoltages.
OOPS THROUGH JAVA B17CS3214	CO1	Understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
	CO2	Write, compile, execute and troubleshoot Java programming for networking concepts.
	CO3	Build Java Application for distributed environment.
	CO4	Design and Develop multi-tier applications.
	CO5	Identify and Analyze Enterprise applications
Code: B17ME3210 INDUSTRIAL ROBOTICS B17ME3210	CO1	Identify various robot configuration and components,
	CO2	Select appropriate actuators and sensors for a robot based on specific application
	CO3	Carry out kinematic and dynamic analysis for simple serial kinematic chains.
	CO4	Perform trajectory planning for a manipulator by avoiding obstacles
	CO5	Identify various robot configuration and components,
ELECTRICAL MACHINES-II LAB B17EE3207	CO1	Calculate the regulation of an alternator by EMF, MMF and ZPF methods.
	CO2	Verify Alternator synchronism and draw the performance characteristics, finding out different reactances.
	CO3	Find the efficiency and machine performances by conducting various tests on 3- Φ and 1- Φ induction motor.

	CO4	Verify the speed variation of induction machine.
	CO5	Calculate the regulation of an alternator by EMF, MMF and ZPF methods.
CONTROL SYSTEMS LAB B17EE3208	CO1	Formulate transfer function for given control system problems.
	CO2	Find time response of given control system model.
	CO3	Apply Root Locus and Bode plots for given control system model
GEOTECHNICAL ENGINEERING LAB & B17CE3209	CO1	Identify the physical properties of soil and classify various types of soil.(K2)
	CO2	Determine the permeability of soil.(K3)
	CO3	Determine compaction characteristics of soils and Estimate in-situ density of soil.(K3)
	CO4	Determine the shear strength parameters of soils by various methods.(K3)
	CO5	Estimate the California Bearing Ratio (CBR) of a soil.(K3)
	CO6	Determine the relative density of a coarse-grained soil.(K3)
CONCRETE TECHNOLOGY LAB & B17CE3210	CO1	Conduct test and find consistency and fineness of cement.
	CO2	Examine the specific gravity of cement.
	CO3	Conduct test and determine the setting times of cement.
	CO4	Determine the compressive strength of cement.
	CO5	Determine the specific gravity of coarse aggregate and fine aggregate.
	CO6	Determine the fineness modulus of coarse aggregate and fine aggregate.
	CO7	Determine the bulking of sand.
	CO8	Understand and determine workability of concrete by slump, compaction factor, flow table and Vee – Bee tests.
	CO9	Evaluate hardened properties of concrete like compressive strength, split tensile strength and flexural strength.
EMPLOYABILITY SKILLS & B17BS3201		Part-A (Verbal Aptitude and Soft Skills-II)
	CO1	Construct coherent, cohesive and unambiguous verbal expressions in both oral and written discourses.
	CO2	Analyze the given data/text and find out the correct responses to the questions asked based on the reading exercises; identify

		relationships or patterns within groups of words or sentences
	CO3	Write paragraphs on a particular topic, essays (issues and arguments), e mails, summaries of group discussions, reports, make notes, statement of purpose(for admission into foreign universities), letters of recommendation(for professional and educational purposes).
	CO4	Converse with ease during interactive sessions/seminars in their classrooms, compete in literary activities like elocution, debates etc., raise doubts in class, participate in JAM sessions/versant tests with confidence and convey oral information in a professional manner.
	CO5	Participate in group discussions/group activities, exhibit team spirit, use language effectively according to the situation, respond to their interviewer/employer with a positive mind, tailor make answers to the questions asked during their technical/personal interviews, exhibit skills required for the different kinds of interviews (stress, technical, HR) that they would face during the course of their recruitment process.
		Part-B (Quantitative Aptitude-II)
	CO1	The students will be able to perform well in calculating different types of data interpretation problems.
	CO2	The students will perform efficaciously on analytical and logical problems using various methods.
	CO3	Students will find the angle measurements of clock problems with the knowledge of calendars and clock.
	CO4	The students will skillfully solve the puzzle problems like arrangement of different positions.
	CO5	The students will become good at solving the problems of lines, triangulars, volume of cone, cylinder and so on.
ADVANCED CODING & B17BS3203	CO1	Acquire coding knowledge on essential of modularprogramming
	CO2	Acquire Programming knowledge on linkedlists
	CO3	Acquire coding knowledge onADT
	CO4	Acquire knowledge on time complexities of differentmethods
	CO5	Acquire Programming skill on Java libraries andCollections
Course Outcomes final year courses (4-1)		
Course Title & code	#	Course outcomes

ELECTRIC DRIVES & B17EE4101	CO1	Discriminate the speed control, starting and braking of AC and DC Drives using conventional techniques.
	CO2	Analyze the operation of Rectifier fed DC Drives
	CO3	Analyze the operation of Chopper fed DC Drives
	CO4	Apply and analyze the voltage and frequency control techniques to induction motor drive and slip power recovery schemes
	CO5	Analyze the operation of synchronous motor drives and special drives
POWER SYSTEM OPERATION AND CONTROL B17EE4102	CO1	Compute the economic load scheduling for Thermal and Hydro-thermal plants.
	CO2	Solve and analyze the unit commitment and optimal power flow problems.
	CO3	Analyze the frequency deviations of single area and two area power systems.
	CO4	Apply the compensation techniques for the reactive power control in transmission system.
	CO5	Apply the knowledge of engineering fundamentals to assess the power system security.
ELECTRIC VEHICLES & B16EE4103	CO1	Analyze and understand dynamic modelling and design considerations of electrical vehicles.
	CO2	Analyze and understand the architecture of electric vehicles and power train components.
	CO3	Evaluate Battery performance parameters for EVs and understand other energy storage methods for EVs.
	CO4	Analyze and understand the electric drives using power electronic converters for EVs.
	CO5	Develop the chargers for EVs and integrate EVs into grid
OPERATIONS RESEARCH (Elective-I) & B17 EE 4104	CO1	Model and solve different optimization problems mathematically.
	CO2	Apply traditional approaches to minimize transportation cost.
	CO3	Apply Hungarian method to solve the optimal solution for assignment problems.
	CO4	Apply the Linear Programming methods for CPM and PERT problems
	CO5	Outline the optimal solution by applying dominance and max-min principle in game theory.
FLEXIBLE AC TRANSMISSION SYSTEMS (Elective-I) & B17 EE 4105	CO1	Interpret the importance of reactive power and its compensation in transmission lines.
	CO2	Summarize the characteristics of TCR, TSR, FC-TCR and TSC.
	CO3	Examine the functional operation of SVC, STATCOM, TCSC & SSSC and their comparison.
	CO4	Inspect SVC & STATCOM for their applications in improvement of transient stability, Steady-State Power-Transfer Capacity, and SSR mitigation.
	CO5	Inspect TCSC & SSSC for their applications in improvement of system stability limit, system damping, Power flow control, and SSR mitigation.

INTEGRATION OF DISTRIBUTED GENERATION (Elective-I) & B17 EE 4106	CO1	Explain energy generation by Wind Power, Solar Power, Combined Heat-and-Power, Hydropower, Tidal Power, Wave Power, Geothermal Power, Thermal Power Plants and interface with grid
	CO2	Illustrate the impact of Integration of DG's to Power System and their issues
	CO3	Demonstrate the Overloading of DG's and losses
	CO4	Discriminate Voltage magnitude variations of DG's and their compensation
	CO5	Identify Harmonics of different frequencies related to Power Quality disturbances.
HIGH VOLTAGE ENGINEERING (Elective-I) & B17 EE 4107	CO1	Apply the knowledge to estimate the performance of different configurations of electrode systems subjected to high voltage.
	CO2	Interpret the breakdown behavior of all types of dielectric materials.
	CO3	Apply the knowledge to comprehend generation of High AC, DC and Impulse voltages and currents.
	CO4	Apply methods to measure High AC, DC and Impulse voltages and currents.
	CO5	Analyze the techniques of testing various equipment's used in HV engineering and industrial applications.
ELECTRIC POWER QUALITY (Elective-II) & B17 EE 4108	CO1	Differentiate between different types of power quality problems.
	CO2	Explain and Analyze power quality terms and power quality standards
	CO3	Analyze and evaluate the causes and effects of harmonic distortion.
	CO4	Explain the principle of voltage regulation and apply power factor improvement methods.
	CO5	Analyze the impact of distributed generation on power quality
ENERGY MANAGEMENT AND AUDITING (Elective-II) & B17 EE 4109	CO1	Illustrate the energy audit, conservation, management and various technologies.
	CO2	Analyze and design the energy efficient lighting systems.
	CO3	Calculate power factor and suggest location and compensation techniques.
	CO4	Analyze the economic aspects of energy using different methods.
	CO5	Compute the economic aspects by applying life cycle costing and return on investment.
POWER ELECTRONICS LAB B17 EE 4110	CO1	Apply power electronic circuits for different loads and triggering methods.
	CO2	Compare the characteristics of power semiconductor devices
	CO3	Analyze the operation of controlled rectifiers and choppers
	CO4	Analyze the operation of AC voltage controllers and Cycloconverter
	CO5	Analyze the operation of inverters
POWER SYSTEM SIMULATION LAB & B17 EE	CO1	Acquire knowledge to write the matlab program for the Ybus, Load flows, Economic Load Dispatch considering with and without losses.

4111	CO2	Construct the Simulink models for the simulation of transient and steady state stabilities in power systems, load frequency control of single and two-area system using MATLAB/SIMULINK software.
	CO3	Attain proficiency in usage of MATLAB/SIMULINK software tool.
	CO2	Evaluate the quality of Bitumen
	CO2	Develop an excel sheet for the design of structural elements
	CO3	Model and analyze the beams and plane frames using STAAD
Course Outcomes final year courses (4-2)		
Course Title & code	#	Course outcomes
ELECTRICAL MACHINE DESIGN & B17EE 4201	CO1	Understand the concept of magnetic circuits, temperature rise in electrical machines
	CO2	Understand the concept of transformers design & their windings
	CO3	Examine various losses in DC machines& their classification
	CO4	Understand the design procedures of Induction Machines & Classification
	CO5	Understand design procedures of synchronous machine and induction machines.
ELECTRICAL DISTRIBUTION SYSTEMS (Elective-III) & B17 EE 4202	CO1	Apply engineering fundamentals to obtain different loadmodelings and their characteristics.
	CO2	Identify the optimal location of substation and Design a radial and loop type distribution feeder.
	CO3	Compute voltage drop and power loss in a distribution system under uniform and non-uniform distribution loads.
		Identify the types of faults in distribution system and select suitable protection schemes.
		Design a suitable capacitor for power factor correction and voltage compensation in a distribution system.
UTILIZATION OF ELECTRICAL ENERGY AND TRACTION (Elective-III) & B17 EE 4203	CO1	Identify different heating and welding methods for industrial applications.
	CO2	Employ different lamps and analyze lighting schemes for illumination of residential, commercial and industrial environments.
	CO3	Illustrate the speed control and braking of traction motors by applying basic principles.
	CO4	Analyze electric traction systems under braking and acceleration conditions.
	CO5	Analyze electrolytic processing techniques used in industries and Apply the knowledge of electric wiring to air-conditioning and Refrigeration systems.
HVDC TRANSMISSION (Elective–III) & B17 EE 4204	CO1	Apply engineering fundamentals to understand operation of basic converters and links used in HVDC transmission system.
	CO2	Analyze 6-pulse and 12-pulse converters and used in HVDC Transmission.
	CO3	Analyze different types of harmonics produced by HVDC converters and Suggest suitable filters to eliminate the harmonics.
	CO4	Analyze voltage Interactions problems between HVDC and

		HVAC systems and the control for MTDC systems
	CO5	Analyze about different types of faults will occur and techniques to protect equipment used in HVDC transmission systems
POWER SYSTEM PROTECTION LAB B17 EE 4205	CO1	Examine different protection relays.
	CO2	Analyze the performance of synchronous machine by using synchronous reactance and power angle curve.
	CO3	Determine the parameters of transmission line and three phase transformers.
	CO4	Compute the dielectric strength of insulating oil
PROJECT WORK & B17 EE 4207	CO1	Identify a current problem through literature/field/case studies
	CO2	Identify the background objectives and methodology for solving the same.
	CO3	Design a technology/ process for solving the problem.
	CO4	Develop a technology/ process for solving the problem.
	CO5	Evaluate that technology/ process at the laboratory level.

B. TECH – INFORMATION TECHNOLOGY

Department Vision

To evolve as a centre of excellence by adopting innovative methods for teaching learning and research in the diversified fields of Information Technology.

Department MISSION

- The highest quality technology based education and services in the most effective manner.
- Maintain a vital, state-of-art research to provide its students and faculty with opportunities to create, interpret, apply and disseminate knowledge.
- Empower students towards higher education, Research and becoming Entrepreneur / Employee and meet intellectual, ethical, carrier challenges and community service.

Program Educational Objectives (PEOs):

- **PEO 1:** To provide graduates with a good foundation in mathematics, sciences, Information Technology and engineering fundamentals required to solve engineering problems that will facilitate them to find employment in industry and / or to pursue postgraduate studies with an appreciation for lifelong learning.
- **PEO 2:** To provide graduates with analytical and problem solving skills to design algorithms, hardware / software systems and inculcate professional ethics, interpersonal skills to work in a multi-cultural team.
- **PEO 3:** To facilitate graduates get familiarized with state of the art software / hardware tools, imbining creativity and Innovation that would enable them to develop cutting-edge technologies of multi-disciplinary nature for societal development.

Program Specific Outcomes (PSOs):

- **PSO 1:** Apply core Information Technologies of System Architecture, information management, programming, networking for the development of current technical concepts
 - **PSO 2:** integrate IT-based solutions into the user environment.

A) PROGRAM OUTCOMES

Engineering Graduates will be able to:

- PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design/development of solutions:** Design solutions for complex

engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes (COs)-R17

SEMESTER: 1

COURSE YEAR:

2017-2018

Course Outcomes for First Year First Semester Course		
COURSE	COURSE OUTCOMES	
ENGLISH B17BS1101	CO1	Understand the rudiments of LSRW Skills, comprehension and fluency of speech.
	CO2	Gain confidence and competency in vocabulary and grammar.
	CO3	Listen, speak, read and write effectively in both the academic and non-academic environment.
	CO4	Extend his/her reading skills towards literature.
	CO5	Strengthen his/her analytical and compositional skills.
MATHEMATICS-I B17 BS 1102	CO1	Solve linear ordinary differential equations of first order and first degree. Also will be able to apply the knowledge in simple applications such as Newtons law of cooling, orthogonal trajectories and simple electrical circuits.
	CO2	Solve linear ordinary differential equations of second order and higher order. Also will be able to apply the knowledge in simple applications such as LCR circuits and Simple harmonic motion
	CO3	Determine Laplace transform and inverse Laplace transform of various functions
	CO4	A Use Laplace transforms to solve a linear ODE.
	CO5	a Calculate total derivative, Jacobian and maxima/minima of functions of two variables.
MATHEMATICS-II B17BS1103	CO1	Find a real root of algebraic and transcendental equations using different methods.
	CO2	Know the relation between the finite difference operators. Determine interpolation polynomial for a given data.
	CO3	Evaluate numerically certain definite integrals applying Trapezoidal and Simpsons rules.
	CO4	Solve a first order ordinary differential equation by Euler and RK methods.
	CO5	Find Fourier series of a given function satisfying Dirichlet conditions. Find half range cosine and sine series for appropriate functions.

	CO6	Find Fourier transforms, Fourier cosine and sine transforms of appropriate functions and evaluate certain integrals using inverse transforms and Fourier integral.
Engineering Physics B17 BS 1104	CO1	Learn the basic concepts of interference and diffraction of light and its applications
	CO2	Understand the science of producing high intensity light beams for technological applications and also understand the propagation of light waves in optical fiber in various applications.
	CO3	Understand the inter relationship of electric and magnetic fields and learn ultra sonic's as a tool for technological applications
	CO4	Learn the behaviour of particles at the very microscopic level by using wave nature of particles and understand the behaviour of materials and be able to classify them using the band theory of solids
	CO5	Learn the basics of structures of solid materials and nano material preparation Techniques/methods.
COMPUTER PROGRAMMING USING C B17 CS 1101	CO1	Understand the basic terminology used in computer programming
	CO2	Write, compile and debug programs in C language.
	CO3	Use different data types in a computer program.
	CO4	Design programs involving decision structures, loops and functions.
	CO5	Explain the difference between call by value and call by reference
	CO6	Understand the dynamics of memory by the use of pointers
	CO7	Use different data structures and create/update basic data files.
ENVIRONMENTAL STUDIES B17 CE 1101	CO1	To bring awareness among the students about the nature and natural ecosystems
	CO2	Sustainable utilization of natural resources like water, land, energy and air.
	CO3	Resource pollution and over exploitation of land, water, air and catastrophic (events) impacts of climate change, global warming, ozone layer depletion, marine, radioactive pollution etc to inculcate the students about environmental awareness and safe transfer of our mother earth and its natural resources to the next generation
	CO4	Safe guard against industrial accidents particularly nuclear accidents .
	CO5	Constitutional provisions for the protection of natural resource
ENGINEERING PHYSICS	CO1	Students get hands on experience in setting up experiments and using the instruments/equipment individually

LAB B17 BS 1106	CO2	Get introduced to using new/ advanced technologies and understand their significance.
ENGLISH COMMUNICATIONS LAB- I B17 BS 1108	CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world..
	CO2	Students improve their speaking skills in real contexts
	CO3	Students learn standard pronunciation and practice it daily discourse.
	CO4	Students give up their communicative barriers.
C PROGRAMMING LAB & HARDWARE FUNDAMENTALS B17 CS 1102	CO1	Apply and practice logical ability to solve the problems.
	CO2	Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment.
	CO3	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs..
	CO4	Understand and apply the in-built functions and customized functions for solving the problems
	CO5	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
	CO6	Document and present the algorithms, flowcharts and programs in form of user manuals.
	CO7	Identification of various computer components, Installation of software
Course Outcomes for First Year Second Semester Course		
ENGLISH – II B17 BS 1201	CO1	To comprehend the speech of people belonging to different backgrounds and regions.
	CO2	Understand the importance of speaking and writing for personal and professional communication and practice it in real contexts
	CO3	To express fluently and accurately in social discourse
	CO4	Participate in group activities like role-plays, discussions and debates
	CO5	Identify the discourse features, and improve intensive and extensive reading skills.
MATHEMATICS – III B17 BS 1203		Determine rank, and solve a system of linear simultaneous equations numerically using various matrix methods
		Determine Eigen values and Eigen vectors of a given matrix, Reduce a

		Quadratic form to its canonical form and classify
		Evaluate double integrals over a region and triple integral over a volume
ENGINEERING CHEMISTRY B17 BS 1205	CO1	At the end of the course the students learn the advantages and limitations of plastic materials and their use in design.
	CO2	Fuels which are used commonly and their economics, advantages and limitations are discussed.
	CO3	Students gained Knowledge reasons for corrosion and some methods of corrosion control.
	CO4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.
	CO5	Similarly students understand liquid crystals and semi conductors. Students can gain the building materials , solar materials, lubricants and energy storage devices.
ENGINEERING DRAWING B17 ME 1201	CO1	Apply principles of drawing to represent dimensions of an object
	CO2	Construct polygons and engineering curves
	CO3	Draw projections of points, lines, planes and solids
	CO4	Represent the object in 3D view through isometric views.
	CO5	Convert the isometric view to orthographic view and vice versa.
OBJECT-ORIENTED PROGRAMMING THROUGH C++ B17 CS 1202	CO1	Write, compile and debug programs in C++ language. Use different data types in a computer program.
	CO2	Design programs involving decision structures, loops and functions.
	CO3	Explain classes and abstract classes and objects, abstraction and encapsulation, inheritance, polymorphism, constructors, access control and overloading.
	CO4	Solve a given application problem by going through the basic steps of program specifications, analysis, design, implementation and testing within the context of the object oriented paradigm.
ELEMENTS OF ELECTRONICS ENGINEERING B17 EC 1201	CO1	Understand the basic concepts of transport of charge carriers in semiconductors ,drift and diffusion currents, physical structure , operation , V-I characteristics of semiconductor diode.
	CO2	Understand the basic concepts of special types of diodes like Zener Diode, LED, Photo Diode and tunnel diode, rectifier circuits with and without filters.
	CO3	Understand the physical structure, operation, input and output

		characteristics of BJT in CE,CB,CC circuit configurations.
	CO4	Understand the basic concepts of transistor biasing and thermal stabilization.
	CO5	Understand the physical structure, operation, characteristics and circuit models of JFET's and MOSFET's.
ENGINEERING CHEMISTRY LAB B17 BS 1207	CO1	An understanding of Professional and develop confidence on recent trends
	CO2	Able to gain technical knowledge of measuring, operating and testing of chemical instruments and equipments
	CO3	Acquire ability to apply knowledge of chemistry.
	CO4	Exposed to the real time working environment.
	CO5	Demonstrate the ability to learn Principles, design and conduct experiments.
	CO6	Ability to work on laboratory and multidisciplinary tasks.
ENGLISH COMMUNICATION SKILLS LAB-II B17 BS 120	CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
	CO2	Students enhance their presentation skills.
	CO3	Students participate in group discussions and improve their team skills.
	CO4	Students confidently face the interviews.
OBJECT ORIENTED PROGRAMMING LAB B17 CS 1205	CO1	Explain what constitutes an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.
	CO 2	Apply an object-oriented approach to developing applications of varying complexities.
Course Outcomes for Second Year First Semester Course		
DATA STRUCTURES B17IT2101	CO1	Apply advanced data structure strategies for exploring complex data structures and implement data structures like stacks, queues
	CO2	Implement data structures on single, circular and double linked lists..
	CO3	Implement different operations on trees
	CO4	Co Apply graphs to real time applications.
	CO5	Perform sorting and searching using different algorithms.
JAVA	CO1	Able to solve real world problems using OOP techniques.

PROGRAMMING B17 IT 2102	CO2	Able to understand the use of abstract classes.
	CO3	Able to solve problems using java I/o classes.
	CO4	Able to develop multithreaded applications.
	CO5	Able to develop multithreaded applications.
	CO6	Able to design GUI based applications.
DATACOMMUNICATIONS B17 IT 2104	CO1	Understand basic concepts related communication systems.
	CO2	Understand different transmission Media.
	CO3	Understand concepts related to data communication hardware.
	CO4	Understand basic functionality of modems.
	CO3	Solve different counting problems
	CO4	Solve the recurrence relations which occur in many fields
	CO5	Utilize the concepts in graphs and Number theory in their fields.
COMPUTER GRAPHICS B17 IT 2103	CO1	The students will understand graphics principles and graphics hardware.
	CO2	The students can demonstrate geometrical transformations
	CO3	The students can create interactive graphics applications and demonstrate computer graphics animation.
DIGITAL LOGIC DESIGN B17 IT 2105	CO1	An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation. The different Boolean algebra theorems and apply them for logic functions.
	CO2	An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions
	CO3	An ability to define the following combinational circuits: multiplexer, demultiplexers encoders/decoders, comparators, arithmetic-logic units and to be able to a build simple circuits
	CO4	An ability to understand asynchronous and synchronous sequential circuits, like counters and shift registers.
	CO5	An ability to understand memories like RAM and ROM, Programmable

		Logic Array and Programmable Array Logic.
DATA STRUCTUR ES LAB B17 IT 2106	CO1	Apply advanced data structure strategies for exploring complex data structures.
	CO2	Implement data structures like stacks, queues
	CO3	Implement data structures on single, circular and double linked lists
	CO4	Implement different operations on trees.
	CO5	Apply graphs to real time applications.
	CO6	Perform sorting and searching using different algorithms.
JAVA PROGRAM MING LAB B17IT2107	CO1	Students will be able to understand compiling and interpreting programs
	CO2	Students will be able to Explore features of Object Oriented Programming.
	CO3	Students will be able to implement various java concepts
	CO4	Students will be able to Develop java Programs to implement applets
	CO5	Students will be able to Develop java Programs to generate and handle events.
BASIC CODING B17 IT 2108	CO1	Know about Control Structures, Loop Structures and branching in programming
	CO2	Know about various searching and sorting methods.
	CO3	Know about Functions, Recursions and Storage Classes.
	CO4	Know about Structures and Unions.
	CO5	Know different Operating System concepts.
	CO6	Differentiate OSI Model Vs. TCP/IP suite.
ENGLISHPR OFICIENCY -I B17BS2106	CO1	Improve speaking skills
	CO2	Enhance their listening capabilities.
	CO3	Learn and practice the skills of composition writing.
	CO4	Enhance their reading and understanding of different texts
	CO5	Improve their inter-personal communication skills
	CO6	Be confident in presentation skills.
Course Outcomes for Second Year Second Semester Course		
COMPUTER ORGANIZA	CO1	Knowledge about major components of a computer such as processor, memory and I/O modules along with their interconnections internally

TI ON B17IT2201		with outside world.
	CO2	Detailed idea about architecture of central processing unit, functions of control unit, memory, I/O devices and their issues
	CO3	Simple and multiple processor organization and their issues.
PROBABILI TY,STATIS TICS ANDQUEUI G THEORY B17BS2202	CO1	Identify the random variable as discrete/continuous and analyse it.
	CO2	Predict the distribution suitable for the given data from its moments.
	CO3	Measure the intensity of association between the variables.
	CO4	Fit a best suitable Curve for the given data.
	CO5	Decide the test applicable for giving inference about Population Parameter based on Sample statistic.
	CO6	Make business decisions about the resources needed to provide a service in day-to-day life applications including telecommunication, traffic engineering, computing and the design of factories, shops, offices and hospitals.
MICROPRO CESSOR I B17 IT 2202	CO1	Student will able to identify microprocessor and microcomputers and will be able to describe 8085 MP architecture and classify instructions .
	CO2	Student will able to state and illustrate 8085 programming techniques and solve code conversions, ISR, subroutines, operations to examine results.
	CO3	Student will able to describe 8086 MP architecture and classify instruction set of 8086
	CO4	Student will able to state and illustrate 8086 programming techniques and solve code conversions, ISR, subroutines, operations to examine results.
FILE STRUCTUR ES B17 IT 2203	CO1	Student will able to identify the basic operations on a file.
	CO2	Student will able to state and illustrate various storage & retrieval mechanisms
	CO3	Student will able to describe various compression methods & advantages of them
	CO4	student will be able to describe various index structures.
	CO5	Student will able to state and illustrate hashing methods for direct access of data from files
UNIX AND SHELLPRO	CO1	Able to working on the basic commands of UNIX operating system.

GRAMMING B17IT2204	CO2	File processing projects will require data organization, problem solving and research
	CO3	Scripts and programs will demonstrate effective use of structured programming.
	CO4	Scripts and programs will be accompanied by printed output demonstrating completion of a test plan
	CO5	Able to understand and handle the process management using system calls
FORMAL LANGUAGE AND AUTOMATA THEORY B17IT2205	CO1	Students will be able to design Finite Automata for languages with concepts of Regular Sets and Regular Grammars
	CO2	Students will be able to Apply concepts of context free Grammars and able to design Push Down Automata from the given CFG.
	CO3	Students will be able to design a Turing Machine from the given language .
	CO4	Students will be able to identify different types of languages using Chomsky Hierarchy and apply concepts of Un-decidability on problems
PYTHON PROGRAMMING LAB B17IT2206	CO1	Making Software easily right out of the box
	CO2	Experience with an interpreted Language.
	CO3	To build software for real needs
	CO4	Prior Introduction to testing software
DIGITAL ELECTRONICS AND MICROPROCESSORS LAB B17IT2207	CO1	Student can examine Digital trainer kit and microprocessor kit
	CO2	Student can calculate logical functions for coders, decoders, multiplexers and counters using digital trainer kits
	CO3	Student can experiment various Arithmetic and logical operations using 8085 instructions
	CO4	Student can experiment various Arithmetic and logical operations using 8086 instructions in MASM assembler.
ADVANCED CODING B17IT2208	CO1	Acquire coding knowledge on essential of modular programming
	CO2	Acquire Programming knowledge on linked lists
	CO3	Acquire coding knowledge on ADT
	CO4	Acquire knowledge on time complexities of different methods
	CO5	Acquire Programming skill on Java libraries and Collections
PROFESSIONAL	CO1	By the end of the course student should be able to understand the importance of ethics and values in life and society .

ETHICS & HUMAN VALUES B17BS2204		
ENGLISH PROFICIENCY-II B17BS2206	CO1	Develop the skills of taking and making notes
	CO2	Interpret the pictures appropriately and effectively.
	CO3	Read, comprehend and infer a given piece of writing effectively
	CO4	Learn and practice the skills of Research writing.
	CO5	Communicate well through various forms of writing.
Course Outcomes for Third Year First Semester Course		
COMPUTER NETWORKS B17IT3101	CO1	Explain the functions of the different layer of the OSI Protocol.
	CO2	Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
	CO3	For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available component
	CO4	For a given problem related TCP/IP protocol developed the network programming.
	CO5	Configure DNS, EMAIL, File Transfer Protocol (FTP), HTTP, Bluetooth, using open source available software and tools
E-COMMERCE B17IT3102	CO1	Ability to discuss the e-Commerce process. Describe an example of system architecture for an e-Business. List the seven major elements of web design.
	CO2	Ability to Identify and explain fundamental web site tools including design tools, programming tools, and data processing tools. Identify the major electronic payment issues and options.
	CO3	Ability to discuss security issues and explain procedures used to protect against security threats.
	CO4	Ability to Identify and discuss management issues underlying e-Commerce issues including organizational structure, strategic planning, goal setting, corporate social responsibility, changing market intermediaries, resource allocation and customer service.

<p>COMPILER DESIGN B17IT3103</p>	CO1	Ability to design, develop, and implement a compiler for any language.
	CO2	Able to use lex and yacc tools for developing a scanner and a parser.
	CO3	Able to design and implement LL and LR parsers.
	CO4	Able to design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity.
	CO5	Ability to design algorithms to generate machine code
<p>OPERATING SYSTEMS B17IT3104</p>	CO1	Evaluate and discriminate various Operating systems and Structures.
	CO2	Explore Design issues of various Process Scheduling algorithms.
	CO3	Apply the principles of concurrency.
	CO4	Select suitable Deadlock handling algorithm
	CO5	Compare and contrast various memory management schemes.
	CO6	Design and Implement a prototype file systems
	CO7	Explore Basic features of Linux and Windows Operating systems.
<p>DATA BASE MANAGEMENT SYSTEMS B17 IT3105</p>	CO1	Describe a relational database and object-oriented database.
	CO2	Create, maintain and manipulate a relational database using SQL
	CO3	Describe ER model and normalization for database design.
	CO4	Examine issues in data storage and query processing and can formulate appropriate solutions.
	CO5	Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage .
	CO6	Design and build database system for a given real world problem.
<p>DESIGN AND ANALYSIS OF ALGORITHMS B17IT3106</p>	CO1	Students will be able to understand, apply and Analyze the algorithms using asymptotic notations and Divide-and-Conquer technique on computer science problems.
	CO2	Student will be able to understand, apply and analyze Greedy technique on computer science problems.
	CO3	Student will be able to understand, apply and analyze Dynamic Programming on computer science problems
	CO4	Student will be able to understand, apply and analyze Basic Traversal and Search techniques and Backtracking on computer science problems.

	CO5	Student will be able to understand, apply and analyze Branch-and-Bound and algebraic problems on computer science problems
DATA BASE MANAGEM ENT SYSTEMS LAB B17IT3107	CO1	Understand, appreciate and effectively explain the underlying concepts of database technologies.
	CO2	Design and implement a database schema for a given problem-domain normalize a database.
	CO3	Populate and query a database using SQL DML/DDL commands.
	CO4	Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
	CO5	Programming PL/SQL including stored procedures, stored functions, cursors, packages.
	CO6	Design and build a GUI application using a 4GL
UNIX AND OPERATIN G SYSTEMS LAB B17IT3108	CO1	To use Unix utilities and perform basic shell control of the utilities
	CO2	To use the Unix file system and file access control.
	CO3	To use of an operating system to develop software
	CO4	Work confidently in Unix/Linux environment
	CO5	Write shell scripts to automate various tasks
	CO6	Master the basics of Linux administration
COMPETITI VE CODING-I B17 BS3104	CO1	Able to solve problems using java collection framework and I/o classes.
	CO2	Able to develop multithreaded applications with synchronization.
	CO3	Able to develop applets for web applications.
	CO4	Able to design GUI based applications
Course Outcomes for Third Year Second Semester Course		
WEBTECHN OLOGIES B17IT3201	CO1	Analyze a web page and identify its elements and attributes.
	CO2	L Create web pages using XHTML and Cascading Styles sheets..
	CO3	int Build dynamic web pages.
	CO4	Build web applications using PHP. Programming through PERL and Ruby .
OBJECT ORIENTED SOFTWARE	CO1	Ability to define a problem and perform Requirements Engineering
	CO2	Ability to draw UML diagrams for the requirements gathered.

ENGINEERING	CO3	Ability to implement the designed problem in Object Oriented Programming Language.
B17IT3202	CO4	Test whether all the requirements specified have been achieved or not
CRYPTOGRAPHY & NETWORK SECURITY B17IT3203	CO1	Students will be able to understand, apply and analyze the algorithms on security problems.
	CO2	Student will be able to understand, apply and analyze symmetric and asymmetric approaches.
	CO3	Student will be able to understand, apply and analyze security measurements.
	CO4	Student will be able to understand, apply and analyze various smalicious software.
STATISTICS WITH R – PROGRAMMING B17IT3204	CO1	Use R for statistical programming, computation, graphics, and modelling .
	CO2	Write functions and use R in an efficient way.
	CO3	Fit some basic types of statistical models.
	CO4	Use R in their own research.
	CO5	Be able to expand their knowledge of R on their own.
DATA WAREHOUSING AND BUSINESS INTELLIGENCE B17IT3205	CO1	Describe the scope and application of business intelligence and decision support.
	CO2	Design systems for sourcing and structuring data to provide an integrated, non-volatile collection of data for decision support using data warehouses.
	CO3	Design multidimensional data models and implement those using star schemas and Relational databases.
	CO4	Communicate and foster realistic expectations of the role of OLAP technology.
ARTIFICIAL INTELLIGENCE B17IT3206	CO1	Possess the ability to formulate an efficient problem space for a problem expressed in English.
	CO2	Possess the ability to select a search algorithm for a problem and characterize its time and space complexities.
	CO3	Possess the skill for representing knowledge using the appropriate technique

	CO4	Possess the ability to apply AI techniques to solve problems of Game Playing, Expert Systems, Machine Learning and Natural Language Processing
SEMANTIC WEB AND SOCIAL NETWORKS B17IT3207	CO1	Ability to understand and knowledge representation for the semantic web.
	CO2	Ability to create ontology.
	CO3	Ability to build a blogs and social networks
DIGITAL SIGNAL PROCESSIN G B17EC3210	CO1	Perform frequency transforms for the signals.
	CO2	Design IIR and FIR filters.
	CO3	Finite word length effects in digital filters.
ROBOTICS B17ME3211	CO1	Be able to use matrix algebra and Lie algebra for computing the kinematics of robots
	CO2	Be able to calculate the forward kinematics and inverse kinematics of serial and parallel robots.
	CO3	Be able to calculate the Jacobian for serial and parallel robot
	CO4	Be able to do the path planning for a robotic system
	CO5	Be proficient in the use of Maple or Matlab for the simulation of robots
IMAGE PROCESSIN G B17IT3208	CO1	Ability to develop algorithms for fundamental concepts in Image processing.
	CO2	Ability to perform image enhancement , image compression and image segmentation using various methods.
	CO3	Ability to implement Image transformation techniques
OPERATIO NS RESEAR CH B17IT3209	CO1	Understand the Methodology of Operations Research.
	CO2	Formulate and Model the Linear Programming Problems, Transportation and Assignment Problems
	CO3	solving methods for LPP, duality, and sensitivity analysis
	CO4	Check for degeneracy and other special cases in above models
	CO5	Construct Network flows and solve them under certainty/uncertainty.
	CO6	Model Inventory control for EOQ.
	CO7	Formulate Competitive models using Game theory and solve them for Optimal Decisions.

WEB TECHNOLOGIES LAB B17IT3210	CO1	To implement XML and XSLT for web applications
	CO2	Develop Dynamic web content using Java Servlets and JSP
	CO3	To develop JDBC connections and implement a complete Dynamic web Application
SOFTWARE ENGINEERING AND MINI PROJECT LAB B17IT3211	CO1	Students will be Construct, Design and implement complex software solutions.
	CO2	Students will be able to test and document the software.
	CO3	Students will be capable of working as part of a software team and develop significant projects under a tight deadline.
	CO4	Students will be able apply the deep knowledge of the technologies they used for implementing their project.
	CO5	Students will be able to assess the changes required for customization in project management.
Course Outcomes for Fourth Year First Semester Course		
MOBILE COMPUTING B17 IT 4102	CO1	Understand the principles and paradigms of mobile computing technologies
	CO2	Analyze technical issues related to new paradigm and come up with a solution(s).
	CO3	Analyze MAC protocols and mobile network layer protocols
	CO4	Illustrate data base issues and dissemination in mobile computation.
MANAGERIAL ECONOMIC S AND FINANCIAL ACCOUNTANCY B17BS4101	CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product.
	CO2	The knowledge of understanding Cost and its types and ability to calculate BEP
	CO3	The pupil is also ready to understand the nature of different markets.
	CO4	The Learner is able to understand Pricing Practices prevailing in today's business world
	CO5	The Learner is able to prepare Financial Statements and know how to calculate Profit & Loss for a firm
	CO6	The Learner can able to know Types of capital and their sources and know how to calculate Depreciation
BIG DATA	CO1	To Understand the existing technologies and the need of distributed

ANALYTICS B17 IT 4103		files systems to analyze the Big Data
	CO2	To Implement and analyze Map-Reduce programming model for better optimization on Big Data.
	CO3	To Collect, manage, store, query, and analyze Big Data; and identify the need of interfaces to perform I/O operations in Hadoop .
	CO4	To Identify the need of Modern tools, viz., Pig and Hive and its applications on Big Data Analytics
INFORMATION RETRIEVAL SYSTEM B17 IT 4104	CO1	Students will use Basic Data Structures and Algorithms to retrieve for information
	CO2	Students ability to analyze a sorted array and build an Inverted file
	CO3	Students ability to apply PAT trees for indexing Text documents
	CO4	Students ability to evaluate stemming process for inverted files
	CO5	Student will construct Thesaurus
	CO6	Students will apply latest technologies and Tools for linking, describing and searching the web for information retrieval
INTERNET OF THINGS B17 IT 4105	CO1	Understand and acquire knowledge of the security and ethical issues of the Internet of Things
	CO2	Develop critical thinking and programming skills with Python related to IoT
	CO3	Demonstrate hardware usage and cloud services for IoT application
	CO4	Develop designing knowledge and understand designing case studies for IoT
MULTIMEDIA PROGRAMMING B17 IT 4106	CO1	Students are able to understand various formats of data representation for text, audio, video.
	CO2	Student is able to understand & analyze various compression mechanisms for image, audio, video.
EMBEDDED SYSTEMS B17 IT 4107	CO1	Analyzing Embedded Systems, Interrupts and Software Architectures.
	CO2	Applying RTOS and Inter Task Communication services.
	CO3	Design RTOS, Embedded Software development Tools
	CO4	Analyzing Embedded Software Debugging Techniques and IoT.
SOFTWARE PROJECT MANAGEMENT	CO1	To understand the basic concepts and issues of software project management
	CO2	To gain knowledge on the principles and techniques of software project

ENT		management to effectively Planning the software projects
B17 IT 4108	CO3	To implement the effort estimation & activity Planning Estimation techniques for software projects management
	CO4	To develop the skills for tracking, controlling and creating software deliverables that address real-world management challenges and risks
MACHINE LEARNING B17 IT 4109	CO1	Recognize the characteristics of machine learning that make it useful to real world Problems
	CO2	Able to implement various machine learning algorithms as supervised, semi supervised and Unsupervised.
	CO3	Have heard of a few machine learning toolboxes, Be able to use support vector machines, regularized regression algorithms.
	CO4	Understand the concept behind neural networks for implementing non-linear functions
MOBILE COMPUTING LAB B17 IT 4111	CO1	To analyze the strengths and limitations of the tools and devices for development of pervasive computing systems
	CO2	To explore the characteristics of different types of mobile networks on the performance of a pervasive computing system
	CO3	To analyze and compare the performance of different data dissemination techniques and algorithms for mobile real-time applications
	CO4	To develop an attitude to propose solutions with comparisons for problems related to pervasive computing system through investigation
CRYPTOGRAPHY AND NETWORKING SECURITY LAB : B17 IT 4112	CO1	Identify basic security attacks and services
	CO2	To use symmetric and asymmetric key algorithms for cryptography
	CO3	To master symmetric and asymmetric cryptography. Applications
Course Outcomes for Fourth Year Second Semester Course		
MANAGEMENT AND ORGANISATIONAL	CO1	I Explain management functions and principles
	CO2	Will be able to describe the concepts of functional management that is HRM and Marketing functions

BEHAVIOUR B17 BS 4201	CO3	The learner is able to recognise strategically contemporary management practices and describe corporate planning process
	CO4	Will be able to get discuss about vision, mission, goal, objective and a strategy based on which the corporate planning depends
	CO5	The learner can discuss about individual behaviour and motivational theories
CLOUD COMPUTING B17 IT 4201	CO1	Understanding the key dimensions of the challenge of Cloud Computing
	CO2	Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization
	CO3	Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
	CO4	Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas.
CYBER SECURITY B17 IT 4202	CO1	I Student remember Cyber Security architecture principles and Identify System and application security threats and vulnerabilities
	CO2	Understand different classes of attacks and Cyber Security incidents to apply appropriate response
	CO3	Apply risk management processes, practices and of decision making outcomes of Cyber Security scenarios..
CLOUD COMPUTING B17 IT 4201	CO1	Understanding the key dimensions of the challenge of Cloud Computing
	CO2	Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization
	CO3	Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
	CO4	Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas.
DATA MINING LAB : B17 IT 4205	CO1	I Ability to preprocess any data set by applying different pre processing techniques
	CO2	Understand different classes of attacks and Cyber Security incidents to apply appropriate response
	CO3	Apply risk management processes, practices and of decision making outcomes of Cyber Security scenarios..

PROJECT WORK B17 IT 4207	CO1	Id Identify a current problem through literature/field/case studies
	CO2	Identify the background objectives and methodology for solving the same.
	CO3	Design a technology/ process for solving the problem.
	CO4	Develop a technology/ process for solving the problem.
	CO5	Evaluate that technology/ process at the laboratory level.
	CO4	To explain and exemplify current QoS architectures and mechanisms, and the QoS support challenges in future networks.
	CO2	Assessment of the economics , financial, and technological implications for selecting cloud computing for own organization.
	CO3	Assessing the financial, technological, and organizational capacity of employer’s for actively initiating and installing cloud-based applications.
CO4	Assessment of own organizations’ needs for capacity building and training in cloud computing-related IT areas.	

B.TECH: MECHANICAL ENGINEERING

Program Outcomes (PO):

A graduate of the Mechanical Engineering Program will demonstrate:

PO1	Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
PO2	Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
P10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
P11	Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
P12	Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Program Specific Outcomes (PSO):

A graduate of the Mechanical Engineering Program will demonstrate:

PSO1	Apply mechanical engineering fundamentals to design mechanical engineering systems and thermal systems.
PSO2	Identify and select appropriate manufacturing processes and apply quality control methods for production of various components.

1ST YEAR 1ST SEMESTER: COURSES

Course:	ENGLISH – I
Course Code:	B17 BS 1101
Theory/lab :	Theory
Course Outcomes:	
CO1	Understand the rudiments of LSRW Skills, comprehension and fluency of speech.
CO2	Gain confidence and competency in vocabulary and grammar.
CO3	Listen, speak, read and write effectively in both the academic and non-academic environment.
CO4	Extend his/her reading skills towards literature.
CO5	Strengthen his/her analytical and compositional skills.

Course:	MATHEMATICS - I
Course Code:	B17 BS 1102
Theory/lab :	Theory
Course Outcomes:	
CO1	Solve linear ordinary differential equations of first order and first degree. Also will be able to apply the knowledge in simple applications such as Newton's law of cooling, orthogonal trajectories and simple electrical circuits.
CO2	Solve linear ordinary differential equations of second order and higher order. Also will be able to apply the knowledge in simple applications such as LCR circuits and Simple harmonic motion.
CO3	Determine Laplace transform and inverse Laplace transform of various functions.
CO4	Use Laplace transforms to solve a linear ODE.
CO5	Calculate total derivative, Jacobian and maxima/minima of functions of two variables.
CO6	Form partial differential equations and solve some standard types of first order PDEs. Find complimentary function and particular integral of linear higher order homogeneous and nonhomogeneous PDEs

Course:	ENGINEERING CHEMISTRY
Course Code:	B17 BS 1105
Theory/lab :	Theory
Course Outcomes:	
CO1	At the end of the course the students learn the advantages and limitations of plastic materials and their use in design.
CO2	Fuels which are used commonly and their economics, advantages and limitations are discussed.

CO3	Students gained Knowledge reasons for corrosion and some methods of corrosion control.
CO4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.
CO5	Similarly students understand liquid crystals and semiconductors. Students can gain the building materials, solar materials, lubricants and energy storage devices.

Course:	ENGINEERING MECHANICS
Course Code:	B17 ME 1101
Theory/lab :	Theory
Course Outcomes:	
CO1	Determine the resultant of the given force systems.
CO2	Analyze force systems using equations of equilibrium.
CO3	Determine centroid, center of gravity and moment of inertia of areas and bodies.
CO4	Analyze trusses and simple beams.
CO5	Distinguish between kinematics and kinetics.
CO6	Apply the work energy and impulse momentum methods of various engineering problems.

Course:	ENGINEERING DRAWING
Course Code:	B17 ME 1102
Theory/lab :	Theory
Course Outcomes:	
CO1	Apply principles of drawing to represent dimensions of an object.
CO2	Construct polygons and engineering curves.
CO3	Draw projections of points, lines, planes and solids.
CO4	Represent the object in 3D view through isometric views.
CO5	Convert the isometric view to orthographic view and vice versa.

Course:	ENVIRONMENTAL STUDIES
Course Code:	B17 CE 1101
Theory/lab :	Theory
Course Outcomes:	
CO1	To bring awareness among the students about the nature and natural ecosystems
CO2	Sustainable utilization of natural resources like water, land, energy and air
CO3	Resource pollution and over exploitation of land, water, air and catastrophic (events) impacts of climate change, global warming, ozone layer depletion, marine, radioactive pollution etc to inculcate the students about environmental awareness and safe transfer of our mother earth and its natural resources to the next generation
CO4	Safe guard against industrial accidents particularly nuclear accidents
CO5	Constitutional provisions for the protection of natural resources

Course:	ENGINEERING CHEMISTRY LAB
Course Code:	B17 BS 1107

Theory/lab :	Lab
Course Outcomes:	
CO1	An understanding of Professional and develop confidence on recent trends.
CO2	Able to gain technical knowledge of measuring, operating and testing of chemical instruments and equipments.
CO3	Acquire ability to apply knowledge of chemistry.
CO4	Exposed to the real time working environment.
CO5	Demonstrate the ability to learn Principles, design and conduct experiments.
CO6	Ability to work on laboratory and multidisciplinary tasks.

Course:	ENGLISH COMMUNICATION SKILLS LAB- I
Course Code:	B17 BS 1108
Theory/lab :	Lab
Course Outcomes:	
CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
CO2	Students improve their speaking skills in real contexts.
CO3	Students learn standard pronunciation and practice it daily discourse.
CO4	Students give up their communicative barriers.

Course:	ENGINEERING WORKSHOP & IT WORKSHOP
Course Code:	B17 BS 1109
Theory/lab :	Lab
Course Outcomes:	
CO1	Use various tools to prepare basic carpentry and fitting joints.
CO2	Prepare jobs of various shapes using black smithy.
CO3	Make basic house wire connections.
CO4	Fabricate simple components using tin smithy.

Course:	INNER ENGINEERING
Course Code:	B17 BS 1111
Theory/lab :	--
Course Outcomes:	
CO1	To improve his concentration levels and improve his public speaking abilities.
CO2	To balance his academic and non-academic activities (Work Life Balance).
CO3	To widen his vision and increase his breadth of perspective in his journey of 4 years.
CO4	To improve his communications skills, leadership, teamwork and decision-making abilities.
CO5	To inculcate creativity & innovation, planning & organizing as part of their life.
CO6	Taking responsibility for themselves and people around them.
CO7	To make their journey more fun and enjoyable.

1ST YEAR 2ND SEMESTER: COURSES

Course:	ENGLISH - II
Course Code:	B17 BS 1201
Theory/lab :	Theory
Course Outcomes:	
CO1	To comprehend the speech of people belonging to different backgrounds and regions.
CO2	Understand the importance of speaking and writing for personal and professional communication and practice it in real contexts.
CO3	To express fluently and accurately in social discourse.
CO4	Participate in group activities like role-plays, discussions and debates
CO5	Identify the discourse features, and improve intensive and extensive reading skills.

Course:	MATHEMATICS – II
Course Code:	B17 BS 1202
Theory/lab :	Theory
Course Outcomes:	
CO1	Find a real root of algebraic and transcendental equations using different methods.
CO2	Know the relation between the finite difference operators. Determine interpolation polynomial for a given data.
CO3	Evaluate numerically certain definite integrals applying Trapezoidal and Simpson's rules
CO4	Solve a first order ordinary differential equation by Euler and RK methods.
CO5	Find Fourier series of a given function satisfying Dirichlet conditions. Find half range cosine and sine series for appropriate functions.
CO6	Find Fourier transforms Fourier cosine and sine transforms of appropriate functions and evaluate certain integrals using inverse transforms and Fourier integral.

Course:	MATHEMATICS - III
Course Code:	B17 BS 1203
Theory/lab :	Theory
Course Outcomes:	
CO1	Determine rank, and solve a system of linear simultaneous equations numerically using various matrix methods.
CO2	Determine Eigen values and Eigen vectors of a given matrix, Reduce a Quadratic form to its canonical form and classify.
CO3	Evaluate double integrals over a region and triple integral over a volume.
CO4	Use the knowledge of Beta and Gamma functions in evaluation of different integrals.
CO5	Find gradient of a scalar function, divergence and curl of a vector function. Use vector identities for solving problems.
CO6	Evaluate line, surface and volume integrals by the use of Green's, Stokes' and Gauss divergence theorems.

Course:	ENGINEERING PHYSICS
Course Code:	B17 BS 1204
Theory/lab :	Theory
Course Outcomes:	
CO1	Learn the basic concepts of interference and diffraction of light and its applications.
CO2	Understand the science of producing high intensity light beams for technological applications and also understand the propagation of light waves in optical fibers in various applications.
CO3	Understand the inter relationship of electric and magnetic fields and learn ultrasonic"s as a tool for technological applications
CO4	Learn the behavior of particles at the very microscopic level by using wave nature of particles and understand the behavior of materials and be able to classify them using the band theory of solids.
CO5	Learn the basics of structures of solid materials and nano material preparation Techniques/methods.

Course:	COMPUTER PROGRAMMING USING C
Course Code:	B17 CS 1201
Theory/lab :	Theory
Course Outcomes:	
CO1	Understand the basic terminology used in computer programming
CO2	Write, compile and debug programs in C language.
CO3	Use different data types in a computer program.
CO4	Design programs involving decision structures, loops and functions.
CO5	Explain the difference between call by value and call by reference
CO6	Understand the dynamics of memory by the use of pointers
CO7	Use different data structures and create/update basic data files.

Course:	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
Course Code:	B17 EE 1202
Theory/lab :	Theory
Course Outcomes:	
CO1	Able to analyze the various Electrical networks and understand the basics of Magnetic Circuits
CO2	Able to understand the operation of DC generators,3-Point starter and conduct the Swinburne"s test.
CO3	Able to analyze the Performance of Transformers.
CO4	Able to explain the operation of three phase induction motors and alternator.
CO5	Able to analyze the operation of Half-wave and Full-wave rectifiers and single stage CE amplifier.

Course:	ENGINEERING PHYSICS LAB
Course Code:	B17 BS 1206
Theory/lab :	Lab
Course Outcomes:	
CO1	Students get hands on experience in setting up experiments and using the

	instruments/equipment individually.
CO2	Get introduced to using new/ advanced technologies and understand their significance.

Course:	ENGLISH COMMUNICATION SKILLS LAB- II
Course Code:	B17 BS 1208
Theory/lab :	Lab
Course Outcomes:	
CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
CO2	Students enhance their presentation skills.
CO3	Students participate in group discussions and improve their team skills.
CO4	Students confidently face the interviews.

Course:	C PROGRAMMING LAB
Course Code:	B17 CS 1204
Theory/lab :	Lab
Course Outcomes:	
CO1	Apply and practice logical ability to solve the problems.
CO2	Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment.
CO3	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs.
CO4	Understand and apply the in-built functions and customized functions for solving the problems.
CO5	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
CO6	Document and present the algorithms, flowcharts and programs in form of user manuals.
CO7	Identification of various computer components, Installation of software

Course:	ENGINEERING PHYSICS - VIRTUAL LABS – ASSIGNMENTS
Course Code:	B17 BS 1210
Theory/lab :	Lab
Course Outcomes:	
CO1	Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper.

2ND YEAR 2ND SEMESTER: COURSES

Course:	MATHEMATICS IV
Course Code:	B17BS2101
Theory/lab :	Theory
Course Outcomes:	
CO1	Using the concept of Analytic function in applications including Electrostatics and Fluid dynamics.
CO2	Finding theoretical solution of certain Elliptic, Parabolic and Hyperbolic partial differential equations.

CO3	Using Z-transforms to solve linear difference equations with constant coefficients.
CO4	Fitting of probability frequency distribution to a given data.
CO5	Using the concepts of sampling theory to analyze data related to some large and small samples.

Course:	STRENGTH OF MATERIALS
Course Code:	B17 ME 2101
Theory/lab :	Theory
Course Outcomes:	
CO1	Understanding the concepts and determining the stress and strain of simple structures.
CO2	Locating the Principal Planes and determining the Principal Stresses.
CO3	Determining Shear Forces and Bending Moments of determinate beams.
CO4	Determining the distribution of Bending and Shear Stresses of beams.
CO5	Finding relation between elastic constants. Determining shear stresses due to torsion.
CO6	Determining stresses in Thin Cylindrical and Spherical shells and Thick Cylinders

Course:	THERMODYNAMICS
Course Code:	B17 ME 2102
Theory/lab :	Theory
Course Outcomes:	
CO1	Students realize the practical importance of ideal gas theory and the use of real gases in combustion engines such as IC Engines and Gas turbines
CO2	Students are able to calculate the properties of the gases such as internal energy, enthalpy and entropy.
CO3	Students are able to estimate the losses which occur during operation of the heat engines, and their maximum possible operating efficiencies under STP conditions.
CO4	Students can estimate the maximum work-output delivered by the heat engines and maximum work consumed by the reversed heat engines

Course:	MANUFACTURING PROCESS
Course Code:	B17 ME 2103
Theory/lab :	Theory
Course Outcomes:	
CO1	Student will be able to recognize various manufacturing materials, manufacturing process and types of productions.
CO2	Student will be able to identify various casting processes, metal forming process and welding process.
CO3	Student will be able to design of gating system, patterns and cores for various casting processes.
CO4	Student will be able to apply knowledge of casting process for manufacturing of products.
CO5	Student will be able to apply knowledge of rolling, forging, extrusion for manufacturing of products.
CO6	Student will be able to apply knowledge of welding, brazing and

	soldering for joining of metals.
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Course:	METALLURGY & MATERIALS SCIENCE
Course Code:	B17 ME 2104
Theory/lab :	Theory
Course Outcomes:	
CO1	Understand crystalline solids and their atomic structures.
CO2	Suggest and recommend necessary engineering materials for specific applications keeping in view of the cost, design, reliability, life, working conditions and properties of the products.
CO3	Understand different phase transformations in Iron-Iron Carbide diagram and distinguish between steels and cast irons.
CO4	Select different materials for tools and components based on functional requirements.
CO5	Use composite materials for different engineering applications like aerospace, automobile, ship building industry, sports item etc.
CO6	Inclination towards self learning, higher education and research work in the field of engineering materials.

Course:	ADVANCED ENGINEERING DRAWING
Course Code:	B17 ME 2105
Theory/lab :	Theory
Course Outcomes:	
CO1	Apply principles of drawing to represent dimensions of an object.
CO2	Draw projections solids with axis inclined to both planes.
CO3	Represent sectional views of solids.
CO4	Develop the surfaces of regular solids and draw the projections of intersection of solids.
CO5	Gain knowledge on Computer Aided Drafting.

Course:	MECHANICAL ENGINEERING LAB
Course Code:	B17 ME 2106
Theory/lab :	Lab
Course Outcomes:	
CO1	Students are now aware of the use of drawing valve timing diagrams of an engine and method to evaluate the volumetric efficiency of air compressor.
CO2	They are also aware of method of calibrating pressure gauge, the importance of flash and fire points and calorific values of fuels.
CO3	The importance and application by calculating viscosities of oil samples are understood.
CO4	The use of moment of inertia and modulus of rigidity is understood.
CO5	They are also now able to identify the parts of boiler and engines etc.

Course:	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB
Course Code:	B17 EE 2107
Theory/lab :	Lab
Course Outcomes:	

CO1	Apply the concepts of Theorems for a given electrical circuit.
CO2	Evaluate the efficiency and regulation of a single phase transformer.
CO3	Relate physical observations and measurements involving electrical circuits" theoretical principles.
CO4	Design amplifier circuit using NPN transistor

Course:	AUTOCAD
Course Code:	B17 ME 2107
Theory/lab :	Lab
Course Outcomes:	
CO1	Auto CAD screen and various Tool bars and menus and Explain about Dimensioning and Hatching
CO2	Draw the 2D – drawings like knuckle joint, screw jack, flange coupling, lathe tool post, eccentric etc.,
CO3	Explain about 3D solids and solids tool bar options and Drawing of 3D – components like bolt & nut, screw jack
CO4	Rendering of 3D images

Course:	ENGLISH PROFICIENCY-I
Course Code:	B17 BS 2107
Theory/lab :	--
Course Outcomes:	
CO1	Improve speaking skills.
CO2	Enhance their listening capabilities.
CO3	Learn and practice the skills of composition writing.
CO4	Enhance their reading and understanding of different texts.
CO5	Improve their inter-personal communication skills.
CO6	Be confident in presentation skills

Course:	PROFESSIONAL ETHICS & HUMAN VALUES
Course Code:	B17 BS 2108
Theory/lab :	--
Course Outcomes:	
CO1	To understand the importance of ethics and values in life and society.

2ND YEAR 2ND SEMESTER: COURSES

Course:	ADVANCED STRENGTH OF MATERIALS
Course Code:	B17 ME 2201
Theory/lab :	Theory
Course Outcomes:	
CO1	Find the slope deflection produced in cantilever, simply supported and overhanging beams subjected to different kinds of lateral loads.
CO2	Draw the bending moment and shear force diagrams of fixed beams of uniform and non uniform cross sections subjected to different load conditions, and having sinking of support.
CO3	Draw the bending moment and shear force diagrams of continuous beams subjected to different load conditions, and having sinking of support.
CO4	Evaluate the stresses across the cross-sections of the curved beam and crane hook subjected to external loads.
CO5	Apply different theories to analyze the crippling stresses induced in columns

	and struts subjected to different load conditions.
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Course:	THERMAL ENGINEERING
Course Code:	B17 ME 2202
Theory/lab :	Theory
Course Outcomes:	
CO1	The student gets complete knowledge of steam and its properties.
CO2	The student learns the complete calculation procedures for designing steam turbines, steam condensers, nozzles etc. used in thermal power plants, steam engines, water turbines and many other industrial applications.
CO3	The student is prepared to work in industry immediately after his course

Course:	METAL CUTTING & MACHINE TOOLS
Course Code:	B17 ME 2203
Theory/lab :	Theory
Course Outcomes:	
CO1	Students will be able to describe the mechanisms of metal cutting.
CO2	Students will be able to calculate cutting forces, tool life and machining parameters.
CO3	Students will be able to design the single point and multi point cutting tools.
CO4	Students will be able to demonstrate the working of various machine tools like lathe, milling machine and grinding machine etc.
CO5	Students will be able to identify different micro finishing operations.
CO6	Students will be able to assess the advantages, limitations and applications of unconventional methods of machining.

Course:	FLUID MECHANICS
Course Code:	B17 ME 2204
Theory/lab :	Theory
Course Outcomes:	
CO1	Apply the Bernoulli equation to solve problems in fluid mechanics.
CO2	Apply the concepts of momentum equation for finding the forces acting on the vanes of the turbines.
CO3	Apply control volume analysis to problems in fluid mechanics.
CO4	Apply potential flow theory to solve problems in fluid mechanics.
CO5	Identify the recent developments in fluid mechanics, with application to aerospace systems.

Course:	MECHANICAL ENGINEERING DRAWING
Course Code:	B17 ME 2205
Theory/lab :	Theory
Course Outcomes:	
CO1	Know drawing of Screw threads and Screw Fastenings using standard Empirical formulae.
CO2	Draw Riveted joints, Keys, Cotter-joint, Draw Couplings (Shaft couplings: Box and split muff couplings, Flanged, Flexible, Universal and Oldham couplings).
CO3	Draw the dimensional and geometrical tolerances and surface roughness

	symbols.
CO4	Draw Assembly and production drawings of various engine components and machine tool components.

Course:	ENGINEERING ECONOMICS
Course Code:	B17 BS 2203
Theory/lab :	Theory
Course Outcomes:	
CO1	Provide detailed insight about origin & definitions of economics & enlighten the students about demand analysis.
CO2	Illustration about applications of cost Concepts & analysis of breakeven point.
CO3	Understand about various types of Market Structure and Pricing practices implemented by the organization.
CO4	Infuse knowledge about different Economic systems & Business cycles.
CO5	Enlighten the students regarding the aspects of Depreciation & Financial Accounting.

Course:	MANUFACTURING PROCESS LAB
Course Code:	B17 ME 2208
Theory/lab :	Lab
Course Outcomes:	
CO1	Student will be able to prepare moulds for a given component.
CO2	Student will be able to apply the knowledge of arc welding to join two metal pieces.
CO3	Student will be able to practice plain turning, facing, step turning, taper turning, and thread cutting operations on the lathe machine.
CO4	Student will be able to generate horizontal, vertical and angular surfaces on a given work piece using shaper.
CO5	Student will be able to generate spur gear on milling machine.
CO6	Student will be able to demonstrate Capstan and Turret lathe, cylindrical grinder and surface grinding machine.

Course:	STRENGTH OF MATERIALS LAB
Course Code:	B17 CE 2210
Theory/lab :	Lab
Course Outcomes:	
CO1	To understand the different types of loading and measure the loads.
CO2	To understand the material properties of different materials and the ways of finding them.
CO3	To understand the bulking property and fineness of sand grains and the methods of finding them.

Course:	INDUSTRY ORIENTED TECHNOLOGY LAB
Course Code:	B17 ME 2209
Theory/lab :	--
Course Outcomes:	
CO1	CATIA screen and various Tool bars and menus and Explain about Dimensioning and Hatching

CO2	Draw the 2D – drawings like knuckle joint, screw jack, flange coupling, lathe tool post, eccentric etc.,
CO3	Explain about 3D solids and solids tool bar options and Drawing of 3D – components like bolt & nut, screw jack.
CO4	Rendering of 3D images.

Course:	ENGLISH PROFICIENCY-II
Course Code:	B17 BS 2206
Theory/lab :	--
Course Outcomes:	
CO1	Develop the skills of taking and making notes
CO2	Interpret the pictures appropriately and effectively.
CO3	Read, comprehend and infer a given piece of writing effectively.
CO4	Learn and practice the skills of Research writing.
CO5	Communicate well through various forms of writing.
CO6	Be confident in giving presentations and dealing with people.

3RD YEAR 1ST SEMESTER: COURSES

Course:	OPERATIONS RESEARCH
Course Code:	B17ME3101
Theory/lab :	Theory
Course Outcomes:	
CO1	Formulate a real time situation into a mathematical model.
CO2	Identify and develop operational research models from verbal description of real system.
CO3	Formulate simple reasoning, learning and optimization problems, in terms of the representations and methods presented.
CO4	Demonstrate the hand execution of basic reasoning and optimization algorithms on simple problems.
CO5	Formulate more complex, but still relatively simple problems, and apply implementations of selected algorithms to solve these problems.
CO6	Apply and analyze mathematical optimization functions to various applications.

Course:	IC ENGINES & GAS TURBINES
Course Code:	B17ME3102
Theory/lab :	Theory
Course Outcomes:	
CO1	Apply the knowledge of gas power cycles adequately and can calculate their efficiencies.
CO2	Explain the processes involved in combustion in S.I Engines.
CO3	Explain the processes involved in combustion in C.I Engines.
CO4	Apply the knowledge of reciprocating and rotary compressors in engineering applications.
CO5	Compute and develop various methods to improve the efficiency of gas turbine power plants, and can explain jet propulsions.
Course:	KINEMATICS OF MACHINES
Course Code:	B17ME3103
Theory/lab :	Theory

Course Outcomes:	
CO1	Understand the basic principles of mechanisms in mechanical engineering applications.
CO2	Understand the mechanisms, their inversions straight line motion mechanisms steering mechanisms etc.
CO3	Understand the importance of toothed gears, gear trains.
CO4	Understand the cam their practice application.
CO5	Understand the importance of relative motion, velocity, and accelerations of the various elements in a mechanism

Course:	DESIGN OF MACHINE ELEMENTS
Course Code:	B17ME3104
Theory/lab :	Theory
Course Outcomes:	
CO1	Explain the design concepts of static strength of mechanical components
CO2	Explain the design concepts of fatigue strength of mechanical components
CO3	Determine the strength of the threaded and welded joints
CO4	Design the shafts, rigid and flexible couplings parametrically for different loading conditions.
CO5	Design the energy absorbing mechanical components such as springs for the specified loading conditions.

Course:	FLUID MACHINES & SYSTEMS
Course Code:	B17ME3105
Theory/lab :	Theory
Course Outcomes:	
CO1	Understand the concepts of jets and jet propulsion and its applications in fluid machinery.
CO2	Gain the knowledge such as workdone, specific speed, performance curves and governing of impulse and reaction turbines.
CO3	Understand the centrifugal pumps - Multi stage pumps, Minimum speed required to start the pump, Performance curves.
CO4	Understand the various aspects of Reciprocating pumps such as working, indicator diagram, air vessels.
CO5	Understand description and working of various types of hydraulic devices.

Course:	INDUSTRIAL MEASUREMENTS & METROLOGY
Course Code:	B17ME3106
Theory/lab :	Theory
Course Outcomes:	
CO1	Identify the uncertainties in dimensional metrology and the define the measurement standards;
CO2	Describe the fundamentals of dimensional and geometrical tolerances;
CO3	Measure length and angles using line-graduated instruments, i.e. Vernier calipers, micrometers, bevel protractor, sine bar and surface plates;
CO4	Use comparative length-measuring instruments, i.e. dial indicator, to measure variations in the distance between two or more surfaces;

CO5	Use effective methods of measuring straightness, flatness, roundness, profile, screw threads and gear teeth;
CO6	Measure dimensions of shafts, bearings and linear surfaces in metric and imperial units using calipers, micrometers, and scales;
CO7	Use contour projector and coordinate measuring machine to record measurements of complex profiles with high sensitivity;
CO8	Use gage blocks, fixed gages, pneumatic gages gage blocks to measure various work pieces.
CO9	Explain the effect of environmental conditions on the accuracy of measurements;
CO10	Demonstrate the correct methods for adjustment and calibration of various measuring instruments;
CO11	Use appropriate method for determination of accuracy based on product function and manufacturing capability.

Course:	IC ENGINES & KINEMATICS OF MACHINES LAB
Course Code:	B17ME3107
Theory/lab :	Lab
Course Outcomes:	
CO1	Deals with practical approach to I.C Engines and four bar chain mechanisms
CO2	To expose students to different methods of finding friction power in single and multi cylinder engines
CO3	Understand the working of Gyroscopes
CO4	Deal with basic trouble shooting aspects and specifications of Car model: Maruthi ZEN

Course:	METROLOGY LAB
Course Code:	B17ME3108
Theory/lab :	Lab
Course Outcomes:	
CO1	Students will understand construction and working of various measuring instruments and its calibration.
CO2	The student will be able to operate measurement instruments on their own and test different components for their dimensional accuracy.
CO3	Students will be able to understand application of gauges.
Course:	PROBLEM SOLVING & LINGUISTIC COMPETENCE
Course Code:	B17BS3101
Theory/lab :	Theory
Course Outcomes:	
CO1	Detect grammatical errors in the text/sentences and rectify them while answering their competitive/ company specific tests and frame grammatically correct sentences while writing.
CO2	Answer questions on synonyms, antonyms and other vocabulary based exercises while attempting CAT, GRE, GATE and other related tests.
CO3	Use their logical thinking ability and solve questions related to analogy, syllogisms and other reasoning based exercises.
CO4	Choose the appropriate word/s/phrases suitable to the given context in order to make the sentence/paragraph coherent.

CO5	Apply soft skills in the work place and build better personal and professional relationships making informed decisions.
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Course:	MODELLING LAB
Course Code:	B17ME3109
Theory/lab :	Lab
Course Outcomes:	
CO1	Modelling screen and various Tool bars and menus and Explain about Dimensioning and Hatching
CO2	Draw the 2D – drawings like knuckle joint, screw jack, flange coupling, lathe tool post, eccentric etc.
CO3	Explain about 3D solids and solids tool bar options and Drawing of 3D – components like bolt & nut, screw jack.
CO4	Rendering of 3D images.

Course:	IPR & PATENTS
Course Code:	B17BS3105
Theory/lab :	--
Course Outcomes:	
CO1	Identify various types of intangible property that an engineering professional could generate in the course of his career.
CO2	Distinguish between various types of protection granted to Intellectual Property such as Patents, Copy Rights, Trademarks etc.,
CO3	List the steps involved in getting protection over various types of intellectual property and maintaining them
CO4	Take precautions in writing scientific and technical reports without plagiarism.
CO5	Help micro, small and medium entrepreneurs in protecting their IP and respecting others IP as part of their business processes.

3RD YEAR 2ND SEMESTER: COURSES

Course:	INDUSTRIAL ENGINEERING & MANAGEMENT
Course Code:	B17ME3201
Theory/lab :	Theory
Course Outcomes:	
CO1	Apply management theories in industry
CO2	Know personnel management techniques to motivate the workers
CO3	Settle the industrial disputes in the organization
CO4	Acquire full knowledge on production planning and control procedures
CO5	Understand the economics of plant layout
CO6	Aware of material handling principles and equipment
CO7	Apply maintenance practices
CO8	Have knowledge on materials management
CO9	Improve the productivity by applying work study procedures and quality concepts

Course:	CONTROL SYSTEMS
Course Code:	B17ME3202

Theory/lab :	Theory
Course Outcomes:	
CO1	Classify control systems and explain the needs and effects of feedback in a control system and Compute transfer function of multiple subsystems modeled as block diagram/ signal flow graph.
CO2	Develop mathematical models for physical systems using the knowledge of fundamental principles of mathematics and control systems.
CO3	Compute transfer function of multiple subsystems modeled as state space representation.
CO4	Compute and describe the output response and steady state error of first, second and higher order control systems for standard input signals
CO5	Determine the stability of a system using Routh Hurwitz and Nyquist criterion.

Course:	DYNAMICS OF MACHINES
Course Code:	B17ME3203
Theory/lab :	Theory
Course Outcomes:	
CO1	Analyze stabilization of sea vehicles, aircrafts and automobile vehicles.
CO2	Compute frictional losses, torque transmission of mechanical systems.
CO3	Understand how to determine the natural frequencies of continuous systems starting from the general equation of displacement.
CO4	Understand the importance of governors , bearings, clutches and their applications
CO5	Understand balancing of reciprocating and rotary masses

Course:	MACHINE DESIGN
Course Code:	B17ME3204
Theory/lab :	Theory
Course Outcomes:	
CO1	Classify different types of gears and apply the design concepts to evaluate the strength of gears.
CO2	Design various parts of IC Engines such as cylinders, pistons and connecting rods
CO3	Apply the design concepts to determine the various parameters of clutches.
CO4	Apply the design concepts to determine the torque and dimensions related to brakes
CO5	Design the sliding and roller contact bearings under various environmental and service Conditions
CO6	Classify and Analyze different types of stresses induced in wire ropes and chain drives

Course:	ENTERPRENEURSHIP (Open Elective)
Course Code:	B17BS3207
Theory/lab :	Theory
Course Outcomes:	
CO1	Students will be able to understand the characteristics of entrepreneur and its role in economic development.
CO2	Student will be able to gain comprehensive knowledge on women entrepreneurship, rural entrepreneurship and their contribution towards

	economic development.
CO3	Students will be familiarizing with project formulation and design.
CO4	Students will be able to familiarize with the problems and prospectus of India.
CO5	Student will be able to include and implement Government of India initiatives in supporting skill development programmes.

Course:	DATABASE MANAGEMENT SYSTEM (Open Elective)
Course Code:	B17CS3213
Theory/lab :	Theory
Course Outcomes:	
CO1	Demonstrate the basic elements of a relational database management system.
CO2	Ability to identify the data models for relevant problems.
CO3	Ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data.
CO4	Apply normalization for the development of application software
Course:	WASTE WATER MANAGEMENT (Open Elective)
Course Code:	B17CE3207
Theory/lab :	Theory
Course Outcomes:	
CO1	Define the quality of industrial wastes
CO2	Explain various industrial waste treatment processes
CO3	Outline the advanced treatment techniques available for industrial wastes
CO4	Explain the sludge reduction and disposal methodologies
CO5	Analyze the waste effluent treatment from different case studies

Course:	COMPUTER GRAPHICS (Open Elective)
Course Code:	B17CS3210
Theory/lab :	Theory
Course Outcomes:	
CO1	The students will understand graphics principles and graphics hardware.
CO2	The students can demonstrate geometrical transformations.
CO3	The students can create interactive graphics applications and demonstrate computer graphics

Course:	INDUSTRIAL ROBOTICS (Open Elective)
Course Code:	B17ME3205
Theory/lab :	Theory
Course Outcomes:	
CO1	Distinguish between fixed automation and programmable automation.
CO2	Identify various components of robot.
CO3	Select appropriate type of actuator for a joint.
CO4	Illustrate robot applications in manufacturing.
CO5	Analyze kinematics of a robot.

Course:	GREEN ENGINEERING SYSTEMS (Open Elective)
Course Code:	B17ME3206

Theory/lab :	Theory
Course Outcomes:	
CO1	Understand the principles and working of solar energy and solar energy collection.
CO2	Understand the principles of solar energy storage and applications of solar energy and wind energy.
CO3	Understand the principles and working of biomass, geo thermal and ocean energies and appreciate their significance in view of their importance in the current scenario and their potential future applications.
CO4	Understand the principles and working of energy efficient systems like electrical and mechanical systems.
CO5	Understand the principles and working of energy efficient processes.

Course:	COMPUTER AIDED DESIGN
Course Code:	B17ME3207
Theory/lab :	Theory
Course Outcomes:	
CO1	Analyze and use engineering computer graphics and geometric modelling techniques for mechanical engineering applications.
CO2	Able to understand and apply theories, methods and procedures for complex-shapes part design
CO3	Apply advanced modelling and computational tools for complex part and shape design and analysis.
CO4	Select and use various engineering design procedures for mechanical design problems involving complex shapes.
CO5	Execute professional engineering CAD projects for mechanical engineering applications in the current industrial practice.

Course:	INDUSTRIAL ENGINEERING LAB
Course Code:	B17ME3208
Theory/lab :	Lab
Course Outcomes:	
CO1	Students will be able to find the quality of the product using different charts.
CO2	Can improve the method of doing work by applying principle of motion economy and method study charts.
CO3	Can find the standard time required for completing a job by different methods.
CO4	Understands the basic probability distributions.
CO5	Understands the impact of work on the human body and also the physiological constraints of the body

Course:	FLUID MECHANICS AND MACHINERY LAB
Course Code:	B17ME3209
Theory/lab :	Lab
Course Outcomes:	
CO1	The student gets complete knowledge on fluid mechanics, hydraulic turbines and pumps.

CO2	The student learns the complete calculation procedures for designing hydraulic turbines, and pumps.
CO3	The student is prepared to work in industry immediately after this course.

Course:	EMPLOYABILITY SKILLS
Course Code:	B17BS3201
Theory/lab :	Theory
Course Outcomes:	
CO1	Construct coherent, cohesive and unambiguous verbal expressions in both oral and written discourses.
CO2	Analyze the given data/text and find out the correct responses to the questions asked based on the reading exercises; identify relationships or patterns within groups of words or sentences
CO3	Write paragraphs on a particular topic, essays (issues and arguments), e mails, summaries of group discussions, reports, make notes, statement of purpose(for admission into foreign universities), letters of recommendation(for professional and educational purposes).
CO4	Converse with ease during interactive sessions/seminars in their classrooms, compete in literary activities like elocution, debates etc., raise doubts in class, participate in JAM sessions/versant tests with confidence and convey oral information in a professional manner.
CO5	Participate in group discussions/group activities, exhibit team spirit, use language effectively according to the situation, respond to their interviewer/employer with a positive mind, tailor make answers to the questions asked during their technical/personal interviews, exhibit skills required for the different kinds of interviews (stress, technical, HR) that they would face during the course of their recruitment process.

Course:	BASIC CODING
Course Code:	B17BS3202
Theory/lab :	Lab
Course Outcomes:	
CO1	Know about Control Structures, Loop Structures and branching in programming.
CO2	Know about various searching and sorting methods.
CO3	Know about Functions, Recursions and Storage Classes.
CO4	Know about Structures and Unions.
CO5	Know different Operating System concepts.
CO6	Differentiate OSI Model Vs. TCP/IP suite.

4TH YEAR 1ST SEMESTER: COURSES

Course:	HEATTRANSFER
Course Code:	B17ME4101

Theory/lab :	Theory
Course Outcomes:	
CO1	Apply the modes of heat transfer and study the problems involving steady and unsteady state heat conduction in various Cross sections.
CO2	Formulate and solve the heat transfer coefficients for natural and forced convection for various cross section areas.
CO3	Design Simple heat exchanger units, acquiring basic knowledge on boiling and condensation heat transfer.
CO4	Analyze radiation heat transfer between black body and gray body surfaces.

Course:	COMPUTER AIDED MANUFACTURING
Course Code:	B17ME4102
Theory/lab :	Theory
Course Outcomes:	
CO1	Prepare manual and APT programming for various components by applying the knowledge of numerical control techniques
CO2	Analyse various computer aided process planning methods and computer aided material handling system
CO3	Distinguish various automated quality control methods
CO4	Organize flexible manufacturing system and CIM system

Course:	MECHATRONICS
Course Code:	B17ME4103
Theory/lab :	Theory
Course Outcomes:	
CO1	Understand various components that constitute a mechatronic system.
CO2	Develop knowledge of various types of available sensors, and use the sensors apply in a mechatronic system.
CO3	Identify the required actuation system for the design of mechatronic system
CO4	Formulate the mathematical model of the simple dynamic systems of mechanical, electrical, and hydraulic & pneumatic domains
CO5	Develop the closed loop PID control of a given mechatronic system
CO6	Develop knowledge of microcontroller and programmable logic controller.

Course:	FINITE ELEMENT ANALYSIS
Course Code:	B17ME4104
Theory/lab :	Theory
Course Outcomes:	
CO1	Understand the fundamental concepts of Finite Element Analysis and Solve the physical problem using functional approximation method
CO2	Analyze the 1D structural problems by applying the concepts of finite element analysis.
CO3	Analyze Trusses and Beams by applying the concepts of finite element analysis
CO4	Analyze 2D structural problems by applying concepts of finite element analysis and apply the principles of Numerical Integration and its

	application to Finite Element Analysis
CO5	Analyze Axisymmetric solids by applying the concepts of Finite Element Analysis

Course:	AUTOMATION IN MANUFACTURING (Elective-I)
Course Code:	B17ME4105
Theory/lab :	Theory
Course Outcomes:	
CO1	Understand the basic principles of automation and its components which are implemented in production systems.
CO2	Identify the importance of material handling and various automatic identification methods used in production systems.
CO3	Understand the components of manufacturing systems and different production lines implemented in production systems.
CO4	Understand cellular manufacturing, forming part families, group technology and their involvement in flexible manufacturing systems.
CO5	Understand various automated inspection methodologies and manufacturing support systems like CAPP, shop floor control, etc.

Course:	QUALITY CONTROL AND ASSURANCE (Elective-II)
Course Code:	B17ME4106
Theory/lab :	Theory
Course Outcomes:	
CO1	Apply the fundamentals in interpreting the concepts like Quality Costs, Deming's philosophy, Taguchi's loss function and Six Sigma
CO2	Construct and analyse control charts for Variables and Attributes for the purpose of improving the process
CO3	Analyse different processes for their Process Capability Acquire knowledge of Laplace transform, partial differentiation and their applications
CO4	Design different sampling plans for the purpose of inspection.

Course:	PROJECT MANAGEMENT (Elective-II)
Course Code:	B17ME4107
Theory/lab :	Theory
Course Outcomes:	
CO1	Understand that PM skills are critical to most careers and they can be applied at most businesses and professions.
CO2	Acquire thorough knowledge on various analytical tools required during different stages of project life cycle.
CO3	Will be able to apply various tools and techniques for planning and scheduling the projects and can estimate the cost of the project.
CO4	Learn how to be proactive to the risks and be able to manage them that occur during the progressive stages of the projects.
CO5	Learn the ways of controlling the projects and all possible practical situations that lead to different changes during the course of project execution.
CO6	Possess full knowledge on how to evaluate the projects, terminate the

	projects and finally how to close the contract.
CO7	Be an effective team member or project manager and knows how to manage the stress.
CO8	Finally, students will acquire all the key skills to become effective project managers across various industries.

Course:	TOOL DESIGN (Elective-II)
Course Code:	B17ME4108
Theory/lab :	Theory
Course Outcomes:	
CO1	Explain about locating and clamping devices
CO2	Practice with jigs and fixtures
CO3	Use press and press tools and design different types of dies
CO4	Illustrate Die casting Dies and Injection Moulds
CO5	Determine gauges and gauge design

Course:	REFRIGERATION & AIR CONDITIONING
Course Code:	B17ME4109
Theory/lab :	Theory
Course Outcomes:	
CO1	Illustrate the fundamental principles and applications of refrigeration and air conditioning system.
CO2	Analyze cooling capacity and performance of refrigeration systems
CO3	Examine the properties, applications and environmental issues of different refrigerants
CO4	Analyze the air conditioning processes using principles of Psychrometry

Course:	HEAT TRANSFER LAB
Course Code:	B17ME4110
Theory/lab :	Lab
Course Outcomes:	
CO1	Conduct experiments on conduction, convection and radiation of heat; collect data, perform analysis and interpret results to draw valid conclusions through standard test procedures
CO2	Determine thermal properties and performance of heat exchanger

Course:	CAD LAB
Course Code:	B17ME4111
Theory/lab :	Lab
Course Outcomes:	
CO1	Apply various commands in CAD software for modelling 2D &3D objects.
CO2	Analyze various structural components using CAD software.

4TH YEAR 2ND SEMESTER: COURSES

Course:	PRODUCTION PLANNING AND CONTROL
Course Code:	B17ME4201

Theory/lab :	Theory
Course Outcomes:	
CO1	Judge which type production is required for different specific real-world situations and can apply various qualitative/quantitative methods for forecasting the future demand.
CO2	Analyze different inventory systems for minimizing the total costs and maximizing the profit.
CO3	Determine the most economical process of doing a work and prepare the route sheets for establishing how and where the work will be done.
CO4	Analyze the sequence of performing jobs scheduled through different machines in order to measure the effectiveness of the system and can also administer the priority rules for dispatching jobs.

Course:	POWER PLANT ENGINEERING (Elective-III)
Course Code:	B17ME4202
Theory/lab :	Theory
Course Outcomes:	
CO1	Describe with a layout, the working of steam power plant with fuel handling and ash handling systems
CO2	Determine the performance of Diesel engine and gas turbine power plants.
CO3	Analyze various hydroelectric power plant and nuclear power plant along with their economics and their impact on environment.
CO4	Calculate load factor, capacity and utilization factor and cost of power generated by power plants.

Course:	AUTOMOBILE ENGINEERING AND HYBRID VEHICLES (Elective-III)
Course Code:	B17ME4203
Theory/lab :	Theory
Course Outcomes:	
CO1	Apply and understand all sub systems of an Automobile such as various types of suspension systems and the concepts of brakes, electrical and electronic ignition systems
CO2	Analyze different types of engines, their cooling systems and various types of catalytic converters to control Exhaust emissions
CO3	Analyze various types and working principles of clutch, gearbox, drive shaft and final drive systems and hybrid vehicles.
CO4	Analyze, troubleshoot, servicing and maintenance of automobile vehicles and also create an idea on future challenges in the field of automobile.

Course:	ADDITIVE MANUFACTURING (Elective-III)
Course Code:	B17ME4204
Theory/lab :	Theory
Course Outcomes:	
CO1	Understand the significance of rapid prototyping and its practical usage.
CO2	Use Stereo Lithography System models files for rapid prototyping.
CO3	Understand various Liquid based and Solid based rapid prototyping

	methods
CO4	Understand the concept of additive manufacturing.
CO5	Develop the CAD models for rapid prototyping.
CO6	Use the tools of rapid prototyping

Course:	CAM LAB
Course Code:	B17ME4205
Theory/lab :	Lab
Course Outcomes:	
CO1	Demonstrate the CAM Software's XL MILL and XL TURN
CO2	Create manual part programming for CNC Turning and milling using G-Codes and M-Codes

Course:	PROJECT WORK
Course Code:	B17 ME 4207
Theory/lab :	--
Course Outcomes:	
CO1	Identify a current problem through literature/field/case studies
CO2	Identify the background objectives and methodology for solving the same.
CO3	Design a technology/ process for solving the problem.
CO4	Develop a technology/ process for solving the problem.
CO5	Evaluate that technology/ process at the laboratory level.