ELECTRONICS AND COMMUNICATIONS ENGINEERING

B.TECH-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.

Department 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, Net working, 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, Jocobian 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 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.
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.
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 SKILS 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 Kirchhoff'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 SKILS 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 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: 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 ARCHITECTUE 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
CO-5	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, A stable 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 CIRCUTS 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 pre processing 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.
Course Code: B17 EC 3208	
Course Title: MICROPROCESSORS AND MICROCONTROLLERS LAB	
CO-1	To become familiar with the instruction set of Intel microprocessors and microcontroller.
CO-2	To familiarize with Assembly language programming.
CO-3	The accompanying lab is designed to provide practical hands-on experience with microprocessor software applications and interfacing techniques.
Course Code: B17EC3209	
Course Title: VLSI LAB	
CO-1	Learn the work flow of mentor graphic tools/Cadence tools for logic gates, Combinational and Sequential circuits.
CO-2	Simulate combinational and sequential circuits with EDA tools
CO-3	Acquire Knowledge of analysis of combinational and sequential circuits using CMOS 130nm Technology
CO-4	Acquire practical experience in drawing layouts using Cadence/Mentor Graphics CAD tools.
Course Code: B17BS3201	
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, and 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 skillfully 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: B17BS3203	
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
Course Code: B17BS3206	
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 Final Year First Semester Course	
Course Code: B17EC4101	
Course Title: WIRELESS COMMUNICATIONS & NETWORKS	
CO-1	Demonstrate the understanding on the functioning of wireless communication systems and evolution of different wireless communication standards.
CO-2	Explain the functioning, protocols, capabilities and application of various wireless communication systems.
CO-3	Ability to apprehend various propagation mechanisms and challenges in Wireless Communication.
CO-4	Demonstrate an ability to evaluate design challenges, constraints in wireless networks.
Course Code: B17EC4102	
Course Title: DIGITAL IMAGE PROCESSING	
CO-1	Explain digital image fundamentals and basic image processing techniques.
CO-2	Evaluate the techniques for image enhancement and restoration.
CO-3	Define the need for image compression and to analyse various image compression methods.
CO-4	Experiment the Partition of a digital image into multiple objects using various techniques.
CO-5	Illustrate the use of different color models to represent an image.

Course Code: B16EC4103	
Course Title: FIBER OPTIC COMMUNICATIONS	
CO-1	Summarize the basic concepts of optical communication and demonstrate its components.
CO-2	Apply basic concepts of optical communication components and systems.
CO-3	Gain the knowledge of different sources of light as well as detectors and their comparative study.
CO-4	Analyze concepts of optical communication systems for the basic design of optical communication links
Course Code: B17 EC 4104	
Course Title: EMBEDDED SYSTEMS & INTERNET OF THINGS	
CO-1	Get familiarity with architecture and communication protocols of embedded systems and IoT.
CO-2	Apply the knowledge of embedded systems in understanding the concepts of IoT.
CO-3	Apply the knowledge of different protocols of IoT.
CO-4	Analyze data from physical devices through the cloud using data analytics.
Course Code: B17 EC4105	
Course Title: INFORMATION THEOTRY AND CODING (Elective – I)	
CO-1	Appreciate the mathematical concept of information (uncertainty) via probability, compute the entropy of a source &Understand the need of source coding & variable length codes.
CO-2	Device source codes using Shannon-Fano& Huffman algorithms, calculate the efficiency of a code.
CO-3	Compute mutual entropy of a channel, understand the concept of channel capacity, State Shannon's noisy channel coding theorem which creates the field of channel coding, compute channel capacity of BSC & AWGN channels, define characteristics of an ideal communication system.
CO-4	Realize the need & benefits of channel coding, Understand Linear block codes structure, theory &use syndrome technique for decoding for linear block codes, Study cyclic codes (BCH, RS and CRC) structure, theory, implementation & decoding of cyclic codes, differentiate source coding and channel coding &learn applications of coding.
CO-5	Study Convolutional codes representation, generation & decoding of convolutional codes using Viterbi algorithm, get acquainted with concatenated codes to increase coding gain & Trellis Coded Modulation (TCM), Know modern codes & pursue modern wireless communications & information security courses.
Course Code: B17 EC 4106	
Course Title: SATELLITE COMMUNICATIONS & GPS (Elective – I)	
CO-1	Apply fundamentals of Kepler's planetary motion in satellite communication and GPS.
CO-2	Analyze and build the space segment, depending upon the requirement
CO-3	Design link margin for various applications.
CO-4	Choose the correct multiple access technique for better communication.
Course Code: B17 EC 4107	
Course Title: ANALOG IC DESIGN (Elective – I)	
CO-1	Outline the concepts of MOS Devices ,MOS device characteristics, MOS device modeling, CMOS amplifiers, Open-Loop Comparators and different types of oscillators
CO-2	Analyze Analog CMOS Sub circuits and Complex Analog Circuits
CO-3	Design Analog CMOS Sub circuits, CMOS amplifiers, CMOS op-amps and Complex Analog Circuits
CO-4	Extend the analog circuit design to different applications.
Course Code: B17 EC 4108	
Course Title: DIGITAL SIGNAL PROCESSING LAB	
CO-1	Make use of MATLAB simulation tool for performing various operations on discrete signals.
CO-2	Make use of MATLAB simulation tool to verify different DSP algorithms.
CO-3	Make use of MATLAB simulation tool to perform various operations on an Image
Course Code: B17 EC 4109	
Course Title: INTERNET OF THINGS LAB	
CO-1	Able to acquire knowledge on interfacing different sensors and communication modules with the System on Chip Modules.
CO-2	Able to connect SOC devices with the cloud for accessing and analyzing the data.

Course Outcomes for Final Year Second Semester Course	
Course Code: B17 EC 4201	
Course Title: CELLULAR & MOBILE COMMUNICATIONS	
CO-1	Applying the fundamentals of mobile communication systems, cellular concepts and Handoff calculate the

	amount of interference, frequency reuse distance and capacity of a cellular system.
CO-2	Demonstrate an ability to explain multiple access techniques for Wireless Communication
CO-3	Able to understand the basics of GSM mobile communication standard, its architecture.
CO-4	Apply knowledge of reflection, diffraction and scattering to calculate link budget using path loss models
Course Code: B17 EC 4202	
Course Title: AI & MACHINE LEARNING (Elective – II)	
CO-1	Summarize the basic concepts of artificial intelligence and its applications.
CO-2	Classify the regression and classification techniques
CO-3	Characterize machine learning algorithms as supervised and unsupervised
CO-4	Understand and apply classification and clustering techniques.
CO-5	Interpret concepts of neural networks and their architectures.
Course Code: B17 EC 4203	
Course Title: NETWORK SECURITY & CRYPTOGRAPHY (Elective – II)	
CO-1	Analyze the algorithms on security problems.
CO-2	Understand and apply symmetric and asymmetric approaches.
CO-3	Understand and apply symmetric and asymmetric approaches.
CO-4	Understand, apply and analyze various malicious Software's.
CO-5	Be familiar with some internet security protocols and standards.
Course Code: B17 EC 4204	
Course Title: DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES (Elective - II)	
CO-1	Implement the DFT and FFT on signals and different types of computations of DSP with basic mathematics.
CO-2	Able to deal with the basic architecture and different design issues in DSP processors.
CO-3	Able to perform the operations with different families of commercially available DSP processors.
CO-4	Connect the DSP processors to different interfacing devices.
Course Code: B17 EC 4205	
Course Title: ADVANCED COMMUNICATIONS LABORATORY	
CO-1	Comprehend the microwave signal measurement using VSWR and frequency meter.
CO-2	Comprehend the design, application and practical implementation of various Digital Modulation techniques.
CO-3	Identify the challenges in practical implementation of Microwave Communication systems.
CO-4	Apply the knowledge of antennae to plot the characteristics of various antennae and its coverage area.
CO-5	Comprehend the characteristics and various losses associated with OFC channels.
Course Code: B17 EC 4207	
Course Title: PROJECT WORK	
CO-1	Identify a current problem through literature/field/case studies
CO-2	Identify the background objectives and methodology for solving the same
CO-3	Design a technology/ process for solving the problem.
CO-4	Develop a technology/ process for solving the problem.
CO-5	Evaluate that technology/ process at the laboratory level.