



Gayatri Vidya Parishad College of Engineering for Women
Madhurawada, Visakhapatnam
(Affiliated to JNTUK, Approved by AICTE, New Delhi)

Department of Electronics and Communication Engineering

B.Tech (ECE) Course Outcomes (R16)

1stSemester

<i>Course Code</i>	<i>Course Title</i>	<i>Course Outcomes</i>	
C111	English – I	CO1	Develop an understanding of the service that can be rendered through the human resources to the society and acquire knowledge of familial relationships portrayed in “An Ideal Family”.
		CO2	Develop awareness and importance of road safety and relate the pain and hopelessness that war brings in the lives of ordinary people.
		CO3	Evaluate and to perceive the advantages and disadvantages of technology and show that courage and determination can triumph all obstacles.
		CO4	Plan alternatives to the depleting sources and to choose suitable sources of energy for rural India and distinguish between reality and illusion, to overcome the superstitious beliefs.
		CO5	Build on the fact that the animal must be preserved because animal life is precious and analyse the tragedy that unplanned development can ensue.
		CO6	Apply safety measures at home, workplace, labs, industries by following safety measures and evaluate the complex issue prevails in racism and slavery.
C112	Mathematics - I	CO1	Solve the first order, first degree differential equations and apply the techniques to engineering applications.
		CO2	Solve the higher order differential equations with constant coefficients and apply it to solve physical situations whose behaviour can be described by Linear D.E.
		CO3	Determine Laplace Transforms of various functions and apply it to solve linear ODE with initial conditions.
		CO4	Utilize multivariate differential calculus concepts to determine the extrema of multivariable functions.
		CO5	Solve the linear and non linear partial differential equations of first order.
		CO6	Classify and solve the higher order linear/non-linear partial differential equations with constant coefficients.

C113	Mathematics-II (Numerical Methods and Complex Variables)	CO1	Solve algebraic and transcendental equations using Numerical Methods.
		CO2	Construct interpolation polynomials for a given set of data and estimate the value of the function at a given point using Newton ,Gauss and Lagrange interpolation polynomials.
		CO3	Evaluate a definite integral from a given set of tabulated values of the integrand $f(x)$ using Simpson's and Trapezoidal rules and solve Ordinary differential Equations using Taylor's, Picard's and R-K methods .
		CO4	Explain the fundamental concepts of complex variable theory, can inspect analyticity of a complex function using C-R equations and determine harmonic conjugate of a function.
		CO5	Evaluate a contour integral using Cauchy's theorem and Cauchy's integral formula. Also determine the Taylor and Laurent expansions of simple functions.
		CO6	Determine the residue of a function , utilize the residue theory to evaluate real definite integrals: around a unit circle, around a semi circle and Indenting the contours having poles on the real axis.
C114	Applied Physics	CO1	Utilize the concepts of interference of light in understanding the optical systems and apply the principle in observing the formation of interference pattern in thin films.
		CO2	Distinguish the different types and understand the resolving power of optical instruments through various slit pattern effects of diffraction.
		CO3	Understand the concepts of polarization types and conversion by studying wave plates and polarimeter and further understand working principle of lasers.
		CO4	Understand the basic principles of electromagnetic fields that predict the possibility of electromagnetic waves.
		CO5	Explain and apply the fundamentals of quantum mechanics to a particle in one dimensional potential box and to study the conductivity of free electrons in solids.
		CO6	Infer the mechanism of electrical conduction in solids, especially the semiconductors which are the basic materials for electronic devices.
C115	Computer Programming	CO1	Outline the basic terminology of computer programming and illustrate to write, compile & debug a C-program.
		CO2	Make use of basic C- programming language constructs to build C-programs.
		CO3	Develop C-programs by utilizing various control structures.
		CO4	Classify modular programming techniques to implement C-programs.
		CO5	Build C-programs by using data structures like arrays, strings.
		CO6	Make use of pointers and different derived data structures to solve problems in C.
C116	Engineering	CO1	Make use of graphic representation as per standards and to

	Drawing		construct polygons, curves
		CO2	Construct scales and prepare the orthographic projections of points and straight lines placed in various quadrants
		CO3	Identify and draw the projection of straight lines inclined to both the planes
		CO4	Identify and draw the projection of planes inclined to both the planes
		CO5	Plan and draw the projection of solids in different positions & inclined to one of the planes
		CO6	Interpret orthographic and isometric views of objects

Laboratory Courses

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C117	English-Communicati on Skills Laboratory - I	1,2	CO1	Apply the skill of making inquiries over phone, thanking and responding to thanks.
		3,4	CO2	Develop responding to requests, requesting, asking permission, giving and refusing permission, asking direction and giving direction.
		5,6	CO3	Make use of language skills in inviting, accepting and declining invitations, congratulating, making and responding to complaints.
		7,8	CO4	Identify the relationship between letters and sounds.
		9,10	CO5	Develop pronunciation, stress and intonation while speaking.
C118	Applied / Engineering Physics Laboratory	4,5	CO1	Determine the elastic modulus of given material and Moments of inertia of various types of pendulums.
		1,2,3	CO2	Operate optical instruments (Spectrometer and travelling microscope) to understand principles of interference and diffraction of light.
		6	CO3	Understand the modes of mechanical vibrations and determine their frequency.
		13	CO4	Apply tangent law to study the variation of magnetic fields due to current carrying conductors.
		10,11,12 ,14	CO5	Estimate the Energy band gap , thermal coeffiecients of resistance for semiconductors and understand the volt -ampere characteristics of diodes.
	Applied / Engineering Physics – Virtual Labs		CO1	Inculcate basic scientific concepts through a virtual studying and learning environment within short duration of time
			CO2	Execute experiments through simulations which are difficult to do in the real laboratories either because of their risk and/or high cost of the equipment
			CO3	Develop skills for technical documentation as well as exploration for any project/research which they do at later

				stages
C119	Engg. Worksh op & IT Workshop	5,6,7,8	CO1	Select tools required for getting required shape and size of the object for black smithy operations and Compare process of least wastage of material and economy in process.
		1,2,3,4	CO2	Prepare various joints with the available work materials i.e with wood, M.S flats.
		9,10,11	CO3	Understand and connects different circuits in house wiring. Further, Identify parts/peripherals of CPU, experiment with system assembling and disassembling, OS installation and Make use of MS office tools to prepare different types of documents.
		1,2,3,4,5,6	CO4	Experiment with Network configuration, Soft ware installation, Internet, Trouble shooting
		7,8	CO5	Model various graph plots using MATLAB and understand basic commands, subroutines of MATLAB and Utilize LATEX to do basic formatting, handling equations and images.

2nd Semester

<i>Course Code</i>	<i>Course Title</i>	<i>Course Outcomes</i>	
C121	English – II	CO1	Make use of the greatest resource, education and follow Dr.A.P.J's simple life and service to the nation. Develop the skill of writing official letters.
		CO2	Develop peaceful co existence and universal harmony and have deep insight on the achievements of Sir C.V.Raman. apply e-correspondence in professional field.
		CO3	Analyse the symptoms of cultural shock and aftermath consequences due to globalization and assimilate the contributions of H.J.Bhabha. Plan speech writing.
		CO4	Assess the theme which the society needs to re-examine its traditions when they are outdated and acquire the knowledge of discoveries and inventions made by J.CBose. Understand the structure of the text.
		CO5	Categorize several health disorders due to climatic change and recommend protective environment for the sustainability of the future generations and develop insight into the contributions of P.C.Ray. Make use of technical writing for the media.
		CO6	Relate eminent personalities, who toiled for the present day advancement in software field and perceive Ramanujan innate talent. Develop report writing skills.
C122	Mathematics – III	CO1	Determine the rank of a matrix and Solve linear system of equations using Rank and iterative methods
		CO2	Determine Eigen values and Eigen vectors of a matrix and apply the concept to examine the nature of quadratic forms

		CO3	Explain the concepts of curve tracing, double and triple integrals and apply them to determine areas and volumes.
		CO4	Examine the properties of Beta and Gamma functions and apply them to solve improper integrals.
		CO5	Apply vector differential operator on scalar and vector point functions and determine directional derivative, angle between two surfaces.
		CO6	Determine the work done using Line Integrals and evaluate line, surface and volume integrals using Green's Theorem, Stoke's Theorem and Gauss Divergence theorem.
C123	Applied Chemistry	CO1	Understand the preparation, properties, advantages and limitations of plastic materials and relate the ideas to engineering applications
		CO2	Compare and relate the advantages, limitations of different fuels with the computational air requirements for combustion
		CO3	Make use of electrochemical reactions in understanding the construction and working of batteries and further gain knowledge of corrosion control
		CO4	Utilize fundamentals of applied chemistry to acquire knowledge of advanced materials and their applications
		CO5	Apply the basics of solid state chemistry in understanding the structure and properties of crystalline solids
		CO6	Gain knowledge regarding non-conventional energy sources and compare their advantages and limitations
C124	Electrical and Mechanical Technology	CO1	Outline the working principles of DC Machines and Transformers
		CO2	Make use of the principles of electromechanical conversion to summarize the operation of AC Machines
		CO3	Classify and Illustrate the construction and working of various measuring instruments.
		CO4	Classify Internal combustion engines by their operational principals and evaluate the performance of IC engines
		CO5	Understand the fundamentals of heat transfer mechanisms in fluids and solids and their applications
		CO6	Analyze the different power transmission systems and Select the suitable manufacturing processes for a typical component
C125	Environmental Studies	CO1	Outline global environmental challenges, initiatives towards sustainable development, understand the concept of the ecosystem and its importance
		CO2	Demonstrate an understanding about natural resources and recognize the need to conserve them
		CO3	Explain biodiversity, identify threats to biodiversity and the conservation methods
		CO4	Categorize and explain different types pollution, their causes, impacts, control measures and waste management practices
		CO5	Identify social issues pertaining to environment and gain knowledge about various environmental legislations
		CO6	Examine and understand the concept of environmental impact assessment, environmental audit and its importance

C126	Data Structures	CO1	Relate the concept of Abstract Data Type and Build Polynomials, Sparse Matrix ADT.
		CO2	Apply data structures like stacks and queues to Solve various real time computing problems.
		CO3	Develop algorithms using linear data structures to Solve real world problems
		CO4	Utilize various non-linear data structures such as trees to Solve various computing problems..
		CO5	Apply various non-linear data structures such as graphs on various computing problems..
		CO6	Make use of various sorting techniques on unsorted Data.

Laboratory Courses

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C127	Applied / Engineering Chemistry Laboratory	2&3	CO1	Make use of experimental skills for volumetric titrations and perform acid - base titrations using indicators
		4, & 16	CO2	Demonstrate an understanding of redox titrations like permanganometry and estimation of vitamin c in different samples
		7,8 &15	CO3	Apply the principles of complexometric titrations to determine hardness of water, amount of Zinc and Copper using EDTA in the given samples
		9,10, 11,1 2,13, &14	CO4	Perform Experiments with instruments such as conductometer, pH meter to acquire skills of conductometric titrations and chemical analysis
		5 &6	CO5	Estimate the amount of Ferrous Iron in the sample using Potassium Dichromate using the principles of oxidation - reduction titration
C128	English- Communication Skills Laboratory - II	1,2	CO1	Build the basics of debating, presenting their views, arguing and counter arguing.
		3,4	CO2	Plan and prepare for a Group Discussion
		5,6	CO3	Organise and structure the content of a presentation.
		7,8	CO4	Make use of C.V for interviews, face interviews confidently and develop official emails.
		9,10	CO5	Apply idiomatic expressions in usage and avoid common errors in English.
C129	C Programming Laboratory	1,2	CO1	Make use of basic C-programming language constructs and practice logical ability to solve problems in Linux Environment.
		3,4,5 ,6,7	CO2	Solve problems by using control structures and modularity.

		8,9	CO3	Build programs using basic data structures include arrays, structures.
		10,1 1	CO4	Apply pointers and dynamic memory allocation for dealing real world problems.
		12,1 3,14	CO5	Utilize files and Strings for developing C-programs.

3rd Semester

<i>Course Code</i>	<i>Course Title</i>	<i>Course Outcomes</i>	
C211	Electronic Devices and Circuits	CO1	Outline the basic concepts of semiconductor physics.
		CO2	Understand the concept of formation of a p-n junction and the construction of different diodes.
		CO3	Analyze the working of rectifiers and filters with relevant expressions.
		CO4	Understand the operation and analyze the characteristics of BJT and FET in different configurations.
		CO5	Apply proper biasing and stabilization methods to BJT and FET circuits.
		CO6	Analyze BJT and FET amplifier circuits using small signal low frequency model.
C212	Switching Theory and Logic Design	CO1	Represent signed binary numbers using different number systems and binary codes.
		CO2	Apply Boolean algebra, K-maps and Tabular method to minimize logic functions.
		CO3	Make use of combinational circuits to implement combinational logic functions.
		CO4	Develop combinational circuits using PLD's.
		CO5	Construct sequential circuits like counters and registers using flip-flops.
		CO6	Model the minimized Finite State Machines by using state diagrams.
C213	Signals and Systems	CO1	Characterize the signals and systems and build the analogy between vectors & signals to develop the Fourier series concepts.
		CO2	Make use of the Fourier concept to analyze the spectral characteristics for different classes of signals.
		CO3	Explain the process of sampling and reconstruction of signal.
		CO4	Outline the concepts of convolution & Correlation to

			examine the response of LTI systems.
		CO5	Apply the Laplace transform to analyze continuous LTI systems.
		CO6	Apply the Z- transform to analyze DT LTI systems.
C214	Network Analysis	CO1	Understand the basic concepts, laws and network topologies of electric circuits.
		CO2	Analyze R, L, and C network with sinusoidal excitation to evaluate its response.
		CO3	Understand the concepts of magnetic circuits with various dot conventions and examine the concept of resonance by varying the parameters of electrical circuits.
		CO4	Simplify electrical networks by using principles of network theorems.
		CO5	Determine the parameters of two port networks.
		CO6	Evaluate the transient response of electrical networks for different types of excitations.
C215	Random Variables and Stochastic Process	CO1	Mathematically model the random phenomena and solve simple probabilistic problems.
		CO2	Identify different types of random variables and compute statistical averages of these random variables.
		CO3	Make use of the concepts of single random variable to study the behaviour of random phenomenon for a multi random variable case.
		CO4	Outline the Temporal characteristics of the Random processes.
		CO5	Explain the characteristics of the Random processes in spectral domain.
		CO6	Apply the concepts of random variables and processes to analyze the behaviour of LTI systems in the presence of different types of noise.
C216	Managerial Economics & Financial Analysis	CO1	Utilize the demand forecasting methods to predict demand of a product.
		CO2	Analyse Production function & economies of scale and assess the BEP of their own business.
		CO3	Identify the concepts of competitive market situations.
		CO4	Classify the types of business organizations and identify the stages of business cycles to improve the organizations.
		CO5	Simplify accounting concepts to prevent loss for the organization.
		CO6	Discover the sources of raising capital for business

			undertaking
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Laboratory Courses

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C217	Electronic Devices and Circuits Lab	1,2,3	CO1	Analyze the characteristics of P-N junction diode and Zener diode. Build the rectifier circuits and regulator circuits using diode.
		4,5	CO2	Analyze the operation and characteristics of BJT and FET in different configurations, which can be used in the design of amplifiers.
		7	CO3	Understand the operation of unipolar junction transistor by examining UJT for its characteristics.
		8	CO4	Design the biasing circuits for transistor.
		9,10,11	CO5	Design amplifier circuits using BJT and find the frequency response of amplifier to determine its bandwidth.
C218	Networks & Electrical Technology Lab	4,5,6 (Part A)	CO1	Apply Network theorems to analyze Electric Circuits
		1,2 (Part A)	CO2	Determine the time and frequency responses of R,L and C networks
		3 (Part A)	CO3	Evaluate the two port network parameters for a given circuit
		4 (Part B)	CO4	Analyze the performance of a single phase transformer
		1,2,3,5 (Part B)	CO5	Analyze the performance characteristics of DC machines and Induction motors

4th Semester

<i>Course Code</i>	<i>Course Title</i>	<i>Course Outcomes</i>	
C221	Electronic Circuit Analysis	CO1	Compare small signal low & high frequency amplifiers using BJT and FET.
		CO2	Compare multistage amplifiers based on the combination of different amplifier configurations.

		CO3	Compare different types of feedback amplifiers
		CO4	Make use of baurkhasan criteion to design different types of oscillators.
		CO5	Apply load line concept to examine different types of power amplifiers.
		CO6	Analyze different Tuned amplifiers.
C222	Control Systems	CO1	Develop the transfer function using block diagram algebra and signal flow graph methods
		CO2	Analyze the Transient & Steady State Performance of control systems
		CO3	Analyze the stability of LTI systems using Routh's stability criterion and the Root locus method.
		CO4	Analyze the stability of LTI systems using frequency response methods.
		CO5	Design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.
		CO6	Develop the state models to solve time invariant state equations and outline the concepts of controllability and observability of control systems.
C223	Electromagnetic Waves and Transmission Lines	CO1	Explain and illustrate the steady Electric fields in different media.
		CO2	Summarize magnetostatic fields for static case, and apply the Maxwell equations to study the time varying behaviour of EM waves.
		CO3	Interpret the characteristics of uniform plane waves in different media.
		CO4	Illustrate the wave characteristics for normal and oblique incidence and derive the relation for the power flow mechanism.
		CO5	Classify different types of transmission lines based on primary and secondary constants.
		CO6	Derive the expressions to determine different transmission line parameters and verify the same with the smith chart.
C224	Analog Communications	CO1	Explain the basic concepts of analog communication system and compare various generation, detection techniques of amplitude modulation
		CO2	Compare various types of amplitude modulation techniques

			with spectral characteristics
		CO3	Explain different methods of generation and detection of FM
		CO4	Classify radio transmitters and receivers based on their operation
		CO5	Outline the effect of noise on analog modulation systems
		CO6	Illustrate various analog pulse modulation systems
C225	Pulse and Digital Circuits	CO1	Explain the response of linear waveshaping circuits to various non sinusoidal inputs.
		CO2	Extend the applications of diodes and transistors to non-linear waveshaping case.
		CO3	Build the Collector and Emitter Coupled Bistable Multivibrators for the given specifications.
		CO4	Make use of basic electronic components to design monostable and astable multivibrators.
		CO5	Explain the operation of different time base generators.
		CO6	Compare the working mechanism of logic gates in different logic families.
C226	Management Science	CO1	Appraise the practices of management concepts in the business environment and evaluate various types of organization structures.
		CO2	Identify the production management practices and distinguish the different stock levels of an organization.
		CO3	Prepare an appropriate marketing mix and determine the recruitment process in global competitive environment.
		CO4	Evaluate the project process on the basis of costs and time.
		CO5	Recognize and analyze the strategies of the firm and can re discover the SWOT of themselves.
		CO6	Understand and develop the contemporary management practices such as MIS, MRP, TQM,ERP, BPO and assess the changing business environment.

Laboratory Courses

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C227	Electronic	1,4,5,6	CO1	Design and analyze various amplifiers (Multi stage amplifiers

	Circuit Analysis Lab			and Single tuned amplifier).
		2,3	CO2	Design and analyze various oscillators (RC phase shift oscillator and Colpitt's oscillator).
		7,8	CO3	Design and analyze feedback amplifiers (voltage series and current shunt feedback amplifiers).
		9,10	CO4	Design and analyze power amplifiers (Class A and Class B complimentary symmetry).
	All experiments	CO5	Become expert with computer skills (Multisim, OrCAD Pspice) for the analysis and design of circuits.	
C228	Analog Communications Lab	1,2,3,5	CO1	Generate, detect and analyze different analog modulation techniques.
		4,6,11	CO2	Analyze AM radio receiver characteristics.
		7	CO3	Demonstrate analog to discrete signal conversion and reconstruction process.
		8,9,10	CO4	Demonstrate various pulse modulation techniques.
		1,2,3,5,8,9	CO5	Make use of MATLAB Communication toolbox for analyzing analog modulation techniques.

5th Semester

<i>Course Code</i>	<i>Course Title</i>	<i>Course Outcomes</i>	
C311	Computer Architecture and Organization	CO1	Outline the architecture, the performance measurement of a modern computer
		CO2	Extend the knowledge of registers, instructions and addressing modes in understanding the architecture of a digital computer.
		CO3	Extend the knowledge of instructions ,addressing modes and I/O operations in understanding the architecture of a digital computer.
		CO4	Compare and Contrast different methods for computer I/O.
		CO5	Classify read only memories, cache memories, Secondary storages in hierarchical memory system.
		CO6	Summarize processing unit and Micro programmed control unit
C312	Linear I C Applications	CO1	Outline the basic operation and performance parameters of differential amplifiers.
		CO2	Demonstrate the measuring techniques for performance parameters of OP-AMP.
		CO3	Construct different linear and non-linear circuits using OP-

			AMPs
		CO4	Analyze and design amplifiers and active filters using OP-AMPs
		CO5	Develop applications by making use of different analog ICs.
		CO6	Construct different types of DAC's and ADC's using OP-AMP
C313	Digital I C Applications	CO1	Illustrate the electrical behavior of CMOS and Bipolar logic families.
		CO2	Apply Data flow and Structural VHDL modeling styles to realize digital circuits.
		CO3	Model different digital circuits using behavioral modeling in VHDL and Study the logic synthesis process steps.
		CO4	Develop different combinational based digital system design modules with relevant digital ICs.
		CO5	Build different Sequential based digital system design modules with relevant digital ICs.
		CO6	Analyze different Synchronous and Asynchronous Sequential circuits with examples.
C314	Digital Communications	CO1	Illustrate the various types of baseband digital modulation techniques
		CO2	Explain band pass digital modulation and demodulation techniques
		CO3	Identify the error probability of various receivers using digital modulation techniques
		CO4	Apply the information theory in determine the channel capacity
		CO5	Compare different source coding schemes for efficient data representation
		CO6	Compare different error control coding schemes for the reliable transmission of digital information over the channel
C315	Antenna and Wave Propagation	CO1	Explain the radiation mechanism of an antenna and basic antenna parameters.
		CO2	Apply Maxwell's equations to quantify the fields radiated by thin linear wire antennas.
		CO3	Classify and Examine various types of antenna Arrays.
		CO4	Construct and analyze non resonant antennas and Broad band

			antennas.
		CO5	Analyze UHF, Microwave antennas and summarize the antenna measurement techniques.
		CO6	Outline the characteristics of radio wave propagation.
		CO1	Apply the moral template inculcating the core human values for transformation into an ethical human being.
C319	Professional Ethics & Human Values	CO2	Utilize the principles of engineering ethics for development of professionalism and professional competencies and also to solve moral dilemmas.
		CO3	Explain and understand accountability, engineering codes and experimental nature of engineering.
		CO4	Evaluate the responsibility and accountability of a professional engineer towards design, operation, safety, by adopting risk benefit analysis.
		CO5	Judge issues pertaining to individual rights, collegiality, moral dilemmas and conflicts while discharging their professional duties.
		CO6	Analyse cross cultural issues in different ethical domains by acquiring knowledge on intellectual property rights in the context of globalization.

Laboratory Courses

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C316	Pulse and Digital Circuits Lab	1,2,3	CO1	Design the various linear and nonlinear wave shaping circuits.
		4	CO2	Justify that the transistor acts as a switch.
		8,9,10,11	CO3	Design and test bistable, monostable and astable multivibrators.
		12,13	CO4	Explain how a sweep signal can be generated using different time base generators.
		5,6,7	CO5	understand sampling gates and to design NAND and NOR gates using various logic families.
C317	Linear IC Applications Lab	1	CO1	Understand the basic architecture of an IC 741 operational amplifier.
		2,3	CO2	Basic characteristics of opamp parameters and its measurements design compensating circuits
		4,5,6,7,10	CO3	Analyze the stability of the system and application opamp.

		8,9,10	CO4	Develop applications using linear and nonlinear characterization of OPAMP.
		11,12	CO5	Understand the basic architecture of IC 555 timer and IC 565, IC 566 to design PLL's and Oscillators.
C318	Digital I C Applications Lab	1-10	CO1	Develop data flow, behavioral and structural models for digital circuits.
		1-10	CO2	Simulate VHDL models of digital circuits using CAD tool.
		1-10	CO3	Synthesize different digital circuit design modules using CAD tool.
		1-5	CO4	Determine the necessary requirements for emulating the outputs and implement digital modules on FPGA
		1-5	CO5	Configure target device and test digital circuits on FPGA.

6th Semester

<i>Course Code</i>	<i>Course Title</i>	<i>Course Outcomes</i>	
C321	Micro Processors & Micro Controllers	CO1	Comprehend the architecture and working of 16 bit microprocessor 8086.
		CO2	Apply assembly language programming skills to perform arithmetic, logical and string operations with 8086.
		CO3	Develop applications involving interfacing of various peripherals with 8086 microprocessor.
		CO4	Outline the architectural features of 80386 and 80486 microprocessors.
		CO5	Develop microcontroller based standalone applications for societal needs.
		CO6	Comprehend the architecture and instruction set of PIC 16F877 microcontroller.
C322	Micro Wave Engineering	CO1	Make use of maxwells equations to derive the field components in rectangular wave guides.
		CO2	Analyze the field components in circular wave guides & Cavity resonators.
		CO3	Compare and analyze various klystron oscillators and amplifiers.
		CO4	Classify the slow wave structures and cross field devices.
		CO5	Examine different types waveguide junctions and components.
		CO6	Explain the procedure to measure the wave guide parameters

			using microwave bench setup.
C323	VLSI Design	CO1	Illustrate the various fabrications steps of IC and come across basic electrical properties of MOSFET.
		CO2	Apply design rules to construct the layout of different digital circuits.
		CO3	Build MOS circuits with the help of Basic circuit concepts and analyze its characteristics based on the Scaling factors.
		CO4	Describe Chip input & output circuits and Design For Testability using different testing techniques.
		CO5	Make use of FPGA architectures to realize digital circuits.
		CO6	Analyze low power circuits through low Power Design Approaches.
C324	Digital Signal Processing	CO1	Apply the concepts of difference equations to analyze the discrete time systems.
		CO2	Make use of the FFT algorithm for solving the DFT of a given signal.
		CO3	Analyze the Digital IIR filter design for different specifications and Realize its structures.
		CO4	Analyze the Digital FIR filter design for different specifications and Realize its structures.
		CO5	Understand the Multirate Processing concepts in various applications.
		CO6	Outline the architecture of programmable Digital Signal processors and apply the signal processing concepts on DSP Processor.
C325	Artificial Neural Networks OPEN ELECTIVE	CO1	Understand the fundamental concept of Artificial Neural Networks , Characteristics, Models of Neuron, Learning Rules, Learning Methods, Stability and Convergence.
		CO2	Explain the basics of Pattern Recognition and Feed forward Neural Networks.
		CO3	Understand the basics of Feedback neural networks and Boltzmann machine.
		CO4	Analyze Feedback layer for different output functions, Pattern Clustering and Mapping networks.
		CO5	Analyze the Stability, Plasticity, Neocognitron and architectures of complex pattern recognition tasks.

		CO6	Illustrate the Different applications of Neural Networks in fields like image processing, decision making, etc.
C329	IPR & Patents	CO1	Recall and relate the real property law with Intellectual property law.
		CO2	Outline the subject matters of copyright and could able to demonstrate the registration procedure and infringement consequences.
		CO3	Make use of Rights and Limitations under Patent Law and could make new inventions and developments in Patent Law.
		CO4	Understand the Trade Mark Registration Process, maintenance, Inter parties Proceedings, Infringement, Ownership of Trade Mark and Litigations.
		CO5	Utilize maintaining Trade Secret, Physical Security, Employee Access Limitation, Employee Confidentiality Agreement of Trade Secret Law.
		CO6	Understand the concepts of the Cyber Law, Cyber Crime, E-commerce, Data Security, Confidentiality, Privacy and International aspects of Computer and Online Crime.

Laboratory Courses

<i>Course Code</i>	<i>Course Title</i>	<i>Experiment No</i>	<i>CO. No.</i>	<i>Course Outcomes</i>
C326	Micro Processors & Micro Controllers Lab	1,2,3,4,5	CO1	Develop basic assembly language programs based on arithmetic, logical, and shift operations using 8086 microprocessor.
		6,7,8	CO2	Develop standalone applications by Interfacing I/O peripheral devices with 8086 microprocessor.
		9,10,11	CO3	Develop basic assembly language programs based on arithmetic, logical, and shift operations using 8051 microcontroller.
		12,13,14	CO4	Develop standalone applications for societal needs by Interfacing I/O peripheral devices with 8051 microcontroller.
C327	VLSI Lab	1-10	CO1	Demonstrate the work flow of Mentor Pyxis Schematic tools for digital and analog design through experimentation.
		1-10	CO2	Develop transistor level digital and analog design applications in Mentor Pyxis Schematic editor.
		1-10	CO3	Figure out AC, DC and Transient analysis for different digital and analog applications with given specifications.
		1-3	CO4	Demonstrate the workflow to draw the layout using Mentor Graphics CAD tool through experimentation.
		1-3	CO5	Verify the design by drawing Layout and check for DRC, LVS and Extract Parasitics for different applications.

C328	Digital Communicati ons Lab	2,3,4,8	CO1	Demonstrate various baseband digital modulation techniques.
		1	CO2	Explain the process of multiplexing and demultiplexing of analog signals.
		5,6,7	CO3	Demonstrate various passband digital modulation techniques.
		9	CO4	Apply Source coding techniques for efficient data representation
		10,11,12	CO5	Apply various error control coding techniques for efficient data transmission

7th Semester

<i>Course Code</i>	<i>Course Title</i>	<i>Course Outcomes</i>	
C411	Radar Systems	CO1	Illustrate the basic principle of radar and to derive the radar range equation.
		CO2	Classify the different types of Radars and its applications.
		CO3	Analyze the principle of each and every block of MTI and Pulse Doppler Radar.
		CO4	Compare the various techniques involved in tracking the targets.
		CO5	Demonstrate the basic principle of Receiver and also extraction of signal in Noise.
		CO6	Understand the various components used in radar receivers and can describe antennas used for radar.
C412	Digital Image Processing	CO1	Illustrate the fundamental concepts of Digital Image Processing and apply different transforms for image processing applications.
		CO2	Analyze the effect of spatial and frequency domain filtering of images.
		CO3	Outline various image restoration and reconstruction methods.
		CO4	Apply different image compression techniques and outline the concepts of wavelet transforms for image processing.
		CO5	Illustrate different image segmentation techniques and morphological image operations.
		CO6	Compare full color and pseudo color image processing techniques.

C413	Computer Networks	CO1	Understand the concepts of Network Topologies and network (communication) reference models (OSI and TCP/IP reference models).
		CO2	Illustrate Physical layer Guided Transmission media and Multiplexing concepts.
		CO3	Interpret Datalink layer Framing Techniques, Error control Techniques using CRC, flow control techniques using Elementary Data Link layer protocols, sliding window protocols in a network..
		CO4	Illustrate how the Media Access control problem is solved in a network using multiple access protocols – ALOHA, CSMA, collision free protocols
		CO5	Make use of the Network Layer routing algorithms, congestion control algorithms to perform better network communication.
		CO6	Analyze the internet Transport layer protocols-TCP, UDP protocol working mechanism in Client – Server Data communication.
C414	Optical Communications	CO1	Explain the working principle of the optical fiber and classify the structures of Optical fiber and types
		CO2	Explain the various loss and dispersion mechanisms in optical fiber. Choose the appropriate materials required to construct the optical fibers.
		CO3	Choose appropriate connectors and/or splices to join the optical fibers.
		CO4	Classify the Optical sources and detectors and to discuss their principle.
		CO5	Analyze the power launching and coupling techniques of optical fiber. Compare the performance of optical analog and digital receivers.
		CO6	Design the optical system for given specifications and also high speed links using WDM. Measure the optical fiber parameters.
C415	System Design through Verilog ELECTIVE I	CO1	Illustrate basic Verilog language Constructs and Conventions.
		CO2	Apply Gate Level modeling to realize digital circuits using Verilog.
		CO3	Make use of Behavioral modeling to realize digital circuits.
		CO4	Build digital circuits using Data flow and Switch level

			modeling.
		CO5	Develop Combinational and Sequential logic circuits using Verilog Synthesis.
		CO6	Analyze Verilog Models like SRAM,UART.
C416	Embedded Systems ELECTIVE II	CO1	Classify the elements, characteristics, quality attributes and applications of typical embedded systems.
		CO2	Identify hardware components required for an embedded system and the design approach of an embedded hardware.
		CO3	Compare embedded firmware design approaches on embedded environment.
		CO4	Explain Internals of Real-Time operating system and the fundamentals of RTOS based embedded firmware design and identify the need for hardware software Co-design.
		CO5	Make use of different IDEs for firmware development of different family of processors/controllers and embedded operating systems.
		CO6	Outline the concepts of embedded system implementation and testing.

Laboratory Courses

<i>Course Code</i>	<i>Course Title</i>	<i>Experiment No</i>	<i>CO. No.</i>	<i>Course Outcomes</i>
C417	Micro Wave Engineering & Optical Lab	1,8,9	CO1	Measure and Analyze the Characteristics and Parameters of Microwave signals using Klystron power supply.
		2,3,4,5	CO2	Analyze Scattering Parameters of various Microwave Waveguide Junctions.
		6	CO3	Plot and Analyze the Radiation Patterns of Horn and Parabolic Reflector Antennas.
		7	CO4	Design and Analyze Rectangular Microstrip Patch Antenna using HFSS Software.
		10,11,12	CO5	Measure and Analyze the Characteristics , Parameters and Losses of Optical link using LED and LASER as sources.
C418	Digital Signal Processing Lab	1-12	CO1	Design different Digital Signal & image Processing algorithms using MATLAB/CCSTUDIO software.
		1-12	CO2	Understand the basic operations of Signal & image processing and their significance.
		3, 4	CO3	Understand the application of mathematical tools like Fourier Series and DFT to analyze a DT signal.
		5,6,7	CO4	Design and simulate FIR and IIR filters using different

		,8		techniques.
		1-12	CO5	Apply digital signal processing techniques to design discrete time systems and digital filters.

8th Semester

<i>Course Code</i>	<i>Course Title</i>	<i>Course Outcomes</i>	
C421	Cellular Mobile Communications	CO1	Outline the concepts of cellular systems and the effect of co-channel Interference reduction.
		CO2	Analyze the effects of interferences, develop antenna system.
		CO3	Outline various frequency management, channel assignment algorithms in cellular systems and illustrate various propagation effects in cellular environment.
		CO4	Illustrate different types of antennas used at cell site and mobile stations.
		CO5	Compare various types of handoff techniques and summarise the concepts of dropped calls.
		CO6	Illustrate the architecture of GSM and multiple access techniques.
C422	Electronic Measurements and Instrumentation	CO1	Understand the different characteristics of electronic measuring instruments.
		CO2	Make use of Signal generators to analyze a signal.
		CO3	Understand the design and functioning of Oscilloscopes.
		CO4	Utilize AC bridges for measurement of inductance.
		CO5	Distinguish active transducers from passive transducers.
		CO6	Develop the ability to use instruments for measurement of physical parameters.
C423	Satellite Communications	CO1	Understand the basics of satellite communication and Ability to calculate the orbital determination and launching methods.
		CO2	Demonstrate the Different Sub systems required in a satellite communication system.
		CO3	Design satellite link system for specified C/N .
		CO4	Compare various types of multiple access techniques like TDMA, FDMA , CDMA and DAMA.
		CO5	Illustrate the architecture of Earth station Technology and

			Ability to demonstrate the LEO and GEO satellite systems.
		CO6	Outline the concepts of satellite navigation and the global positioning system.
C424	Digital IC Design ELECTIVE III	CO1	Illustrate the concepts of MOS Design.
		CO2	Design and analysis of Combinational MOS Circuits.
		CO3	Build different Sequential MOS Circuits.
		CO4	Extend the Digital IC Design to Different Applications.
		CO5	Analyze Advanced interconnect techniques.
		CO6	Compare the Concepts of Semiconductor Memories, Flash Memory, RAM array organization.
C425	SEMINAR	CO1	Outline the important concepts to gain factual knowledge.
		CO2	Organise the presentation and disseminate ideas effectively with good communication skills.
		CO3	Develop self learning & time management skills to engage in continuous learning.
		CO4	Synthesize and reflect on to show the depth of knowledge in a compelling, well structured and professional behaviour.
		CO5	Develop writing skills with clarity of thought and expression.
C426	PROJECT	CO1	Demonstrate the technical knowledge to identify problems in the field of Electronics & Communication Engineering and its allied areas.
		CO2	Analyze and formulate technical projects with a comprehensive and systematic approach.
		CO3	Identify the modern tools to implement technical projects.
		CO4	Design engineering solutions for solving complex engineering problems.
		CO5	Develop effective communication skills, professional behaviour and team work.