SIR C R REDDY COLLEGE OF ENGINEERING, ELURU

Approved by AICTE & Affiliated to JNTUK, Kakinada

Department of ECE

COURSE OUTCOMES 2019-2023

CODE	COURSE	C.O CODE	COURSE OUTCOME DESCRIPTION
HS1101	English	CO1	Apply the four languages learning skills-listening, speaking, reading, writing (LSRW) for professional success.
		CO2	Employ knowledge of grammatical structures and vocabulary in speech and writing
		CO3	Apply effective communication skills to enhance professional possibilities.
		CO4	Develop acceptable personality traits suitable for chosen profession.
BS1101	Mathematics-I	CO1	Examine the convergence of series and apply mean value theorem to real life problem.
		CO2	Solve the Differential Equations of first and higher order related to various engineering applications
		CO3	Apply the partial differentiation techniqueto solve physical problem
		CO4	Apply double and triple integrals to find areas and volumes.
BS1106	Applied Chemistry	CO1	Identify the advantages and limitations of plastic materials, elastomers and their use in day to day life.
		CO2	Select the suitable methods of corrosion control and gain the knowledge of applications of batteries.
		CO3	Recognize the need of nano materials, liquid crystals, semiconductors and super conductors.
		CO4	Obtain the knowledge of computational chemistry and molecular machines .
		CO5	Obtain the knowledge of generation of electricity from various Non-Conventional energy sources.
ES1101	PPSUC	CO1	Describe the concept of computer system, analyze a given problem, develop an algorithm, fundamental programming constructs, identify data representation formats, describe operators and their precedence, associativity.
		CO2	Understand branching and loop statements.
		CO3	Describe the concept of homogeneous derives data types, strings and functions.
		CO4	Understand pointers and heterogeneous data types.
		CO5	Describe the concept of file system and functions.
ES1103	Engineering Drawing	CO1	Construct polygons, scales and draw curves used in engineering applications, draw orthographic projection of points
		CO2	Apply concept of orthographic projection to project lines inclined to both reference planes.
		CO3	Produce orthographic projections of planes inclined to both the reference planes.
		CO4	Produce orthographic projections of regular solids inclined to both the reference planes.
		CO5	Construct isometric view from orthographic views and vice versa.
HS1102	English Lab	CO1	Recognize the sounds of English with the help of audio visual aids
		CO2	Build confidence and overcome inhibitions while speaking in English.
		CO3	Demonstrate acquired language skills in performing the designated activity.
BS1107	Ap.Chem.Lab	CO1	Obtain the knowledge of acid-base titrations to determine the strength of acid and base solutions.
		CO2	Gain the knowledge of Redox titrations to determine the concentration of samples such as Ores, KMnO4 and Copper using different indicators.
		CO3	Obtain the knowledge of complexometry titrations to determine the hardness of given water sample by EDTA method.
		CO4	Gain the knowledge of commonly used instruments such as pH meter, Conductivity meter and Potentiometer to determine the strength of given acid solutions.
ES1102	PPSUC LAB	CO1	Describe the basics of computer and understand the problem-solving aspect.
		CO2	Design and develop C program to evaluate simple expressions and logical operations.
		CO3	Develop & Implement C programs with suitable modules to solve the given problem.
		CO4	Demonstrate the concept of pointer and perform I/O operations in files.
BS1202	Mathematics-II	CO1	Solve system of linear algebraic equations and apply eigen value computation technics to reduce a given quadratic to canonical form
		CO2	Solvealgebraic and Transcendental equations by using Numerical methods
		CO3	Apply Newton 's forward and backward interpolation and Lagrange's formula for equal and unequal intervals.
		CO4	Compute numerical solutions of differential equations.
BS1203	Mathematics-III	CO1	Apply the concepts of vector calculus to the problems of work done by a force, circulation and flux
		CO2	Apply Laplace Transforms to solve the ordinary differential equations
		CO3	Compute Fourier series of the periodic function and Apply Fourier transform to a range of non-periodic function.
		CO4	Solve the first and higher order partial differential equations and apply to various physical problems
BS1204	Applied Physics	CO1	Analyze the intensity variation of light due to interference & diffraction and illustrate the resolving power of various optical instruments
		CO2	Explain fundamental concepts of quantum mechanics and apply to one dimensional motion of particles.
		CO3	Explain various electron theories andsummarize various types of solids based on band theory.
		CO4	Understand how electrons & holes behave in semiconductor and explain how they conduct current.
		CO5	Summarize magnetic & dielectric material properties and recognize their need in engineering applications.
ES1209	Network Analysis	CO1	gain the knowledge on basic network elements.
		CO2	will analyze the RLC circuits behavior in detailed.
		CO3	analyze the performance of periodic waveforms.
		CO4	gain the knowledge in characteristics of two port network parameters (Z, Y, ABCD, h & g).
		CO5	analyze the dc exitation concepts in real world applications.

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ES1206	BEEE	CO1	Explain principle and operation of ac&dc machines
		CO2	Analyze characteristics of DC&AC machines
		CO3	Analyze performance of DC&AC machines by conducting various tests.
		CO4	Solve the problems on DC&AC machines
		CO5	Identify various applications of dc&ac machines
ES1215	Electronic Workshop	CO1	Examine characterstics and performance of AC and DC components
		CO2	Analyze the behaviour of various measuting instruments.
		CO3	Describe the working of soldering and PCB layout
ES1208	BEE LAB	CO1	Analyze characteristics & performance of dc shunt and series machines
		CO2	Analysing behaviour of 1-Φ transformer at various loads and power factor conditions
		CO3	Analyze performance of 3- Φ induction motor and alternator
BS1205	App.Phy.Lab	CO1	Apply the knowledge of different phenomena of light like interference, diffraction and handle various optical measuring instruments.
		CO2	Analyze various electronic circuits and study the temperature dependence of semiconductors.
		CO3	Draw the relevance between theoretical knowledge and the means to imply it in a practical manner by performing various relative experiments
HS1203	Communication skills lab	CO1	Recognize the sounds of English with the help of audio visual aids
		CO2	Build confidence and overcome inhibitions while speaking in English.
		CO3	Demonstrate acquired language skills in performing the designated activity.
PR1201	Engineering Exploration Project	CO1	Build mindsets&foundations essential for designs
		CO2	Learn about the Human-Centred design methodologyand understand their real world applications
		CO3	Use design thinkining for problem solving methodology for investigating illdefined problems.
		CO4	Undergo several design challenges and work towards the final design challenge.
R1921041	Electronic Devices and Circuits	CO1	Apply and acquire knowledge on basic concepts of semiconductor physics.
		CO2	Apply the concept of different PN junction diodes in electronic circuits.
		CO3	Analyze various components of power supplies and transistor biasing.
		CO4	Implement various applications of transistors using modern tools.
R1921042	Switching Theory and Logic Design	CO1	Classify different number systems and apply to generate various codes.
		CO2	Use the concept of Boolean algebra in minimization of switching functions
		CO3	Design different types of combinational logic circuits.
		CO4	Apply knowledge of flip-flops in designing of Registers and counters
		CO5	The operation and design methodology for synchronous sequential circuits and algorithmic state machines.
R1921043	Signals and Systems	CO1	Differentiate the various classifications of signals & systems
		CO2	Analyze the frequency domain representation of signals using Fourier concepts
		CO3	Classify the systems based on their properties and determine the response of LTI systems
		CO4	Know the sampling process and various types of sampling techniques
		CO5	Apply Laplace & Z transforms to analyze signals and systems
R1921045	Random Variables and Stochastic Processes	CO1	Understand the concepts of Random variables and its operations
		CO2	Analyze the operations like expectation, variance and moments of multiple random variables
		CO3	Characterize the random processes in time and frequency domain
		CO4	Analyze LTI systems driven by a stationary random process using correlation and spectral density functions.
	Object Oriented Programming through Java	CO1	Show competence in the use of the Java Programming language in the development of small to medium sized application programs that demonstrate professionally acceptable coding and performed standard
		CO2	Illustrate the basic principles of the object-oriented programming
		CO3	Develop exception handling and Multithreading with applications
		CO4	Design and Event handling in Gui applications and develop Networking applications
R1921026	Managerial Economics & Financial Analysis	CO1	Understand how to estimate the Demand and demand elasticities for a product.
		CO2	Understand the Input-Output-Cost relationship and estimation of the least cost combination of inputs.
		CO3	Understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
		CO4	Prepare Financial Statements and the usage of various Accounting tools for Analysis.
		CO5	Evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
R1921046	EDC LAB	CO1	Identify various electronic components and devices with their specifications.
		CO2	Analyze the characteristics of various junction diodes and transistors and calculate their parameters.
		CO3	Verify the parameters of rectifier circuits with and without filter and voltage regulator.
		CO4	Design various amplifiers and observe its frequency response
R1921047	STLD LAB	CO1	Realize and implementation of Boolean function using digital IC's
		CO2	Implementaion of diffrent Combinational logic circuits using IC's
		CO3	Realize and implementation of synchronous and asynchronous counters using flip-flop IC's
		CO4	Design a Finite state mechine for Sequence detector
	Constitution of India	CO1	To understand the role of election commission
		CO2	to differentiate and compare the role of chief election commisioner and commissinarate
		CO3	To analyze the role of state election commission
		CO4	to evaluate various commissions of SC/ST/OBC and women

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R1922041	Electronic Circuit Analysis	CO1	Design and analysis of small signal high frequency transistor amplifier using BJT and FET.
		CO2	Design and analysis of multi stage amplifiers using BJT and FET and Differential amplifier using BJT
		CO3	Deduce the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.
		CO4	Know the classification of the power and tuned amplifiers and their analysis with performance comparison
R1922042	Linear Control Systems	CO1	Classify the control systems and controller feedback on the performance
		CO2	Evaluate the transfer function of various types of control systems
		CO3	Analyze the stability concepts using time-and frequency responses
		CO4	Evaluate compensators in time-domain and frequency -domain
		CO5	Analyze the system response and stability using State space
R1922043	Electromagnetic Waves and Transmission Lines	CO1	Determine E and H using various laws and applications of electric & magneticfields
		CO2	Apply the Maxwell equations to analyze the time varying behavior of Emwaves
		CO3	Gain the knowledge in uniform plane wave concept and characteristics of uniformplane wave in various media
		CO4	Calculate Brewster angle, critical angle and total internal reflection
		CO5	Derive andCalculate the expressions for input impedance of transmission lines,reflection coefficient, VSWR etc. using smithchart
R1922044	Analog Communications	CO1	Students will be able to Differentiate various Analog modulation and demodulation schemes
		CO2	Spectral characteristics Analyze noise characteristics of various analog modulation methods
		CO3	Analyze various functional blocks of radio transmitters and receivers
		CO4	Design simple analog systems for various modulation techniques
R1922045	Computer Architecture and Organization	CO1	Analyze the architecture of modern computer and the performance of a Computer using performance equation.
		CO2	Classify different instruction types and calculates the effective address of an operand by addressing modes.
		CO3	Illustrate the operation and interface of different of I/O devices and memory systems.
		CO4	Design and describe the execution of instructions using hardwired and micro programmed control units.
R1922046	Management and Organizational Behavior	CO1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational structure.
		CO2	Will familiarize with the concepts of functional management that is HRM and Marketing of new product developments.
		CO3	The learner is able to think in strategically through contemporary management practices.
		CO4	The learner can develop positive attitude through personality development and can equip with motivational theories.
		CO5	The student can attain the group performance and grievance handling in managing the Organizational culture.
R1922047	ECA LAB	CO1	Calculate various parameters of FT using modern tools
		CO2	Analyze the working of various oscillators
		CO3	Analyze the working of various amplifiers.
		CO4	Simulate various amplifiers and oscillators using modern tools
R1922048	AC LAB	CO1	Analyze and compare different analog modulation schemes for their modulation factor and power
		CO2	Study pulse amplitude modulation.
		CO3	Characterize different analog modulation schemes and can compute the error performance.
		CO4	Define and simulate the Analog modulations and demodulations .
R1931041	Linear Integrated Circuits and Applications	CO1	Compute AC and DC parameters for various differential amplifier configurations
		CO2	Describe the concepts of operational amplifiers with liner integrated circuits
		CO3	Design circuits using operation amplifiers for various applications
		CO4	Design Butterworth filters and oscillators using functional ICs
R1931042	Microprocessor and Microcontrollers	CO1	Describe the architectural features of 8086 processor, 8051 controller .
		CO2	Demonstrate the assembly language programmng skills for 8086 microprocessors and 8051 micro controller.
		CO3	Analyse various interfacing techniques and apply to design 8086 and 8051 based system
		CO4	Describe the architectural features of ARM CORETEX processor, Demonstrate the programming skills of ARM.
R1931043	Digital Communications	CO1	Understand basic components of digital communication systems
		CO2	Design Optimum receivers for digital modulation techniques
		CO3	Analyze the error performance of digital modulation techniques
		CO4	Know about different error detecting and error correcting codes.
R1931044	Electronic Measurements & Instrumentation	CO1	Recognise the static and dynamic characteristics of instruments and types of errors.
		CO2	Gain knowledge on the working principles of Ammeters, Voltmeters,Ohmmeters, Multimeters and signal generators for appropriate measurement
		CO3	Analyze different types of digital instruments like frequency counter, Oscilloscopes, wave analyzers, Q-meters, AC & DC bridges.
		CO4	Apply appropriate passive and active transducers for measurement of physical parameters

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CODE	COURSE	C.O CODE	COURSE OUTCOME DESCRIPTION
R193104B	Digital System Design usingHDL	CO1	Understand the architecture of FPGAs, tools used in modelling of digital design
		CO2	Analyze and design basic digital circuits with combinatorial and sequential logic circuits using Verilog HDL.
		CO3	Model complex digital systems at several levels of abstractions
		CO4	Design real time applications such as vending machine and washing machines etc
R1931045	LICA LAB	CO1	Understand the basics of Op-Amp and to Design, Analyze Amplifiers, Active filters and Hysteresis voltage of Schmitt trigger using 741 IC.
		CO2	DesIgn the multivibrator circuits using IC555 and determine frequency of oscillation and timedelay
		CO3	Understand the functionality of IC723 and determine the load and line regulations. • Understand the characteristics of PLL & design the various applications of PLL
R1931046	DC LAB	CO1	Demonstrate the performance of Analog to Digital Conversion techniques.
		CO2	Analyze different Digital Modulation & Demodulation schemes
		CO3	Evaluate various Source & Channel Coding Techniques
		CO4	Analyze Multiplexing & Demultiplexing scheme
R1931047	MPMC LAB	CO1	An ability to understand programming of processors/ microcontroller
		CO2	Develop assembly language programs for processors.
		CO3	Develop assembly language programs for various applications using 8051 microcontroller
		CO4	An ability to perform interfacing with 8086 and 8051.
R1931048	MINI PROJECT	CO1	Identify the complex engineering problems relevant to the society and industry.
		CO2	Apply modern technologies, tools and systems in the field of Electronics and Communication Engineering to analyze the identified problem.
		CO3	Design and implement a viable solution to the problem
		CO4	Apply communication, report writing skills& Presentation skills.
		CO5	Develop the team work and leadership skills with professional and ethical values.
R1931049	Essence of Indian Traditional Knowledge	CO1	To understand the concept of Traditional knowledge and its importance
		CO2	To know the need and importance of protecting traditional knowledge
		CO3	To know the various enactments related to the protection of traditional knowledge
		CO4	To understand the concepts of Intellectual property to protect the traditional knowledge
R1932041	Wired and Wireless Transmission Devices	CO1	Identify basic antenna parameters.
		CO2	Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and micro strip antennas
		CO3	Quantify the fields radiated by various types ofantennas
		CO4	Design and analyze antennaarrays
		CO5	Analyze antenna measurements to assess antenna'sperformance
		CO6	Identify the characteristics of radio wavepropagation
R1932042	VLSI Design	CO1	Demonstrate a clear understanding of fabrication flow and technology scaling
		CO2	Apply the design rules and draw layout of a given logic circuit
		CO3	Analyse the behaviour of amplifier circuits with various loads
		CO4	Design static and dynamic CMOS based combinational and Sequential logic circuits
		CO5	Demonstrate a clear understanding of FPGA architectures and advanced technologies
R1932043	Digital Signal Processing	CO1	Analyze the Discrete time signals and systems
		CO2	Apply FFT algorithms for efficient computation of the DFT
		CO3	Design and realize digital filters for desired specifications
		CO4	Apply the signal processing concepts on DSP Processor
R193204A	Cellular & Mobile Communication	CO1	Compare the different mobile telephone systems, multiple access schemes and types of interference.
		CO2	Describe the concepts of cellular systems and Radio propagation and modelling.
		CO3	Analyze and Design the frequency management, channel assignment strategies and interference in cellular systems.
		CO4	Analyze carrier to interference ratio and different handoff strategies.
R193204F	DataMining	CO1	Understand stages in building a Data Warehouse
		CO2	Understand the need and importance of preprocessing techniques
		CO3	Understand the need and importance of Similarity and dissimilarity techniques
		CO4	Analyze and evaluate performance of algorithms for Association Rules.
		CO5	Analyze Classification and Clustering algorithms
R1932044	IOT	CO1	Understand the concepts of architectural and design principles of IoT
		CO2	Illustrate various smart objects connected to IoT
		CO3	Interpret different network technology protocols for IoT
		CO4	Develop real time IoT based applications by understanding the role of IoT in various IoT case studies
R1932045	VLSI LAB	CO1	Perform simulation of various combinational logic circuits and sequential logic circuits using Verilog
		CO2	Perform FPGA level synthesis of various combinational logic circuits and sequential logic circuits using Verilog
		CO3	perform backend level design of combinational and sequential circuits
R1932046	DSP LAB	CO1	Understand the handling of discrete signals in time and frequency domain and using MATLAB.
		CO2	Demonstrate various signal processing operations using MATLAB.
		CO3	Analyze and Design IIR and FIR filters using MATLAB.
		CO4	Verify various signal processing operations on DSP kit.

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R1932047	IPR&P	CO1	IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents
		CO2	Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements
		CO3	advanced Technical and Scientific disciplines
		CO4	Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latestdevelopments
R1941047	Microwave and Optical Communication Engineering	CO1	The historical background, basic concepts and frequency allocations for Microwave Engineering & Optical Communications.
		CO2	Able to Demonstrate different kinds of Wave guide structures & Optical fiber structures
		CO3	Able to Design & Demonstrate the process of Link power budget in Optical communications.
		CO4	Able to Distinguish between Microwave tubes and Solid State Devices, calculation of efficiency devices
R1941042	Data Communications & Computer networks	CO1	Know categories and functions of various data communication networks and network models
		CO2	Compare various flow, error control mechanisms and multiple access protocols
		CO3	Demonstrate the mechanism of connection, congestion control and routing.
		CO4	Summarize the functioning of various application layer protocols
R1941043	Digital Image and Video Processing	CO1	Defining the digital image, representation of digital image, importance of image resolution, applications in image processing
		CO2	Know the advantages of representation of digital images in transform domain, application of various image transforms.
		CO3	Know how an image can be enhanced by using histogram techniques, filtering techniques Etc
		CO4	Understand image degradation, image restoration techniques using spatial filters and Frequency domain
		CO5	Know the detection of point, line and edges in images, edge linking through local processing, global processing. Understand the redundancy in images, various image compression techniques.
		CO6	Know the video technology from analog color TV systems to digital video systems, how video signal is sampled and filtering operations in video processing. Know the general methodologies for 2D motion estimation, various coding used in video processing.
R1941044B	Analog ICDesign	CO1	Model and simulate different MOS Devices using small signal Model.
		CO2	Design and analyze any Analog Circuits in real time applications
		CO3	Apply the concepts Analog Circuit Design to develop various Applications in Real Time.
		CO4	Analyze and compare different Open-Loop Comparators and Oscillators.
R1941045C	EmbeddedSystems	CO1	Understand the basic concepts of an embedded system and able to know an embedded system design approach to perform a specific function.
		CO2	Associate with hardware components required for an embedded system and for the design approach of an embedded hardware.
		CO3	Make use of various embedded firmware design approaches, development languages on embedded environment.
		CO4	Understand how to integrate hardware and firmware of an embedded system using real time operating system.
		CO5	Analyse embedded software development cycles and tools including testing.
R1941046	IOT LAB	CO1	Understand the concept of Internet of Things
		CO2	Demonstrate the implementation of street light control, Smoke detection and obstacle detection
		CO3	Interfacing of touch sensor, Ultrasonic sound sensor, Humidity and Temperature sensors with Arduino /Node MCU
		CO4	Demonstrate the ability to program the PSoC 4 BLE.
R1941047	MOCE LAB	CO1	Observe the characteristics of various microwave and optical sources
		CO2	Measure and analyze electrical and Scattering parameters of various microwave components using microwave bench
		CO3	Determine the losses and data rate in optical link .
		CO4	Examine the radiation pattern of the antennas.
R1941048	PROJECT-1	CO1	Identify the complex engineering problems relevant to the society and industry.
		CO2	Apply modern technologies, tools and systems in the field of Electronics and Communication Engineering to analyze the identified problem.
		CO3	Design and implement a viable solution to the problem
		CO4	Apply communication, report writing skills& Presentation skills.
		CO5	Develop the team work and leadership skills with professional and ethical values.
R194204A	Wireless Communication	CO1	Know about the Wireless systems and Standards (1G/2G/3Gsystems).
		CO2	Concept and analysis of CDMA-based wireless networks.
		CO3	Understand the concepts of Multiple-Input Multiple-Output(MIMO).
		CO4	Understand the modern wireless systems using OFDM.
		CO5	Analysis of Satellite-Based Wireless systems.

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R194204G	Cyber Security &Cryptography	CO1	Able to identify the security risks&take preventives teps
		CO2	Illustrate the methods for data recovery ,evidence collection& data seizure
		CO3	Analyze various computer forensic systems
		CO4	Understand the cybercrime legal perspectives
R1942041	PROJECT-2	CO1	Identify the complex engineering problems relevant to the society and industry.
		CO2	Apply modern technologies, tools and systems in the field of Electronics and Communication Engineering to analyze the identified problem.
		CO3	Design and implement a viable solution to the problem
		CO4	Apply communication, report writing skills& Presentation skills.
		CO5	Develop the team work and leadership skills with professional and ethical values.

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