G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY::KURNOOL
(AUTONOMOUS)
ACCREDITED BY NAAC 'A' GRADE OF UGC AND NBA OF AICTE
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE OUTCOMES-R20 REGULATION

III

S.NO	Course Outcomes (COs)
1.	**A30015 – TRANSFORM TECHNIQUES AND COMPLEX VARIABLES**
	30015.1 Apply Laplace transforms to solve ordinary differential equations.
	30015.2 Build Fourier series and Fourier transforms of a given function.
	30015.3 Test for analyticity of complex functions in the given domain
	30015.4 Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper Integrals along contours
	30015.5 Evaluate improper integrals of complex functions using Residue theorem
2.	**A30403 – ELECTRONIC DEVICES AND CIRCUITS**
	A30403.1 Explain the construction, working principles and applications of various electronic devices.
	A30403.2 Analyze the characteristics of diodes and transistors.
	A30403.3 Design the DC bias circuitry of BJT and FET for various applications.
	A30403.4 Construct the simple amplifier circuits using BJT and FET.
3.	**A30404 – DIGITAL LOGIC DESIGN**
	A30404.1 Perform arithmetic operations on different number systems and to apply the principles of Boolean algebra to minimize logic expressions.
	A30404.2 Make use of k-map and tabulation methods to minimize Boolean functions and to implement with logic gates.
	A30404.3 Analyze basic components used in digital systems such as adder, subtractor, decoder, encoder, multiplexer, flip-flops, registers and counters.
	A30404.4 Distinguish combinational and sequential logic in terms of their functions.
	A30404.5 Design various PLDs such as ROMs, PALs, PLAs and PROMs.
4.	**A30405 – SIGNALS AND SYSTEMS**
	A3405.1 Distinguish between different signals and systems.
	A3405.2 Make use of Fourier series for the representation of signals.
	A3405.3 Analyze different signals by using an appropriate transform.
	A3405.4 Examine the transmission characteristics of linear systems.
	A3405.5 Select an appropriate transform to find the transfer function of linear systems.
5.	**A30211 – NETWORK ANALYSIS**
	A30211.1 Understand the basic Fundamentals of A.C and D.C circuits and solve the basic various circuits by using mesh and node analysis.
	A30211.2 Apply the theorems to solve A.C and D.C complex circuits to calculate the voltage, current and power.
	A30211.3 Apply the fundamental knowledge of circuits to calculate the various parameters for A.C and D.C circuits.
	A30211.4 Apply the basic fundamentals of Laplace transform to calculate the transient and steady state response of D.C and A.C circuits.
	A30211.5 Apply the basic fundamentals of circuits to calculate resonance frequency, quality factor and also analyze the magnetic coupled circuits.
6.	**A30406 – ELECTRONIC DEVICES AND CIRCUITS LABORATORY**
	A30406.1 Identify various electronic components and measuring equipment.
	A30406.2 Analyze the V-I characteristics of electronic devices.
	A30406.3 Measure the ripple content present in rectifiers with and without filters.
	A30406.4 Construct single stage amplifier circuits and plot transient and frequency response.

7.	**A30407 – DIGITAL LOGIC DESIGN LABORATORY**
	A30407.1 Construct combinational and sequential circuits using LabVIEW Software.
	A30407.2 Execute LabVIEW graphical programs for combinational and sequential circuits.
	A30407.3 Analyze combinational and sequential circuits functioning using LabVIEW Software.
	A30407.4 Test and Debug the combinational and sequential circuits using LabVIEW Software.
	A30407.5 Develop LabVIEW based projects using LabVIEW Software.
8.	**A30408 – BASIC SIMULATION LABORATORY**
	A30408.1 Develop programs to generate different signals.
	A30408.2 Compile programs to perform different operations on signals and sequences.
	A30408.3 Analyze different responses of the systems and spectrums of the signals.
	A30408.4 Test the different properties of given signals and systems.
9.	**A30409 – PCB DESIGNING**
	A30409.1 Understand the significance of printed circuit board design
	A30409.2 Analyze various PCB components and their categories
	A30409.3 Understand the concept of development tools like OrCAD and PROTEUS
	A30409.4 Develop academic and industrial based projects using OrCAD and PROTEUS.
10.	**A30032 – UNIVERSAL HUMAN VALUES**
	A30032.1 Understand the significance of value inputs in a classroom and start applying them in their life and profession
	A30032.2 Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
	A30032.3 Understand the value of harmonious relationship based on trust and respect in their life and profession
	A30032.4 Understand the role of a human being in ensuring harmony in society and nature.
	A30032.5 Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.
	A30032.6 Analyze the value of maintaining ethical values in critical situations

S.NO	Course Outcomes (COs)
1.	**A30412 – ANALOG COMMUNICATION SYSTEMS**
	A30412.1 Explain the operation of different analog communication systems.
	A30412.2 Analyze the performance of different modulation schemes used in analog communication systems.
	A30412.3 Make use of sampling theorem to generate pulse modulation signals.
	A30412.4 Analyze the performance of AM, FM and PM receivers in the presence of noise.
	A30412.5 Choose an appropriate modulation technique to design an analog communication system.
2.	**A30017 – PROBABILITY THEORY AND STOCHASTIC PROCESSES**
	A30017.1 Apply different probability techniques to observe the different events.
	A30017.2 Determine the characteristics of random variables and random processes.
	A30017.3 Classify the random processes by using different techniques.
	A30017.4 Analyze the temporal and spectral characteristics of stochastic processes.
	A30017.5 Develop the relationship between the input and output statistical characteristic of a linear system.
3.	**A30413 – ELECTRONIC CIRCUIT ANALYSIS**
	A30413.1 Analyze the small signal models of BJT amplifiers at high frequencies.
	A30413.2 Analyze the frequency response of single and multi-stage amplifiers with compound connections.
	A30413.3 Classify amplifiers based on feedback mechanism.
	A30413.4 Evaluate the efficiency of large signal amplifiers.
	A30413.5 Explain the concept of resonant frequency in tuned amplifiers.
4.	**A30414 – ELECTROMAGNETICS AND TRANSMISSION LINES**
	A30414.1 Apply various laws of electrostatics and magnetostatics to deduce Maxwell'sequations in static and time variants fields.
	A30414.2 Develop boundary conditions for different combinations of media.
	A30414.3 Make use of Maxwell's equations to deduce EM wave equations.
	A30414.4 Develop expressions for primary and secondary parameters of transmission line using conventional and graphical methods.
	A30414.5 Derive continuity equation, Poisson's, Laplace's equation and Poynting theorem to characterize field.
5.	**A30019 – MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
	A30019.1 Analyze the concepts of managerial economics and financial accounting to makebetter decisions in the organization
	A30019.2 Analyze the demand, production, cost and break even to know interrelationshipamong variables and their impact
	A30019.3 Classify the market structure to decide the fixation of suitable price
	A30019.4 Apply capital budgeting techniques to select best investment opportunity
	A30019.5 Analyze and prepare financial statements to assess financial health of business
6.	**A30415 – ANALOG COMMUNICATION SYSTEMS LABORATORY**
	A30415.1 Analyze the performance of different continuous modulation and demodulation schemes.
	A30415.2 Sketch the characteristics of mixer, pre-emphasis and de-emphasis.
	A30415.3 Compute the specifications of a phase locked loop.
	A30415.4 Analyze the performance of different pulse modulation Schemes.
7.	**A30416 – ELECTRONIC CIRCUIT ANALYSIS LABORATORY**

	A30416.1 Design single and multistage amplifiers at low, mid and high frequencies.
	A30416.2 Determine the gain of feedback amplifiers and efficiency of power amplifiers.
	A30416.3 Design oscillator circuits for given frequency of oscillation.
	A30416.4 Compare the frequency response of tuned amplifiers.
	A30416.5 Analyze all the electronic circuits using simulation software and hardware.
8.	**A30417 – INTERNET OF THINGS LABORATORY**
	A30417.1 Develop embedded C Programs using arduino uno and ide.
	A30417.2 Execute arduino C programs for blink led, push button, potentiometer, fade led, ldr, serial interface, lcd, dht sensor.
	A30417.3 Build Programs of nodemcu using embedded C.
	A30417.4 Interface LEDs, Push Buttons, dht sensor, ir sensor, mqtt broker to nodemcu.
	A30417.5 Test and Debug arduino uno and nodemcu embedded C Programs.
9.	**A30418 – WEB DEVELOPMENT**
	A30418.1 Develop front end of an application using HTML, CSS and JavaScript along with ReactJs.
	A30418.2 Develop back end of an application using NodeJs.
	A30418.3 Implement MVC and responsive design to scale well across PC, tablet and Mobile Phone.
	A30418.4 Develop a website and deploy on a web server.
	A30418.5 Authenticate, store, and structure user data.

S.NO	Course Outcomes (COs)
1.	**A30425 – ANTENNAS AND WAVE PROPAGATION** A30425.1: Compare the performance of different antennas using antenna parameters A30425.2: Analyze dipole and array antennas by computing fields, radiated power and radiation resistance. A30425.3: Select appropriate antenna for a specific application like TV, AM/FM radio, radar, satellite link. A30425.4: Design horn, helical and reflector antennas for VHF, UHF and microwave communication applications A30425.5: Formulate the design equations of microstrip antennas for a given application
2.	**A30426-DIGITAL COMMUNICATION SYSTEMS** A30426.1 Analyze different digital modulation techniques to convert analog signals to digitalform. A30426.2 Distinguish between baseband and passband transmission techniques in terms of SNRand BER. A30426.3 Examine the concepts of geometric representation of signals and constellationdiagrams. A30426.4 Compare digital carrier modulation schemes in terms of bandwidth, complexity andspectral efficiency. A30426.5 Interpret the differences between linear block codes and convolutional codes for noisyand noiseless channels.
3.	**A30427 – LINEAR INTEGRATED CIRCUIT APPLICATIONS** A30427.1 Analyze the characteristics of operational amplifier. A30427.2 Design different amplifier and oscillator circuits using op-amp. A30427.3 Make use of IC 555 and PLL effectively in communication systems. A30427.4 Construct different active filters using op-amp. A30427.5 Design different analog to digital and digital to analog converters effectively.
4.	**A30451 – OPTICAL COMMUNICATIONS (Professional Elective-1)** A30451.1 Analyze different optical propagation methods and understand cylindrical fibers and mode configurations A30451.2 Differentiate various fabrication methods used in optical fibers and factors causing signal distortion A30451.3 Evaluate the signal degradation at fiber joints and fiber splices A30451.4 Describe the characteristics of optical sources and detectors, and power launching capability of optical fiber A30451.5 Evaluate the power penalties by system considerations in the link, error control corrections and detections
5.	**A30453 – SYSTEM DESIGN THROUGH VERILOG HDL(Professional Elective-1)** A30453.1 Understand the basics of Hardware Description Languages, Program structure and basic language elements of Verilog. A30453. 2 Understand types of modelling, modules, functions of Verilog and simulate and synthesize related Programs. A30453. 3 Design, Simulate and synthesize various Verilog descriptions for Combinational circuits. A30453. 4 Design, Simulate and synthesize various Verilog descriptions for Sequential circuits. A30453. 5 Use tasks and functions to design complex circuits like combinational and sequential UDPs.
6.	**A30458 – COMPUTER ARCHITECTURE AND ORGANIZATION(Professional Elective-1)** A30458.1 Recognize basic digital computer components and various microoperations and their implementation in RTL. A30458.2 Interpret the various parameters effect the computer performance and techniques to increase

	performance.	
	A30458.3 Experiment with the representation of data, addressing modes, instruction sets, stacks and register organization in a basic computer.	
	A30458.4 Understanding the various techniques to design functional units of the processor such as register file, arithmetic logic unit and control unit.	
	A30458.5 Understand memory hierarchy and analyze the functioning of a multi-processor system and interconnection structures.	
7.	**A30284 – CONTROL SYSTEMS ENGINEERING (Open Elective-1)**	
	A30284.1 Determine the transfer function of a given system using different techniques.	
	A30284.2 Analyze the response of a given system in time and frequency domains.	
	A30284.3 Test the stability, observability and controllability of a given system.	
	A30284.4 Apply suitable technique for calculating the gain margin and phase margin of a given system.	
8.	**A30428 – DIGITAL COMMUNICATION SYSTEMS LABORATORY**	
	A30428. 1 Demonstrate the working of various digital modulation and demodulation schemes.	
	A30428.2 Design various digital modulation schemes to obtain desired modulation index.	
	A30428.3 Analyze the performance of time division multiplexing and demultiplexing.	
	A30428.4 Study and verify sampling theorem.	
	A30428.5 Verify digital modulation techniques using MATLAB.	
9.	**A30429 – LINEAR INTEGRATED CIRCUIT APPLICATIONS LABORATORY**	
	A30429.1 Implement different configurations of operational amplifiers.	
	A30429.2 Generate various shapes of signals using op-amps and timers.	
	A30429.3 Construct and analyze various active filters and data converters using op-amp.	
	A30429.4 Analyze the characteristics and applications of PLL.	
10.	**A30430 – PYTHON FULL STACK**	
	A30430.1 Develop front end of an application using HTML, CSS and JavaScript along with ReactJs.	
	A30430.2 Develop back end of an application using NodeJs.	
	A30430.3 Implement MVC and responsive design to scale well across PC, tablet and Mobile Phone.	
	A30430.4 Develop a website and deploy on a web server.	
	A30430.5 Authenticate, store, and structure user data.	
11.	**A30033 – INDIAN CONSTITUTION**	
	A30033.1 Understand historical background of the constitution making and its importance for building a democratic India.	
	A30033.2 Explain the role of President and Prime Minister.	
	A30033.3 Understand the functioning of three wings of the government ie., executive, legislative and judiciary.	
	A30033.4 Understand the value of the fundamental rights and duties for becoming good citizen of India	
	A30033.5 Analyze the decentralization of power between central, state and local selfgovernment.	
	A30033.6 Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.	

S.NO	Course Outcomes (COs)
1.	**A30432 – DIGITAL SIGNAL PROCESSING**
	A30432.1 Apply the Discrete Fourier Transform to represent the signals in frequency domain.
	A30432.2 Analyze various DFT algorithms and their applications.
	A30432.3 Analyze various realization forms of FIR and IIR Filters.
	A30432.4 Design digital FIR and IIR filters and analyze their performances.
	A30432.5 Apply the concepts of multirate signal processing to implement digital filters.
2.	**A30433 – MICROPROCESSORS & MICROCONTROLLERS**
	A30433.1 Analyze 8086 microprocessor and MSP430 microcontroller architectures.
	A30433.2 Develop programs using 8086 microprocessor and MSP430 microcontroller.
	A30433.3 Make use of peripherals of MSP430 to interface I/O devices.
	A30433.4 Apply serial communication protocols for interfacing serial devices.
	A30433.5 Design embedded applications using MSP430 microcontroller.
3.	**A30434 – CMOS VLSI DESIGN**
	A30434.1 Analyze the electrical properties of MOS transistors
	A30434.2 Apply various CMOS processing techniques to fabricate NMOS, PMOS and CMOSdevices
	A30434.3 Analyze the DC and transient characteristics of CMOS logic gates
	A30434.4 Build logic circuits using transmission gate logic
	A30434.5 Make use of charge leakage and charge sharing concepts to design dynamic logicCircuits
4.	**A30454 - MICROWAVE ENGINEERING (Professional Elective-2)**
	A30454.1 Analyze rectangular waveguide transmission line characteristics using concepts of Electromagnetic theory.
	A30454.2 Evaluate relation between input(s) and output(s) of microwave passive componentsusing scattering parameters.
	A30454.3 Compare performance of O-type and M-type microwave tubes.
	A30454.4 Sketch the characteristics of microwave solid state devices.
	A30454.5 Measure microwave parameters using microwave bench setup.
5.	**A30455 – BIOMEDICAL SIGNAL PROCESSING (Professional Elective-2)**
	A30455.1 Analyze the nature of biomedical signals and related concepts.
	A30455.2 Apply averaging technique on biomedical signals and extract the features.
	A30455.3 Design various time domain filtering techniques for the removal of artefact from biomedical signal.
	A30455.4 Apply signal compression techniques on biomedical signals.
	A30455.5 Analyze event detection techniques for EEG and ECG signals.
6.	**A30456 – FPGA Design (Professional Elective-2)**
	A30456.1 Discuss different PLDs based on real time applications and compare its architectures.
	A30456.2 Analyze the programmable technologies used in FPGAs.
	A30456.3 Design combinational and sequential circuits using FPGA.
	A30456.4 Distinguish between technology dependent and technology independent optimizations while implementing logic in FPGA.
	A30456.5 Make use of finite state machines to design applications on FPGA.
7.	**A30582 – FUNDAMENTALS OF DBMS (Open Elective-2)**
	A30582.1 Apply suitable data models for given application.
	A30582.2 Design database using integrity constraints and ACID properties.
	A30582.3 Construct optimized SQL queries to solve real time problems.
	A30582.4 Apply suitable normal form to eliminate data redundancy.
	A30582.5 Choose appropriate index structure to improve performance.

8.	**A30435 – DIGITAL SIGNAL PROCESSING LABORATORY**
	A30435.1 Evaluate the DFT and IDFT of given signals using MATLAB.
	A30435.2 Analyze various DFT algorithms and their applications.
	A30435.3 Design IIR and FIR digital filters for the given specifications using MATLAB.
	A30435.4 Apply the concepts of multirate signal processing using MATLAB.
	A30435.5 Demonstrate real-time signal Processing applications with DSK kit (TMS320C6713) and Code Composer Studio.
9.	**A30436 – MICROPROCESSORS AND MICROCONTROLLERS LABORATORY**
	A30436.1 Develop assembly language programs using EMU8086 emulator.
	A30436.2 Execute 8086 ALPs for arithmetic, logical, string, call operations.
	A30436.3 Build programs of MSP430 using embedded C.
	A30436.4 Interface LEDs, push buttons, potentiometer to MSP430.
	A30436.5 Test and debug 8086 ALPs and MSP430 embedded C programs.
10.	**A30510 – OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY**
	A30510.1 Design solutions for the problems of general purpose applications using object oriented concepts.
	A30510.2 Generate reusable code using inheritance, user defined packages and interface
	A30510.3 Write robust and efficient code using exception handling and multithreading concepts
	A30510.4 Implement collection frameworks and file handling techniques to store and retrieve data
	A30510.5 Design user interface using swings
11.	**A30524 – R PROGRAMMING**
	A30524.1 Understand and apply the basics in R programming in terms of constructs, control statements, string functions
	A30524.2 Apply the functions on matrix rows and columns and list operators
	A30524.3 Work on Data frames and tabular type of DATA
	A30524.4 Understand and write reliable code using OOP concepts in R
	A30524.5 Understand and apply R Interfaces for Other languages
12.	**A30034 – GENDER SENSITIZATION**
	A30034.1 Develop a better understanding of important issues related to gender in contemporary India
	A30034.2 Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender
	A30034.3 Acquire insight into the gendered division of labour and its relation to politics and economics
	A30034.4 Equip to work and live together as equals
	A30034.5 Develop a sense of appreciation of women in all walks of life

S.NO	Course Outcomes (COs)
1.	**A30459 – CELLULAR & MOBILE COMMUNICATIONS (Professional Elective-3)** A30459.1 Analyze the cellular mobile system design concepts to improve the signal to noise Ratio and cell coverage. A30459.2 Interpret the Co-channel interferences and their parameters to improve the system capacity. A30459.3 Illustrate the importance of cell coverage for signal and traffic, diversity techniques and mobile antennas to a caller. A30459.4 Utilize the Omni directional and directional antennas to improve the channel capacity and interference reduction. A30459.5 Demonstrate the Interim Standard, Digital Enhanced Cordless System, multiple access schemes of the wireless networks and standards and types of handoff.
2.	**A30461 – LOW POWER VLSI DESIGN(Professional Elective-3)** A30461.1 Comprehend different sources of power dissipation. A30461.2 Realize switched capacitance and arrive at ways to minimize. A30461.3 Analyze and minimize dynamic and static power consumption in VLSI circuits. A30461.4 Outline the working principles of adiabatic logic. A30461.5 Establish ways to minimize power in software design.
3.	**A30462 – EMBEDDED SYSTEM DESIGN(Professional Elective-3)** A30462.1 Analyze the embedded systems features and architecture considerations A30462.2 Develop Programs using TM4C123GH6PM Microcontroller A30462.3 Make use of Peripherals of TM4C123GH6PM to interface I/O Devices A30462.4 Apply Serial Communication Protocols for interfacing serial Devices. A30462.5 Design Embedded Applications using TM4C123GH6PM Controller
4.	**A30463 – GLOBAL NAVIGATION SATELLITE SYSTEM(Professional Elective-4)** A30463.1 Understand the principle of operation of GPS and GPS ephemerides. A30463.2 Analyze GPS signal structure and significance of various coordinate systems A30463.3 Estimate the various errors and their effect on position estimation. A30463.4 Compare other global and regional navigational systems. A30463.5 Apply DGPS principle and also analyze various augmentation systems. Use of GPS inSurveying, Mapping and Navigation
5.	**A30465 – SYSTEM VERILOG & VERIFICATION(Professional Elective-4)** A30465.1 Develop language constructs of System Verilog HDLs and implements a digital logic effectively. A30465.2 Utilize assertions to quickly correct behaviour in simulation. A30465.3 Design an interface between the System Verilog test program and the Device Under Test. A30465.4 Construct a device driver routine to drive DUT input with stimulus from generator. A30465.5 Execute device drivers, monitors and self-checking routines concurrently.
6.	**A30468 – DIGITAL IMAGE PROCESSING(Professional Elective-5)** A30468.1 Demonstrate different operations on image pixels. A30468.2 Distinguish between different types of image transforms. A30468.3 Compare different image enhancement techniques. A30468.4 Apply different techniques to perform image segmentation. A30468.5 Contrast between different color models and compression techniques.
7.	**A30583 – BASICS OF SOFTWARE ENGINEERING (Open Elective-3)** A30583.1 Apply the phases of software development life cycle in application development.

	A30583.2 Identify software requirements for construction.
	A30583.3 Design requirement engineering process for change management.
	A30583.4 Apply the design concepts for design models.
	A30583.5 Construct the various testing techniques for software systems.
8.	**A30588 – INTRODUCTION TO JAVA PROGRAMMING(Open Elective-4)**
	A30588.1 Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP like encapsulation, Inheritance and Polymorphism.
	A30588.2 Demonstrate an ability to design and develop java programs, analyze, and interpret object oriented data and report results.
	A30588.3 Demonstrate an ability to design an object oriented system, swing components and multithreaded processes as per needs and specifications.
	A30588.4 Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks like console and windows applications both for standalone and Applets programs.
	A30588.5 Demonstrate skills to use latest object oriented programming language and software to analyze OOP problems.
	A30588.6 Develop confidence for self-education and ability for life-long learning needed for advanced java technologies.
9.	**A 30022 - PROFESSIONAL ETHICS**
	A30022.1 to identify ethical dilemmas and take ethical decisions.
	A30022.2 to consider the importance of maintaining professional competence and pursuing lifelong learning
	A30022.3 to understand patterns and channels of communication and their efficiency.
	A30022.4 to analyze and evaluate available data andinformation from a variety of sources.
	A30022.5 to demonstrate leadership qualities in teams effectively and efficiently.
	A30022.6 theimportance of applying an enquiring mind when collecting and assessing data and information.
10.	**A30438 – VLSI & EMBEDDED SYSTEMS PROGRAMMING**
	A30438.1 Design and draw the internal structure of the various digital integrated circuits.
	A30438.2 Develop Verilog HDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.
	A30438.3 Verify the logic with the necessary embedded hardware.
	A30438.4 Build Embedded C Programs using TM4C123GH6PM microcontroller.
	A30438.5 Develop embedded systems applications using TM4C123GH6PM.