R K COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi & Affiliated to JNTUK, Kakinada & SBTET, Amaravati)
(An ISO 9001:2015 Certified Institution)
Kethanakonda (V), Ibrahimpatnam (M), Vijayawada, AMARAVATI - AP - 521456

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE OUTCOMES (COs)

Course Outcomes (COs) describe what students can able to do after completion of the course.

S.No	Year-Sem	Course Code	Course Name	Course Outcomes After completion of the course student can able to
1	II-I	PCC	Electronic Devices And Circuits	**CO1:** Understand the principles of semiconductor Physics.
				CO2: Analyze and create application of special purpose diodes, and electronic circuits
				CO3: Understand carrier transport in semiconductors.
				CO4: Analyze and evaluate the mathematical models of MOS&BJT transistors for circuits and systems.
				CO5: Analyze and create application of transistor amplifier models
2	II-I	BSC	M-III	**CO1:**Interpret the physical meaning of different operators such as gradient, cur land divergence (L5)
				CO2: Estimate the work done against a field, circulation and flux using vector calculus (L5)
				CO3: Apply the Laplace transform for solving differential equations (L3)
				CO4: Find or compute the Fourier series of periodic signals (L3)
				CO5: Know and be able to apply integral expressions for the forwards and inverse Fourier transform to arrange of non-periodic wave forms (L3) Identify solution methods for partial differential equations that model physical process
				CO1: Differentiate the various classifications of signals and systems
				CO2: Analyze the frequency domain

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				Swings and AWT.
7	II-I	PCC Lab	Electronic Devices And Circuits Lab	**CO 1:** Measure Voltage, frequency and phase of any wave form using CRO
				CO 2: Generate sine, square and triangular waveforms with required frequency and amplitude using function generator
				CO 3: Analyze the characteristics of different electronic devices such as diodes, transistors etc. and simple circuits like rectifiers, amplifiers etc.,
8	II-I	PCC Lab	Switching Theory And Logic Design Lab	**CO 1:** Students Able to design simple combinational circuit by using basic logic gates.
				CO 2: Students are able to design full adder circuit and verify its functional table.
				CO 3: Students are able to verify functional tables of (i.) JK Edge Triggered Flip- Flop (ii.) JK Master Slave Flip Flop
				CO 4: Students are able to design a four bit ring counter using D- Flip Flops/JK Flip-Flops.
				CO 5: Able to design a four bit Johnson's Counter using D-Flip Flops/JK Flip-Flops.
9	II-II	PCC	Digital IC Design	**CO1:** Understand the structure of commercially available digital integrated circuit families.
				CO2: Learn the IEEE Standard 1076 Hardware Description Language (VHDL).
				CO3: Model complex digital systems at several levels of abstractions, behavioral, structural, and rapid system prototyping.
				CO4: Analyze and design basic digital circuits with combinatorial circuits using VHDL.
				CO5: Analyze and design basic digital circuits with sequential logic circuits using VHDL.
				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: Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.

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10	II-II	BSC/PC	Electronic Circuit Analysis	**CO4:** Know the classification of the power and tuned amplifiers and their analysis with performance comparison..
				CO5: Know the classification of the feedback amplifiers and their analysis with performance comparison..
11	II-II	PCC	Analog Communications	**CO1:** Understand the basic concepts of the analog communication systems
				CO2: Evaluate modulation index, bandwidth and power requirements for various analog modulation schemes including AM,FM and PM
				CO3: Understand and Analyze various analog continuous wave modulation and demodulation techniques including AM, FM and PM
				CO4: Analyze various analog pulse modulation and demodulation techniques including AM, FM and PM
				CO5: Understand the influence of noise over Analog Modulation schemes through random process and noise theory and applications of Analog communication techniques.
12	II-II	ESC	Linear control Systems	**CO1:**This course introduces the concepts of feedback and its advantages to various control systems
				CO2: The performance metrics to design the control system in time-domain and frequency domain are introduced
				CO3: Control systems for various applications can be designed using time-domain and frequency domain analysis.
				CO4: In addition to the conventional approach, the state space approach for the analysis of control systems is also introduced.
				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.

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13	II-II	HSS	Management And Organizational Behaviour	**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.
14	II-II	PCC Lab	Electronic Circuit Analysis Lab	**CO 1:** Comprehend the fundamentals of multi stage amplifiers, feedback power amplifiers and oscillator circuits.
				CO 2: Analyze the circuit design process and simulate the common base, common emitter and common collector amplifier circuits.
				CO 3: Acquaint with the design and simulate the RC coupled and Cascade amplifier circuits
				CO 4: Discriminate the design and simulate the RC coupled and Cascade amplifier circuits
				CO 5: Interpret to design and simulate various oscillator circuits
				CO 6: Create the design and simulate the cascade, class A power amplifier circuits, and single tuned voltage amplifier circuits
15	II-II	PCC Lab	Analog Communication s Lab	**CO 1:** Analyze the concepts, write and simulate the concepts of AM and AM Demodulation process in Communication
				CO 2: Know the origin and simulation of FM and FM- Demodulation process in communication
				CO 3: Acquaint with AM and FM basic functionalities
				CO 4: Discriminate the AM and FM functionalities
				CO 5: Interpret with various angle modulation and demodulation systems
				CO 6: Create the writing and simulation environments in PWM, PPM, Mixer and ring modulation
				CO1: Students should enable to describe and explain the operation of fundamental digital gates

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16	II-II	PCC Lab	Digital IC Design Lab	**CO2:** Get the knowledge and use of hardware descriptive language(VHDL) for system modeling and simulation.
				CO3: Students Can Analyze the operation of medium complexity standard combinational circuits like encoder, decoder, multiplexer, multiplexers and develop corresponding VHDL code in one of the model.
				CO4: Students can design complex digital systems at several level of abstractions, behavioral and structural, synthesis and rapid system prototyping
				CO5: Students can design complex digital system such as ALU.
17	III-I	PC	Linear IC Applications	**CO1:**Design circuits using operational amplifiers for various applications
				CO2: Analyze and design amplifiers and active filters using Op-amp.
				CO3: Diagnose and trouble-shoot linear electronic circuits.
				CO4: Understand the gain-bandwidth concept and frequency response of the amplifier configurations
				CO5: Understand thoroughly the operational amplifiers with linear integrated circuits.
18	III-I	PC	Micro Processors and Micro Controllers	**CO1:** Understand about basic Computing Architectures, 8086 – Micro Processor Pin Diagram, Architecture, Interrupt Structure and Timing Diagrams in Maximum and Minimum mode.
				CO2: Understand about Instruction Set and various tools for developing 8086 Assembly Language Program.
				CO3: Acquire the knowledge on interfacing various peripherals, configure and develop programs to interface peripherals.
				CO4: 8051 Micro Controller Pin Diagram,

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				Architecture and able to write 8051 Assembly Language Program for interfacing concepts.
				CO5: Able to develop programs efficiently on ARM Cortex Processors and debug.
19	III-I	PC	Digital Communications	**CO1:** Design a coded communication system.
				CO2: Analyze the performance of a Digital Communication System for probability of error and are able to design a digital communication system.
				CO3: Analyze various error techniques.
				CO4: Analyze various source coding techniques.
				CO5: Compute and analyze Block codes, cyclic codes and convolution codes
20	III-I	PC	Electronic Measurement and Instrumentation	**CO1:** Select the instrument to be used based on the requirements..
				CO2: Understand and analyze different signal generators and analyzers.
				CO3: Understand the different types of Oscilloscopes for different applications
				CO4: Understand and analyze the concepts Bridge circuits in measuring equipment
				CO5: Design different transducers for measurement of different parameters.
21	III-I	PE	Digital System Design Using HDL	**CO1:** Understand the architecture of FPGAs, tools used in modeling of digital design
				CO2: Understanding and practice the operators and data types and different modiling concepts of design of hardware circuits in very log.
				CO3: Analyze and design basic digital circuits with combinatorial logic circuits using Verilog HDL.
				CO4: Analyze and design basic digital circuits with sequential logic circuits using Verilog HDL.
				CO5: Design real time applications such as vending machine and washing machines etc..
				CO1: Design and analyse the various linear applications of op-amp
				CO2: Design and analyse the various non-linear applications of op-amp
				CO3: Design and analyse filter circuits using op-

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22	III-I	LC	Linear Integrated Circuits and Applications Lab	amp
				CO4: Design and analyse oscillators and multi vibrator circuits using op-amp
				CO5: Design and analyse the various applications of 555 timer.
				CO6: Analyse the performance of oscillators and multivibrators using PSPICE
23	III-I	LC	Digital Communications Lab	**CO1:** Students will able to understand basic theories of Digital Communication system in practical.
				CO2: Can able to design and implement different modulation and demodulation techniques.
				CO3: Students Can measure the bandwidth of various modulation techniques and observes the output waveform
				CO4: Emphasize on sampling modeling, techniques, signal constellations
				CO5: Can able to perform channel coding.
24	III-I	LC	Microprocessor and Microcontrollers Lab	**CO1:** Students can develop Assembly Language Program by using MASM /TASM software.
				CO2: Design and implement programs on 8086 micro processor.
				CO3: Design interfacing circuits and implement corresponding programs on 8086 micro processor.
				CO4: Design and implement 8051 microcontroller based systems.
				CO5: Able to develop Assembly Language Program for ARM Cortex M3 Processor using KEIL MDK ARM.
25	III-II	PC	Wired And Wireless Transmission Devices	**CO1:** Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and micro strip antennas
				CO2: Quantify the fields radiated by various types of antennas
				CO3: Design and analyze antenna arrays
				CO4: Analyze antenna measurements to assess antenna's performance

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				CO5: Identify the characteristics of radio wave propagation
26	III-II	PC	Very Large Scale Integrated Circuits	**CO1:** Demonstrate a clear understanding of CMOS fabrication flow and technology scaling.
				CO2: Apply the design Rules and draw layout of a given logic circuit.
				CO3: Design basic building blocks in Analog IC design.
				CO4: Design MOSFET based logic circuits using various logic styles like static and dynamic CMOS
				CO5: Design FPGA Architectures and Analyze the behaviour of static and dynamic logic circuits.
27	III/II	PC	Digital Signal Processing	**CO1:** Formulate engineering problems in terms of DSP operations
				CO2: Analyze digital signals and systems
				CO3: Analyze discrete time signals in frequency domain
				CO4: Design digital filters and implement with different structures
				CO5: Understand the key architectural
28	III-II	PE	Cellular And Mobile Communications	**CO1:** Identify the limitations of conventional mobile telephone systems; understand the concepts of cellular systems.
				CO2: Understand the different types of interferences and design of antenna system
				CO3: Understand the frequency management, channel assignment strategies and antennas
				CO4: Understand the concepts of handoff and architectures of various cellular systems.
				CO5: Understand the concepts of GSM, GPRS LTE,Wi-MAX and 3G,4G and 5G
29	III-II	OE	Power Electronics	**CO1:** Explain the characteristics of various power semiconductor devices and understand the gate driver circuits.
				CO2: Explain the operation of single-phase full wave converters and perform harmonic analysis.
				CO3: Explain the operation of three phase full–wave converters and perform harmonic analysis.
				CO4: Analyze the operation of different types of

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				DC- DC converters.
				CO5: Explain the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
30	III-II	PC	INTERNET OF THINGS	**CO1:** Understand about Design Principles, Business Process, Architecture of IOT system and its role in Cloud.
				CO2: Understand about Mini Computers usage to develop IOT Services and Embedded Processor(Cortex- M0).
				CO3: Understand about various IOT Protocols for Communication Purpose, Bluetooth Low Energy Architecture.
				CO4: Understand about Solution Framework for IOT Applications.
				CO5: Able to Design Real Time IOT based applications.
31	III-II	LC	VLSI Lab	**CO1:** Demonstrate a clear understanding in hardware design language Verilog HDL.
				CO2: Able to model a combinational circuit using hardware description language Verilog HDL and validate its functionality.
				CO3: Able to model a Sequential circuit using hardware description language Verilog HDL and validate its functionality.
				CO4: Able to implement 8-bit synchronous up down counter on FPGA.
				CO5: Able to implement 4-bit sequence detector through Mealy and Moore state machines.
32	III-II	LC	Digital Signal Processing Lab	**CO1:** Students Can Verify Linear and Circular Convolution for two Discrete Time Signals by using MATLAB.
				CO2: Able to design FIR Filter (LP/HP) using windowing technique.
				CO3: Able to implement IIR Filter(LP/HP) on DSP Processors.
				CO4: Able to implement N-point DFT Algorithm.
				CO5: Able to implement FFT Algorithm.

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33	IV-I		RADAR SYSTEMS	**CO1:** Derive the radar range equation and to solve some analytical problems.
				CO2: Understand the different types of radars and its applications.
				CO3: Understand the concept of tracking and different tracking techniques.
				CO4: Understand the concept of tracking and different tracking techniques.
				CO5: Understand the various components of radar receiver and its performance.
34	IV-I		Digital Image processing	**CO1:** Perform image manipulations and different digital image processing technique
				CO2: Perform basic operations like – Enhancement, segmentation, compression
				CO3: Analyze pseudo and fullcolor image processing techniques.
				CO4: Apply various morphological operators on images.
				CO5: Perform Image transforms and restoration techniques on image.
35	IV-I		Computer Networks	**CO1:** understand osi and tcp/ip models
				CO2: analyze mac layer protocols and lan technologies
				CO3: design applications using internet protocols
				CO4: understand routing and congestion control algorithms
				CO5: understand how internet works
36	IV-I		Optical Communications	**CO1:** Choose necessary components required in modern optical communications systems
				CO2: Design and build optical fiber experiments in the laboratory, and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an optical system, dispersion of optical fibers.
				CO3: Understand and Analyze various analog continuous wave modulation and demodulation techniques including AM, FM and PM..
				CO4: USE different types of photo detectors and

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				optical test equipment to analyze optical fiber and light wave systems
				CO5: Choose the optical cables for better communication with minimum losses Design, build, and demonstrate optical fiber experiments in the laboratory
37	IV-I		Electronic Switching Systems	**CO1:** Evaluate the time and space parameters of a switched signal
				CO2: Establish the digital signal path in time and space, between two terminals
				CO3: Evaluate the inherent facilities within the system to test some of the SLIC, CODEC and digital switch functions.
				CO4: Investigate the traffic capacity of the system.
				CO5: Evaluate methods of collecting traffic data.
38	IV-I		Embedded System	**CO1:** Understand the basic concepts of an embedded system and able to know an embedded system design approach to perform a specific function.
				CO2: The hardware components required for an embedded system and the design approach of an embedded hardware.
				CO3: The various embedded firmware design approaches on embedded environment.
				CO4: Understand how to integrate hardware and firmware of an embedded system using real time operating system
				CO5: The various embedded firmware design approaches on embedded environment.
39	IV-I		Micro Wave Engineering & Optical Lab	**CO1:** Verify the characteristics of Reflex Klystron.
				CO2: Analyze various parameters of Waveguide Components.
				CO3: Estimate the power measurements of RF Components such as directional Couplers.
				CO4: Demonstrate characteristics of various optical sources.
				CO5: Measure data Rate, Numerical Aperture and Losses in Optical Link.
				CO1: Students Can Verify Linear and Circular Convolution for two Discrete Time Signals by

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40	IV-I		Digital Signal Processing Lab	using MATLAB.
				CO2: Able to design FIR Filter (LP/HP) using windowing technique.
				CO3: Able to implement IIR Filter(LP/HP) on DSP Processors.
				CO4: Able to implement N-point DFT Algorithm.
				CO5: Able to implement FFT Algorithm.
41	IV-II		Cellular And Mobile Communications	**CO1:** Identify the limitations of conventional mobile telephone systems; understand the concepts of cellular systems.
				CO2: Understand the different types of interferences and design of antenna system
				CO3: Understand the frequency management, channel assignment strategies and antennas
				CO4: Understand the concepts of handoff and architectures of various cellular systems.
				CO5: Understand the concepts of GSM, GPRS LTE, Wi -MAX and 3G,4G and 5G
42	IV-II		Electronic Measurement and Instrumentation	**CO1:** Select the instrument to be used based on the requirements..
				CO2: Understand and analyze different signal generators and analyzers.
				CO3: Understand the different types of Oscilloscopes for different applications
				CO4: Understand and analyze the concepts Bridge circuits in measuring equipment
				CO5: Design different transducers for measurement of different parameters.
				CO6: Understand the Measurement of physical parameters like force, pressure etc..,
43	IV-II		Satellite Communication	**CO1:** Understand the concepts, applications of satellite communication
				CO2: Derive the expression for G/T ratio and to solve some analytical problems on satellite link design.
				CO3: Derive the expression for G/T ratio and to solve some analytical problems on satellite link design.
				CO4: Understand the various types of multiple

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				access techniques and architecture of earth station design.
				CO5: Understand the various types of multiple access techniques and architecture of earth station design.
				CO6: Understand the concepts of GPS and its architecture.
44	IV-II		Operating Systems	CO1: Design various Scheduling algorithms
				CO2: Apply the principles of concurrency
				CO3: Design deadlock, prevention and avoidance algorithms
				CO4: Compare and contrast various memory management schemes.
				CO5: Design and Implement a prototype file systems.
45	IV-II		project	CO1: Analyze new problems, identify and define the appropriate requirements for its solutions.
				CO2: Understand of the impact of engineering solutions.
				CO3: Understand team work to complete a common goal

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