DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE OUTCOMES (R-19)

I Year - I Semester

C Programming

At the end of the course student should be able to

Sno	Course code	CO Statement
1	ES1101	To write algorithms and to draw flowcharts for solving problems
2	ES1101	To convert flowcharts/algorithms to C Programs, compile and debug programs
3	ES1101	To use different operators, data types and write programs that use two-way/ multi-way selection
4	ES1101	To select the best loop construct for a givenproblem
5	ES1101	To design and implement programs to analyze the different pointerapplications
6	ES1101	To decompose a problem into functions and to develop modular reusablecode To apply File I/Ooperations

C Programing lab

At the end of the course student should be able to

Sno	Course code	CO Statement
1	ES1102	Gains Knowledge on various concepts of a Clanguage.
2	ES1102	Able to draw flowcharts and writealgorithms.
3	ES1102	Able design and development of C problem solvingskills

I Year - II Semester

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Tamaram, Makavarapalem, Narsipatnam(R.D), Visakhapatnam Dist–531113

NETWORK ANALYSIS

At the end of the course student should be able to

Sno	Course code	CO Statement
1	ES1209	Gain the knowledge on basic network elements
2	ES1209	Analyze the RLC circuits behaviour in detailed.
3	ES1209	analyze the performance of periodic waveforms
4	ES1209	Gain the knowledge in characteristics of two port network parameters (Z,Y,ABCD,h &g).
5	ES1209	analyze the filter design concepts in real world applications.

BASIC ELECTRICAL ENGINEERING

At the end of the course student should be able to

Sno	Course code	CO Statement
1	ES1211	Able to explain the operation of DC generator and analyze the characteristics of DC generator.
2	ES1211	Able to explain the principle of operation of DC motor and analyze their characteristics. Acquire the skills to analyze the starting and speed control methods of DCmotors.
3	ES1211	Ability to analyze the performance and speed – torque characteristics of a 3-phase induction motor and understand starting methods of 3-phase induction motor.
4	ES1211	Able to explain the operation of Synchronous Machines
5	ES1211	Capability to understand the operation of various special machines.

BASIC ELECTRICAL ENGINEERING LAB

At the end of the course student should be able to

Sno	Course code	CO Statement

1	ES1208	Determine and predetermine the performance of DC machines and transformers
2	ES1208	Control the DC shunt machines.
3	ES1208	Compute the performance of 1-phasetransformer

II year I semester

ELECTRONIC DEVICES AND CIRCUITS

At the end of the course student should be able to

Sno	Course code	CO Statement
1	C201.1	Apply the basic concepts of semiconductor physics.
2	C201.2	Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.
3	C201.3	Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons.
4	C201.4	Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations
5	C201.5	Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations. Perform the analysis of small signal low frequency transistor amplifier circuits using BJT and FET in different configurations.

SWITCHING THEORY and LOGIC DESIGN

At the end of the course student should be able to

Sno	Course code	CO Statement
1	C202.1	Classify different number systems and apply to generate variouscodes.
2	C202.2	Use the concept of Boolean algebra in minimization of switching functions
3	C202.3	Design different types of combinational logic circuits
4	C202.4	Apply knowledge of flip-flops in designing of Registers and counters
5	C202.5	The operation and design methodology for synchronous sequential circuits and algorithmic state machines

SIGNALS and SYSTEMS

At the end of the course student should be able to

Sno	Course code	CO Statement
1	C203.1	Differentiate the various classifications of signals andsystems
2	C203.2	Analyze the frequency domain representation of signals using Fourier concepts
3	C203.3	Classify the systems based on their properties and determine the response of LTI Systems.
4	C203.4	Know the sampling process and various types of samplingtechniques.
5	C203.5	Apply Laplace and z-transforms to analyze signals and Systems (continuous &discrete).

RANDOM VARIABLES and STOCHASTIC PROCESSES

At the end of the course student should be able to

Sno	Course code	CO Statement
1	C204.1	Mathematically model the random phenomena and solve simple probabilistic problems.
2	C204.2	Identify different types of random variables and compute statistical averages of these random variables
3	C204.3	Characterize the random processes in the time and frequencydomains.
4	C204.4	Analyze the LTI systems with random inputs.

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

At the end of the course student should be able to

Sno	Course code	CO Statement
1	C205.1	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 performance standard
2	C205.2	Illustrate the basic principles of the object-oriented programming
3	C205.3	Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming

MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

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At the end of the course student should be able to

Sno	Course code	CO Statement
1	C206.1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product
2	C206.2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs
3	C206.3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
4	C206.4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis.
5	C206.5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

ELECTRONIC DEVICES AND CIRCUITS LAB

At the end of the course student should be able to

S.no	Course code	CO Statement
1	C207.1	Observing the characteristics of different types of diodes and uses
2	C207.2	BJT Characteristics(CE Configuration), Input Characteristics, Output Characteristics, FET Characteristics(CS Configuration), Drain Characteristics, Transfer Characteristics, SCR Characteristics, UJT Characteristics, Transistor Biasing
3	C207.3	Analysing the function of CRO, Rectifiers, BJT-CE Amplifier, Emitter Follower-CC Amplifier, FET-CS Amplifier.

SWITCHING THEORY and LOGIC DESIGN LAB

At the end of the course student should be able to

Sno	Course code	CO Statement
1	C208.1	Analysing the working nature of all logic gates and brief understanding of simple combinational circuit.
2	C208.2	Observing the functionalities of decoders, multiplexers, de multiplexers, half adders and full adders.
3	C208.3	Verifying operation modes of shift registers and all types of flip flops

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II Year II semester

ELECTRONIC CIRCUIT ANALYSIS

At the end of the course student should be able to

Sno	Course code	CO Statement
1	C209.1	Design and analysis of small signal high frequency transistor amplifier using BJT and FET.
2	C209.2	Design and analysis of multistage amplifiers using BJT and FET and Differential amplifier using BJT
3	C209.3	Derive the expressions for frequency ofoscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.
4	C209.4	Know the classification of the power and tuned amplifiers and their analysis with performance comparison.

LINEAR CONTROL SYSTEMS

At the end of the course student should be able to

Sno	Course code	CO Statement
1	C210.1	This course introduces the concepts of feedback and its advantages to various control systems
2	C210.2	The performance metrics to design the control system in time-domain and frequency domain are introduced.
3	C210.3	Control systems for various applications can be designed using time-domain and frequency domain analysis
4	C210.4	In addition to the conventional approach, the state space approach for the analysis of control systems is also introduced.

ELECTROMAGNETIC WAVES and TRANSMISSION LINES

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C211.1	Determine E and H using various laws and applications of electric & magnetic fields
2	C211.2	Apply the Maxwell equations to analyze the time varying behaviour of EMwaves

3	C211.3	Gain the knowledge in uniform plane wave concept and characteristics of uniform plane wave invarious media
4	C211.4	Calculate Brewster angle, critical angle and total internal reflection
5	C211.5	Derive and Calculate the expressions for input impedance of transmission lines, reflection coefficient, VSWR etc. using smith chart

ANALOG COMMUNICATIONS

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C212.1	Differentiate various Ana log modulation and demodulation schemes and their spectral characteristics
2	C212.2	Analyze noise characteristics of various analog modulation methods
3	C212.3	Analyze various functional blocks of radio transmitters and receivers
4	C212.4	Design simple analog systems for various modulation techniques

COMPUTER ARCHITECTURE and ORGANIZATION

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C213.1	Students can understand the architecture of modern computer.
2	C213.2	They can analyze the Performance of a computer using performance equation
3	C213.3	Understanding of different instruction types.
4	C213.4	Students can calculate the effective address of an operand by addressing modes
5	C213.5	They can understand how computer stores positive and negative numbers.

MANAGEMENT and ORGANISATIONAL BEHAVIOUR

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C214.1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational structure.
2	C214.2	Will familiarize with the concepts of functional management that is HRM and Marketing of new product developments.

3	C214.3	The learner is able to think in strategically through contemporary management practices
4	C214.4	The learner can develop positive attitude through personality development and can equip with motivational theories.
5	C214.5	The student can attain the group performance and grievance handling in managing the organizational culture.

ELECTRONIC CIRCUIT ANALYSIS LAB

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C215.1	Attaining brief study on feedback amplifiers and oscillators
2	C215.2	Operational analysis of Power amplifiers and Voltage amplifiers

ANALOG COMMUNICATIONS LAB

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C216.1	Performing actions on different modulation and demodulation techniques.
2	C216.2	Verification of sampling theorem and Pulse Amplitude Modulation & Demodulation, PWM, PPM –Modulation & Demodulation, PLL IC-565 as FM demodulator.
3	C216.3	Analysing the Radio receiver characteristics and M. Radio Receiver/TV Receiver Demo kits or Trainees.

III year I semester

LINEAR INTEGRATED CIRCUITS and APPLICATIONS

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C301.1	Design circuits using operational amplifiers for various applications
2	C301.2	Analyze and design amplifiers and active filters using Op-amp.
3	C301.3	Diagnose and trouble-shoot linear electronic circuits.
4	C301.4	Understand the gain-bandwidth concept and frequency response of the amplifier configurations.

5	C301.5	Understand thoroughly the operational amplifiers with linear integrated circuits

MICROPROCESSOR AND MICROCONTROLLERS

S.No	Course code	CO Statement
1	C302.1	Understand the architecture of microprocessor/ microcontroller and their operation.
2	C302.2	Demonstrate programming skills in assembly language for processors and Controllers.
3	C302.3	Analyze various interfacing techniques and apply them for the design of processor/Controller based systems.

DIGITAL COMMUNICATIONS

At the end of the course student should be able

S.No	Course code	CO Statement
1	C303.1	Analyze the performance of a Digital Communication System for probability of error and are able to design a digital communication system.
2	C303.2	Analyze various source coding techniques.
3	C303.3	Compute and analyze Block codes, cyclic codes and convolution codes.
4	C303.4	Design a coded communication system

ELECTRONIC MEASUREMENTS & INSTRUMENTATION

At the end of the course student should be able

S.No	Course code	CO Statement
1	C304.1	Select the instrument to be used based on ther equirements.
2	C304.2	Understand and analyze different signal generators and analyzers.
3	C304.3	Understand the design of oscilloscopes for different applications.
4	C304.4	Design different transducers for measurement of different parameters

DATASTRUCTURES and ALGORITHMS

At the end of the course student should be able

S.No	Course code	CO Statement
1	C305.1	Demonstrate analytical comprehension of concepts such as abstract data

		types
2	C305.2	Analyze various generic programming techniques
3	C305.3	Compare various sorting algorithms and perform their efficiency analysis.
4	C305.4	Demonstrate the ability to analyze, design, apply and use data structures and algorithms to solve engineering problems and evaluate their solutions.
5	C305.5	Demonstrate the ability of using generic principles for data representation & manipulation with a view for efficiency, maintainability, and code-reuse.

LINEAR INTEGRATED CIRCUITS and APPLICATIONS LAB

At the end of the course student should be able

S.No	Course code	CO Statement
1	C306.1	Complete study on Operational Amplifier with its parameters, specifications and applications.
2	C306.2	Brief analysis of all types of filters, Integrator, Differentiator circuits and Oscillators.
3	C306.3	Verifying the working of 555 timer, Schmitt Trigger Circuits and Shunt capacitance filters.

DIGITAL COMMUNICATIONS LAB

At the end of the course student should be able

S.No	Course code	CO Statement
1	C307.1	Analysis on Time division multiplexing, Pulse code modulation, Differential pulse code modulation, Delta modulation,
2	C307.2	Observing different types of keying mechanisms like Frequency shift keying, Phase shift keying, Differential phase shift keying, Companding
3	C307.3	Observing the working of Source Encoder and Decoder, Linear Block Code-Encoder and Decoder, Binary Cyclic Code - Encoder and Decoder Convolution Code - Encoder and Decoder, BCH Codes.

MICROPROCESSOR and MICROCONTROLLERS LAB

At the end of the course student should be able

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S.No	Course code	CO Statement
1	C308.1	Performing 16 -bit arithmetic operations on kit.
2	C308.2	Sorting an array, Program for Factorial of given n-numbers, Interfacing ADC to8086, Interfacing DAC to8086, Interfacing stepper motor to8086.
3	C308.3	Getting brief knowledge on 8051 microcontroller.

MINI PROJECT WITH HARDWARE DEVELOPMENT

At the end of the course student should be able

S.No	Course code	CO Statement
1	C308.1	Student should be aware of components
2	C308.2	Student should learn basic programming languages
3	C308.3	A brief document should be prepared

III year II semester

WIRED and WIRELESS TRANSMISSION DEVICES

At the end of the course student should be able

S.No	Course code	CO Statement
1	C309.1	Identify basic antenna parameters.
2	C309.2	Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and micro stripantennas
3	C309.3	Quantify the fields radiated by various types of antennas
4	C309.4	Design and analyze antenna arrays
5	C309.5	Analyze antenna measurements to assess antenna's performance

VLSI DESIGN

At the end of the course student should be able

S.No	Course	CO Statement

	code	
1	C310.1	Demonstrate a clear understanding of CMOS fabrication flow and technology scaling
2	C310.2	Apply the design Rules and draw layout of a given logic circuit.
3	C310.3	Design MOSFET based logic circuit.
4	C310.4	Design basic building blocks in Analog IC design.
5	C310.5	Design various CMOS logic circuits for design of Combinational logic circuits.

DIGITAL SIGNAL PROCESSING

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C311.1	Formulate engineering problems in terms of DSP operations
2	C311.2	Analyze digital signals and systems
3	C311.3	Analyze discrete time signals in frequency domain
4	C311.4	Design digital filters and implement with different structures
5	C311.5	Understand the key architectural

ELECTIVE

BIO MEDICAL ENGINEERING

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C312.1	Has an in-depth knowledge of the methodological-operational aspects of mathematical disciplines, basic sciences and information engineering.
2	C312.2	These skills are partly guaranteed by the access criteria and partly acquired through the scientific disciplines belonging to the related and integrative fields listed in the table of training activities.
3	C312.3	Have a broad understanding of the applications of various sensors and transducers available for physiological and cellular measurements, Understand fundamental transduction and biosensing principles, Get the clear domain knowledge about various measurement systems includes different types of sensors, electrodes, signal conditioning circuits for acquiring and recording various physiological parameters, Understand various measurement devices and techniques, including the underlying biological processes that generate the quantities to be measured or controlled, Be capable of critically reviewing the literature in the application area and apply knowledge gained from the course to analyse simple biosensing and transduction problems.
4	C312.4	. Describe and characterize the sources of biomedical signals and needs of

		using biomedical instruments & their limitations. 2. Understand & describe pc based medical instrumentation & regulation of medical devices. 3. Describe and characterize medical instruments as per their specifications, static & dynamic characteristics and understand data acquisition system.

EMBEDDED SYSTEMS

OPEN ELECTIVE

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C313.1	Understand the basic concepts of an embedded system and able to know an embedded.
2	C313.2	The hardware components required for an embedded system and the design approach of an embedded hardware.
3	C313.3	System design approach to perform a specific function.
4	C313.4	The various embedded firmware design approaches on embedded environment.
5	C313.5	Understand how to integrate hardware and firmware of an embedded system using real time operating system.

INTERNET OF THINGS

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C314.1	Understand internet of Things and its hardware and software components
2	C314.2	Interface I/O devices, sensors &communication modules.
3	C314.3	Remotely monitor data and control devices
4	C314.4	Design real time IoT based applications

VLSI LAB

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C315.1	The students need to develop Verilog /VHDL Source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary Synthesizer.
2	C315.2	All the experiments need to be implemented on the latest FPGA/CPLD Hardware in the Laboratory. Back-end Level Design and Implementation
3	C315.3	The students need to design the following experiments at schematic level using CMOS logic and verify the functionality. Further students need to draw the corresponding layout and verify the functionality including parasites. Available state of the art technology libraries can be used while simulating the designs using Industry standard EDA Tools.

DIGITAL SIGNAL PROCESSING LAB

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C316.1	Students has to know about the software MATLAB
2	C316.2	Students have to observe different types of convolution codes by using code composer studio.
3	C316.3	Some of the Experiments are to be done using a TI DSP Starter Kit.

IV year I semester

MICROWAVE and OPTICAL COMMUNICATION ENGINEERING

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C401.1	Design different modes in wave guide structures
2	C401.2	Calculate S-matrix for various waveguide components and splitting the microwave energy in a desired direction
3	C401.3	Distinguish between Microwave tubes and Solid State Devices, calculation of efficiency devices.
4	C401.4	Measure various microwave parameters using a Microwave test bench

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DATA COMMUNICATIONS & COMPUTER NETWORKS

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C402.1	Know the Categories and functions of various Data communication Networks
2	C402.2	Design and analyze various error detection techniques.
3	C402.3	Demonstrate the mechanism of routing the data in network layer
4	C402.4	Know the significance of various Flow control and Congestion control Mechanisms
5	C402.5	Know the Functioning of various Application layer Protocols.

DIGITAL IMAGE and VIDEO PROCESSING

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C403.1	Defining the digital image, representation of digital image, importance of image resolution, applications in image processing.
2	C403.2	Know the advantages of representation of digital images in transform domain, application of various image transforms.
3	C403.3	Know how an image can be enhanced by using histogram techniques, filtering techniques etc
4	C403.4	Understand image degradation, image restoration techniques using spatial filters and frequency domain
5	C403.5	Know the detection of point, line and edges in images, edge linking through local processing, global processing.

ELECTIVE 4

EMBEDDED SYSTEMS

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C313.1	Understand the basic concepts of an embedded system and able to know an embedded.
2	C313.2	The hardware components required for an embedded system and the design approach of an embedded hardware.
3	C313.3	System design approach to perform a specific function.

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4	C313.4	The various embedded firmware design approaches on embedded environment.
5	C313.5	Understand how to integrate hardware and firmware of an embedded system using real time operating system.

INTERNET OF THINGS LAB

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C406.1	Student has to aware of Internet concepts, required protocols for communication
2	C406.2	Level of understanding the latest trends and technology in IOT
3	C406.3	Learning about the required software and protocols for communication of data
4	C406.4	Identifying the different communication devices in the embedded market
5	C406.5	Practising to get the positive outcomes for required output
6	C406.6	Need to understand the embedded c language

MICROWAVE AND OPTICAL COMMUNICATION ENGINEERING LAB

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C407.1	Analysing the Characteristics of Reflex Klystron, Gunn diode, Directional Coupler. Attenuation Measurement.
2	C407.2	Student got an idea on basic principles and basic construction of antennas
3	C407.3	Student can get knowledge on Impedance and Frequency Measurement, Scattering parameters of Circulator, Scattering parameters of Magic Tee. Radiation Pattern of Horn and Parabolic Antennas, Synthesis of Microstip antennas (Rectangular Structure) Using any Industrystandard Simulation Software.

IV YEAR-II SEMESTER

Concurrent and parallel programming (Elective)

At the end of the course student should be able to

S.No	Course code	CO Statement
1	C412.1	**Differentiate** the concurrent and sequential processing
2	C412.2	**Demonstrate** the applications of process and threads
3	C412.3	**Apply** parallel algorithms on data
4	C412.4	**Describe** parallel programing paradigm
5	C412.5	**Explain** about parallel programing languages
6	C412.6	**Explain** heterogeneous computing

HOD   **Principal**