



1. List of Course in B.Tech. Electronics and Communication Engineering A.Y:2022-23

S. No.	Course Name	Course Code
First Year - First Semester		
1	Communicative English	C111
2	Mathematics -I	C112
3	Applied Chemistry	C113
4	Programming for Problem Solving Using C	C114
5	Engineering Drawing	C115
6	English Communication Skills Laboratory	C116
7	Applied Chemistry Lab	C117
8	Programming for Problem Solving using C Lab	C118
First Year - Second Semester		
9	Mathematics – II	C121
10	Applied Physics	C122
11	Object Oriented Programming through Java	C123
12	Network Analysis	C124
13	Basic Electrical Engineering	C125
14	Electronic workshop Lab	C126
15	Basic Electrical Engineering Lab	C127
16	Applied Physics Lab	C128
17	Environmental Science	C129
Second Year - First Semester		
18	Electronic Devices and Circuits	C211
19	Switching Theory and Logic Design	C212
20	Signals and Systems	C213
21	Mathematics-III	C214
22	Random Variables and Stochastic Processes	C215
23	OOPS through Java Lab	C216
24	Electronic Devices and Circuits - Lab	C217
25	Switching Theory and Logic Design – Lab	C218
26	Python Programming	C219
Second Year - Second Semester		
27	Electronic Circuit Analysis	C221
28	Digital IC Design	C222
29	Analog Communications	C223
30	Linear control Systems	C224
31	Management and Organizational Behavior	C225
32	Electronic Circuit Analysis Lab	C226
33	Analog Communications Lab	C227
34	Digital IC Design Lab	C228
35	Soft Skills	C229
36	Constitution of India	C2210
Third Year - First Semester		
37	Analog ICs and Applications	C311
38	Electromagnetic Waves and Transmission Lines	C312
39	Digital Communications	C313
40	Computer Organization and Architecture	C314
41	Electronic Measurements and Instrumentation	C315
42	Analog ICs and Applications LAB	C316
43	Digital Communications Lab	C317



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44	Data Structures using Java Lab	C318
45	Indian Traditional Knowledge	C319
	Third Year - Second Semester	
46	Microprocessor and Microcontrollers	C321
47	VLSI Design	C322
48	Digital Signal Processing	C323
49	Embedded Systems	C324
50	Python Programming	C325
51	Microprocessor and Microcontrollers - Lab	C326
52	VLSI Design Lab	C327
53	Digital Signal Processing Lab	C328
54	ARM based/ Aurdino based Programming	C329
55	Research Methodology	C3210
	Fourth Year - First Semester	
56	Microwave and Optical Communication Engineering	C411
57	Data Communications & Computer networks	C412
58	Digital Image and Video Processing	C413
59	Smart Sensors	C414
60	Embedded Systems	C415
61	Internet of Things Lab	C416
62	Microwave and Optical Communication Engineering LAB	C417
63	Project - Part I	C418
	Fourth Year - Second Semester	
64	Machine Learning & Artificial Intelligence	C421
65	Cyber Security & Cryptography	C422
66	Project - Part II	C423



2. Course Outcomes of B. Tech. ECE First Year – First Semester

Course Name with Code	CO No.	Course Outcome
Communicative English (C111)	C111.1	Identifying the life of people, culture and tradition interpreting the information, speaking English to elicit information, identifying the vocabulary and Nouns
	C111.2	Understanding the responsibility and values, conversing for expressing greetings and leave takings, usage of articles, prepositions
	C111.3	Remembering life and contributions of Stephen Hawking discuss about specific topics practice letter writing, CVs, E-mail etiquette, application of verb forms
	C111.4	Understanding the life of Wangari Maathai, Role plays, use of adjectives and adverbs, vocabulary
	C111.5	Understanding way of life and values, technical writing and presentation, Vocabulary, common errors
	C111.6	Understanding soft skills, recognize Scientific and Technical English
Mathematics -I (C112)	C112.1	Utilize mean value theorems to real life problems
	C112.2	Able to form differential equation from physical problems and to solve various first order differential equations.
	C112.3	Solve the differential equations related to various engineering fields
	C112.4	Familiarize with functions of several variables which is useful in optimization
	C112.5	Apply double integration techniques in evaluating areas bounded by region
	C112.6	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems
Applied Chemistry (C113)	C113.1	Analyze the different types of plastic materials and the mechanism of conduction in conducting polymers.
	C113.2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning engineering products and the reasons for corrosion and study methods to control corrosion.
	C113.3	Synthesize nanomaterials for modern advances of engineering technology
	C113.4	Summarize the preparation of semiconductors; Analyze the applications of liquid crystals and superconductors.
	C113.5	Analyze the principles of different spectroscopic methods and their applications and design models for energy by different natural sources.
	C113.6	Obtain the knowledge of computational chemistry and molecular machines
Programming for Problem Solving using C (C114)	C114.1	To write algorithms and to draw flowcharts for solving problems, converts both to C program finally compile and debug the programs.
	C114.2	To use different operators, data types and write programs that use two-way/ multi-way selection.
	C114.3	To select the best loop construct for a given problem
	C114.4	To design and implement programs to analyze the different pointer applications
	C114.5	To decompose a problem into functions and to develop modular reusable code
	C114.6	To apply File, I/O operation
Engineering Drawing (C115)	C115.1	Understand plane geometry by drawing different engineering curves like ellipse, cycloids, involute etc.
	C115.2	Identify the position of points and lines with use of orthographic projections.
	C115.3	Analyze the location and position of plane figures through orthographic projections.
	C115.4	Analyze the location and position of solid bodies through orthographic projections.
English Communication Skills Laboratory (C116)	C116.1	Develop 2D and 3D objects by converting their views
	C116.2	Understand the AutoCAD commands
	C116.3	Articulate better pronunciation through stress or word accent, intonation, and rhythm.
	C116.4	Acting out about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking.
	C116.5	Experimenting the fluency in spoken English and neutralize mother tongue influence
Applied Chemistry Lab (C117)	C117.1	Mind Mapping of the students to a variety of self-instructional and learner-friendly modes of language learning.
	C117.2	Understand different types of chemical analysis
	C117.3	Experiment volumetric analysis of various classes
	C117.4	Use some commonly employed simple instruments
	C117.5	Gains Knowledge on various concepts of a C language.
	C117.6	Able design and development of C problem solving skills.
Programming for Problem Solving using C Lab (C118)	C118.1	Able to design and develop modular programming skills.
	C118.2	Able to design and develop file programming skills
	C118.3	Identifying the life of people, culture and tradition interpreting the information, speaking English to elicit information, identifying the vocabulary and Nouns
	C118.4	Understanding the responsibility and values, conversing for expressing greetings and leave takings, usage of articles, prepositions.
	C118.5	Remembering life and contributions of Stephen Hawking discuss about specific topics practice letter writing, CVs, E-mail etiquette, application of verb forms
	C118.6	Understanding the life of Wangari Maathai, Role plays, use of adjectives and adverbs, vocabulary



3. Course Outcomes of B. Tech. ECE First Year – Second Semester

Course Name with Code	CO No.	Course Outcome
Mathematics-II (C121)	C121.1	Compute Line, Surface, Volume integrals using Green's, Stoke's and Divergence theorems.
	C121.2	Use Laplace Transform methods to solve initial value problems for constant coefficient linear ordinary differential equations.
	C121.3	Discuss the expansion of a given periodic function by Fourier series in the given interval.
	C121.4	Solve engineering problems using Fourier Transforms and Inverse Fourier Transforms.
	C121.5	Apply a range of techniques to solve first and second order linear partial differential equations.
	C121.6	Model physical phenomena of Heat and Wave equations by using Partial differential equations.
Applied Physics (C122)	C122.1	Understand the concept of error and its analysis.
	C122.2	Compare the theory and correlate with experiment findings.
	C122.3	Understand and apply the fundamentals of wave optics.
	C122.4	Develop experimental skills on basic physics experiments.
	C122.5	Apply object-oriented programming features and concepts for solving given problem
	C122.6	Solve real time problems using the concepts of class, inheritance, interface and packages
Object Oriented Programming through Java (C123)	C123.1	Design the real time applications using graphical user interface
	C123.2	Describe the applet life cycle and methods
	C123.3	Demonstrate the I/O classes and methods
	C123.4	Develop real time applications using multithreading and exception handling
	C123.5	Interpret basic R, L, C circuit behavior for dc source
	C123.6	Analyze different R, L, C circuit combinations transients with AC & DC sources
Network Analysis (C124)	C124.1	Solve various AC complex impedance circuits
	C124.2	Determine Q-factor, bandwidth for series & parallel circuits
	C124.3	Apply various two port networks to electronic devices, transmission lines & amplifier circuits.
	C124.4	Analyze coupled circuits like transformers, generators & motors
	C124.5	Discuss the operation of DC generator and analyze the characteristics of DC generator
	C124.6	Analyze starting and speed control methods of DC motors along with principle of operation
Basic Electrical Engineering (C125)	C125.1	Draw the equivalent circuit of single-phase transformer and also compute efficiency
	C125.2	Explain the operation of Synchronous Machines
	C125.3	Analyze the performance and speed – torque characteristics of 3-phase induction motor
	C125.4	Understand the operation of various special machines
	C125.5	To identify different active and passive components and to find their values theoretically.
	C125.6	To identify different measuring and supply instruments.
Electronic workshop Lab (C126)	C126.1	Perform soldering for a given electronic circuit.
	C126.2	Design and to make PCB for a simple electronic circuit.
	C126.3	Testing of electronic components using appropriate measuring instrument.
	C126.4	Observe and measure the voltage and frequency of waveform using CRO.
Basic Electrical Engineering Lab (C127)	C127.1	Determine Magnetization characteristics of D.C. Shunt generator.
	C127.2	Calculate efficiency of dc machine & single-phase transformer Induction motor.
	C127.3	Compare and control Speed of D.C.shunt motor above and below rated speeds.
	C127.4	Compute regulation of three phase alternator
	C127.5	Predict no load and full load losses of single-phase transformer without loading transformer.
	C127.6	Analyze performance of shunt motor, three phase induction motor
Applied Physics Lab (C128)	C128.1	Understand the concept of error and its analysis.
	C128.2	Compare the theory and correlate with experiment findings.
	C128.3	Understand and apply the fundamentals of wave optics.
Environmental Science (C129)	C129.1	Develop experimental skills on basic physics experiments.
	C129.2	Overall understanding of the natural resources
	C129.3	Basic understanding of the ecosystem and its diversity
	C129.4	Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
	C129.5	An understanding of the environmental impact of developmental activities
	C129.6	Awareness on the social issues and global treaties.



4. Course Outcomes of B. Tech. ECE Second Year – First Semester

Course Name with Code	CO No.	Course Outcome
Electronic Devices and Circuits (C211)	C211.1	Illustrate PN junction characteristics from semiconductor materials.
	C211.2	Compare the characteristics of rectifiers with and without filters.
	C211.3	Summarize the characteristics of BJT in different configurations.
	C211.4	Discuss the construction and operation of Field Effect Transistor characteristics and its applications
	C211.5	Apply biasing methods for stabilization of BJT and FET amplifiers.
	C211.6	Analyze small signal low frequency equivalent models of BJT and FET.
Switching Theory and Logic Design (C212)	C212.1	Apply different digital number systems to generate various codes.
	C212.2	Use the concept of Boolean algebra in minimization of switching functions
	C212.3	Illustrate different types of combinational logic circuits with relevant ICs
	C212.4	Compute the Boolean expressions using PLDs
	C212.5	Apply knowledge of flip-flops in designing of Registers and counters
	C212.6	Analyze clocked sequential circuits
Signals and Systems (C213)	C213.1	Interpretation of signals using orthogonal functions
	C213.2	Analyze the frequency domain representation of continuous time signals.
	C213.3	Examine the signals & systems classification based on their properties to determine the response of LTI Systems
	C213.4	Outline the filter characteristics of linear systems to extract the signal from noise by filtering
	C213.5	Describe Sampling process and correlation.
	C213.6	Apply Z-Transforms to analyze DT signals and Systems
Mathematics -III (C214)	C214.1	Compute Line, Surface, Volume integrals using Green's, Stoke's and Divergence theorems.
	C214.2	Use Laplace Transform methods to solve initial value problems for constant coefficient linear ordinary differential equations.
	C214.3	Discuss the expansion of a given periodic function by Fourier series in the given interval.
	C214.4	Solve engineering problems using Fourier Transforms and Inverse Fourier Transforms.
	C214.5	Apply a range of techniques to solve first and second order linear partial differential equations.
	C214.6	Model physical phenomena of Heat and Wave equations by using Partial differential equations.
Random Variables and Stochastic Processes (C215)	C215.1	Solve the simple probabilistic problems and identify the different distribution and density functions of random variables
	C215.2	Explain the single random variable concept to compute the statistical averages like mean, variance and moments
	C215.3	Extend the concept of calculating statistical averages and finding moments to multiple Random variables
	C215.4	Explain the random processes concept and its parameters in the time domain.
	C215.5	Explain the Spectral characteristics of random process in frequency domain
	C215.6	Apply the principles of Random processes concepts in LTI systems
OOPS through Java Lab (C216)	C216.1	Identify classes, objects, members of a class and the relationship among them needed for a specific problem
	C216.2	Implement programs to distinguish different forms of inheritance
	C216.3	Create packages and to reuse them
	C216.4	Develop programs using Exception Handling mechanism
	C216.5	Develop multithreaded application using synchronization concept.
	C216.6	Design GUI based applications using Swings and AWT.
Electronic Devices and Circuits Lab (C217)	C217.1	Illustrate the characteristics of two terminal devices.
	C217.2	Construct a Rectifier circuit with and without filter
	C217.3	Examine the characteristics of BJT and FET
	C217.4	Demonstrate the operation of CRO
	C217.5	Illustrate the characteristics of UJT and Three terminal devices
	C217.6	Analyse the frequency response characteristics of BJT and FET
Switching Theory and Logic Design Lab (C218)	C218.1	Test the operation of different logic gates using relevant IC's.
	C218.2	Examine the operation of different combinational logic circuits.
	C218.3	Apply the concept of Boolean algebra or k-maps to reduce and Construct logic circuit for given function.
	C218.4	Analyse the Truth tables of different Flip-Flops.
	C218.5	Design of registers using sequential logic circuits.
	C218.6	Design of Synchronous and Asynchronous counters using Flip-Flops.
Python programming (C219)	C219.1	Know comprehensions, generators in python
	C219.2	Know exception handling in python
	C219.3	Know file I/O
	C219.4	Understand various data types like lists, tuples, strings etc
	C219.5	Know the usage of various pre-defined functions on the above data types
	C219.6	Know Class in Python.



5. Course Outcomes of B. Tech. ECE Second Year – Second Semester

Course Name with Code	CO No.	Course Outcome
Electronic Circuit Analysis (C221)	C221.1	Construct small signal high frequency transistor amplifiers.
	C221.2	Compare single and multi-stage amplifiers.
	C221.3	Analyze different voltage and current feedback amplifiers.
	C221.4	Design RC and LC oscillators as per the given specifications.
	C221.5	Summarize the performance metrics of power amplifiers.
	C221.6	Select the appropriate tuned amplifier circuit to build a given application.
Digital IC Design (C222)	C222.1	Summarize the basics of Hardware Description Languages (HDL)
	C222.2	Demonstrate the Combinational Logic Design with relevant digital ICs with HDL
	C222.3	Illustrate the Sequential Logic Design with relevant digital ICs with HDL
	C222.4	Analyse the types of Combinational MOS Logic circuits
	C222.5	Categorize different CMOS logic circuits with neat architectures
	C222.6	Evaluate the behavior of Sequential MOS logic circuits with various flip-flops
Analog Communication s (C223)	C223.1	Understand the basic building blocks in analog communication systems and of amplitude modulation and demodulation
	C223.2	Analyze time and frequency domain waveforms of DSB-SC and SSB-SC and their generation and detection schemes.
	C223.3	Analyze the modulation and demodulation schemes in FM
	C223.4	Remember the classification of radio transmitters and receivers.
	C223.5	Analyze the effect of noise in analog modulation schemes.
	C223.6	Understand various pulse modulation techniques and comparing FDM and TDM Techniques.
Linear Control Systems (C224)	C224.1	Explain the basic concepts of linear control system and to obtain the overall transfer function
	C224.2	Analyze the time domain response of first order and second order system with different test signals
	C224.3	Analyze stability of control system using Routh's stability criterion
	C224.4	Analyze the system stability by Root Locus techniques
	C224.5	Determine the frequency domain analysis of the linear control system using Bode plot and Nyquist stability criterion.
	C224.6	Develop the system response of systems represented in state-space form.
Management and Organizational Behavior (C225)	C225.1	Explain various concepts of management, principles, leadership styles and basic concepts on Organization
	C225.2	Discuss conceptual knowledge on functional management that is on Human resource management and Marketing management
	C225.3	Explain the basic Concepts into select contemporary management practices and Strategic Management
	C225.4	Discuss the theories of motivation and also deals with individual behavior, their personality and perception of individuals
	C225.5	Understand about organizations groups that affect the organizational climate
	C225.6	Analyze entire organizations which helps employees in stress management
Electronic Circuit Analysis Lab (C226)	C226.1	Calculate bandwidth of given two stage RC coupled amplifier
	C226.2	Compare different types of Feedback amplifiers according to their input and output impedances.
	C226.3	Construct different types of Oscillator circuits.
	C226.4	Demonstrate various Power amplifiers.
	C226.5	Analyze the response of the tuned amplifier.
	C226.6	Design different types of Amplifiers and Oscillator circuits using simulation software tool.
Analog Communication s Lab (C227)	C227.1	Understand different analog modulation and demodulation scheme and analysis of signals on Spectrum Analyzer.
	C227.2	Detailed analysis of diode detector.
	C227.3	Understand different frequency modulation and demodulation schemes. Extend the analysis of FM with Pre-emphasis & De-emphasis circuits.
	C227.4	Prove Sampling Theorem.
	C227.5	Understand the basics of different pulse modulation and demodulation schemes.
	C227.6	Evaluate the performance of various components like AGC that improve radio receiver's performance.
Digital IC Design Lab (C228)	C228.1	Describe the concept and operation of the HDL simulator.
	C228.2	Demonstrate the simulation of logic gates using HDL simulator.
	C228.3	Interpret the combinational logic circuits like full-adder, decoder, encoder, multiplexer and comparator using HDL simulator.
	C228.4	Distinguish the coding among the three modeling systems viz., behavioral, dataflow and structural.
	C228.5	Execute the HDL simulator for sequential logic circuits.
	C228.6	Implement combinational and sequential logic circuits on FPGA hardware
Soft skills (C229)	C229.1	Effectively communicate through verbal/oral communication and improve the listening skills
	C229.2	Write precise briefs or reports and technical documents
	C229.3	Actively participate in group discussion / meetings / interviews and prepare & deliver presentations
	C229.4	Become more effective individual through goal/target setting, self-motivation and practicing creative thinking.
	C229.5	Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.



6. Course Outcomes of B. Tech. ECE Third Year – First Semester

Course Name with Code	CO No.	Course Outcome
Analog ICs and Applications (C311)	C311.1	Discuss the internal operation of Op-Amp and its Parameters
	C311.2	Analyze different linear applications using Op-Amp
	C311.3	Analyze different non-linear applications using Op-Amp
	C311.4	Analyze the active filters using Op-Amp
	C311.5	Illustrate the 555 Timers and Phase Locked Loop
	C311.6	Discuss the concepts of different types of D-A & A-D Converters
Electromagnetic Waves and Transmission Lines (C312)	C312.1	Construct transmission line equation and expressions for primary & secondary constants
	C312.2	Calculate the expressions for input impedance, reflection coefficient, VSWR of transmission lines, Impedance transformation & matching and applications of smith chart
	C312.3	Determining Maxwell's Equations for Static & Time varying Electric fields and applications
	C312.4	Determining Maxwell's Equations for Static & Time varying Magnetic fields and applications
	C312.5	Employ the knowledge of uniform plane wave concept and characteristics of uniform plane wave in various media
	C312.6	Demonstrate the expressions for the reflection & refraction of plane waves in perfect conductor & dielectric medium and power analysis.
Digital Communications (C313)	C313.1	Explain the process of encoding and decoding of analog signals.
	C313.2	Explain various line coding & digital modulation techniques
	C313.3	Evaluate the probability of error for various digital modulation schemes
	C313.4	Predict the average and mutual information of discrete messages
	C313.5	Distinguish the data compression techniques in source coding
	C313.6	Demonstrate different error detection & correction coding schemes for reliable transmission
Computer Organization and Architecture (C314)	C314.1	Interpret and manipulate representations of numbers stored in digital Computers, relate Postulates of Boolean algebra, and minimization of Boolean functions
	C314.2	Design and evaluate different methods of combinational and sequential logic circuits
	C314.3	Organize and analyze the various structure of components in RTL, Micro operations and micro program
	C314.4	Ability to determine data transfer programming, micro programmed Control unit and their respective micro-operations
	C314.5	Explain the basic of instruction sets and their impact on processor design on data transfer, micro program and manipulator program in CPU.
	C314.6	Ability to analyze memory hierarchy and its impact on computer cost performance and design trade-offs on the different ways of communication with I/O devices & I/O interfaces
Electronic Measurements and Instrumentation (C315)	C315.1	Discuss fundamental characteristics of different instruments
	C315.2	Describe different signal generators and analyzers in terms of their performance
	C315.3	Use different oscilloscopes in various applications.
	C315.4	Determine the working of various AC bridges
	C315.5	Analyze several electrical parameters of transducers
	C315.6	Explain the measurement of different physical parameters
Analog ICs and Applications Lab (C316)	C316.1	Describe the Functioning, Parameters and Specifications of IC 741, IC 555, IC 565, IC 566, IC 1496
	C316.2	Analyze and Construct Op-Amp circuits for linear applications with the given specifications.
	C316.3	Analyze and Construct Op-Amp circuits for Non-linear applications with the given specifications
	C316.4	Analyze and Design various types of active filters using Op-Amp
	C316.5	Experiment monostable and astable circuits using IC 555 Timer, Construct PLL using IC 565 and Construct VCO using IC 566
	C316.6	Examine different types of regulators and converters using Op-Amp
Digital Communications Lab (C317)	C317.1	Estimate the performance of base band signals.
	C317.2	Estimate the pass band transmission of digital signals.
	C317.3	Analyze different digital modulation techniques in digital communications
	C317.4	Apply companding technique in digital communication system.
	C317.5	Apply various channel coding schemes & demonstrate their capabilities towards the improvement of the noise performance system.
	C317.6	Analyze different techniques in modern digital communications, in particular error detection and correction techniques.
Data Structures using Java Lab (C318)	C318.1	Implement Searching and Sorting Techniques
	C318.2	Apply appropriate data structures to implement basic data structure Stacks
	C318.3	Apply appropriate data structures to implement Queues, Dequeues, Priority Queues
	C318.4	Implement Trees, Binary Trees and Binary Search Trees
	C318.5	Develop and implement graph traversals
	C318.6	Implement Pattern Matching Algorithm



7. Course Outcomes of B. Tech. ECE Third Year – Second Semester

Course Name with Code	CO No.	Course Outcome
Micro Processors & Micro Controllers (C321)	C321.1	Summarize the basic concepts of microprocessors & microcontrollers architectures.
	C321.2	Explain the physical operation of 8086.
	C321.3	Develop assembly language program for 8086 and 8051.
	C321.4	Analyze memory and I/O interfacing devices with 8086 and 8051
	C321.5	Examine the internal operation of 8051 with SFR.
	C321.6	Illustrate the ARM Cortex- M3 functioning.
VLSI Design (C322)	C322.1	Explain the fabrication process of various MOS technologies and electrical behavior of MOS circuits related problems
	C322.2	Apply the concept of Design rules for stick diagrams and Layouts
	C322.3	Discuss the scaling and delays of MOS circuits
	C322.4	Analyze the basic building blocks of Analog IC design
	C322.5	Describe the concepts of CMOS combinational & sequential Logic circuits
	C322.6	Discuss the basic FPGA & various advanced technologies in VLSI
Digital Signal Processing (C323)	C323.1	Summarize the concepts of Signals & Systems and represent in frequency domain using Z- Transforms
	C323.2	Apply FFT Algorithm to compute Discrete Fourier transform
	C323.3	Design IIR Filters using various techniques
	C323.4	Design the structures of Digital IIR Filters using various methods.
	C323.5	Design IIR filters using windowing Techniques and Frequency sampling method
	C323.6	Understand the basic architecture of DSP processor
Embedded Systems (C324)	C324.1	Understand basic concept of embedded systems and the applications in various processors and domains of embedded system.
	C324.2	Design and simulate combinational logic circuits using different modelling techniques.
	C324.3	Analyze the different software tools and embedded software development cycles.
	C324.4	Analyze to understand the concepts of RTOS and what is a microcomputer and Computational models of embedded system.
	C324.5	Remember the different types of debugging techniques and tools of embedded systems.
	C324.6	Analyze to understand the differences between IDE tools, host and target machines.
Python Programming (C325)	C325.1	Describe comprehend the basics of python programming
	C325.2	Demonstrate the principles of structured programming and be able to describe, design, implement, and test structured programs using currently accepted methodology
	C325.3	Explain the use of the built-in data structures list, sets, tuples and dictionary
	C325.4	Make use of functions and its applications
	C325.5	Make use of Modules and Packages in python
	C325.6	Identify real-world applications using oops, files and exception handling provided by python.
Micro Processors & Micro Controllers Lab (C326)	C326.1	write a Program on a microprocessor using instruction set of 8086
	C326.2	Summarize the concepts of 8086 assembly level language programming and its applications
	C326.3	Contrast how input output devices can be interfaced to processor and will explore several techniques of interfacing.
	C326.4	Write a program on a 8051 microcontroller using instruction set of 8051
	C326.5	Summarize the concepts of 8051 assembly level language programming and its applications.
	C326.6	Contrast how input output devices can be interfaced to microcontroller and will explore several techniques of interfacing
VLSI Design Lab(C327)	C327.1	Discuss the environment of Xilinx Vivado and its design flow
	C327.2	Design and simulate combinational logic circuits using different modelling techniques.
	C327.3	Design and simulate sequential logic circuits using different modelling techniques.
	C327.4	Design inverter and universal gates at transistor level using Pyxis schematic and perform transient analysis and evaluate performance metrics.
	C327.5	Design combinational logic circuits using Pyxis schematic and perform transient analysis and evaluate performance metrics.
	C327.6	Design sequential logic circuits and evaluate their performance metrics using Mentor Graphics EDA tools with 130nm technology



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Digital Signal Processing Lab (C328)	C328.1	Develop program for Linear and Circular convolution using MATLAB and Code composer studio.
	C328.2	Analyse stability using different transformation techniques.
	C328.3	Compute DFT & IDFT using MATLAB & CC Studio
	C328.4	Compute Linear Circular convolution & N-point DFT using TI DSP starter kit
	C328.5	Design and Implementation of FIR & IIR Filters using TI DSP starter kit
	C328.6	Design and Implementation of FIR, IIR Filters and Implantation of FFT algorithm using Cypress FM4 starter kit
ARM based/ Aurdino based Programming (C329)	C329.1	Interface the temperature sensor with Arduino board and measure an analog signal in serial plotter
	C329.2	Understand the Microcontroller-Transducers Interface techniques and generate the PWM output on CRO
	C329.3	Establish Serial Communication link with Arduino
	C329.4	Analyze basics of SPI interface.
	C329.5	Interface Stepper Motor with Arduino
	C329.6	Analyze Accelerometer interface technique
Research Methodology (C3210)	C3210.1	Demonstrate the ability to choose methods appropriate to research aims and objectives.
	C3210.2	Understand the limitations of particular research methods.
	C3210.3	Develop skills in qualitative and quantitative data analysis and presentation.
	C3210.4	Develop advanced critical thinking skills.



8. Course Outcomes of B. Tech. ECE Fourth Year – First Semester

Course Name with Code	CO No.	Course Outcome
Microwave and Optical Communication Engineering (C411)	C411.1	Understanding the working of various microwave sources.
	C411.2	Understanding various impedance matching devices and knowledge of passive microwave components.
	C411.3	Illustrate basic functionality parameters of optical communication system
	C411.4	Categorize different optical fiber connectors and splicing techniques used to joint the optical cables
	C411.5	Discuss the various optical sources and optical detectors and their use in the optical communication system and power calculations and efficiencies between source to fiber devices
	C411.6	Discuss the different measurement techniques used for microwave & optical communications.
Data Communications & Computer networks (C412)	C412.1	Know the Categories and functions of various Data communication Networks
	C412.2	Design and analyze various error detection techniques
	C412.3	Demonstrate the mechanism of routing the data in network layer
	C412.4	Identify working principles of LAN and the concepts behind physical and logical addressing.
	C412.5	Know the significance of various Flow control and Congestion control Mechanisms
	C412.6	Know the Functioning of various Application layer Protocols.
Digital Image and Video Processing (C413)	C413.1	Summarize the basics of image formation and various transforms used in image processing
	C413.2	Apply spatial and frequency domain filtering operations to enhance and restore an image.
	C413.3	Classify segmentation techniques, edge linking through local processing and global processing
	C413.4	Illustrate the redundancy in images, various image compression techniques
	C413.5	Discuss how video signal is sampled and filtering operations in video processing
	C413.6	Summarize the general methodologies for 2D motion estimation
Smart Sensors (C414)	C414.1	Recall and understand the electronic measurement process and system
	C414.2	Explain and analyse applicability of the temperature, humidity and pressure sensors in real life
	C414.3	Organize and classify the working of occupation and motion sensors
	C414.4	Analyse the applicability of velocity and acceleration sensor
	C414.5	Assess the working of flow sensors and chemical sensors
	C414.6	Understand the working of wireless sensor network
Embedded Systems (C415)	C415.1	Understand basic concept of embedded systems and the applications in various processors and domains of embedded system.
	C415.2	Analyze the different hardware components and embedded hardware development cycles and tools.
	C415.3	Analyze the different software tools and embedded software development cycles.
	C415.4	Analyze to understand the concepts of RTOS and what is a microcomputer and Computational models of embedded system.
	C415.5	Remember the different types of debugging techniques and tools of embedded systems.
	C415.6	Analyze to understand the differences between IDE tools, host and target machines.
Internet of Things Lab (C416)	C416.1	Understand the different modules and pin configurations available on Arduino Board.
	C416.2	Understand the PSoc 4 BLE chip with necessary software installation and to write a program in PSoc to control the blinks of LED using Push Button.
	C416.3	Apply the control and communication action on BLE using PSoc and Arduino kit and a smart phone app.
	C416.4	Design automatic street light control system using Arduino
	C416.5	Predicting the presence of smoke and obstacles by using MQ-2 gas sensor and IR sensor respectively on Arduino board.
	C416.6	Analyze the temperature and humidity sensor and Ultrasonic sound sensor on Arduino board and print the output on Serial monitor.
Microwave and Optical Communication Engineering LAB (C417)	C417.1	Demonstrate the characteristics of wave guide components
	C417.2	Analyze the characteristics of Reflex klystron and Gunn diode.
	C417.3	Measure Attenuation, Frequency, impedance and VSWR of micro wave guides
	C417.4	Determine the Characteristics of various antennas and scattering parameters of circulator and magic tee.
	C417.5	Demonstrate the Characteristics of analog and digital link transmission and the losses present in optical fiber using LED and LASER
	C417.6	Determine the Numerical Aperture of an optical fiber
Project -part I (C418)	C418.1	Identify the problem by applying acquired knowledge.
	C418.2	Use literature to identify the objective, scope and the concept of the work.
	C418.3	Analyse and categorize executable project modules after considering risks.
	C418.4	Choose efficient tools for designing project modules.
	C418.5	Integrate all the modules through effective team work after efficient testing.
	C418.6	Explain the completed task and compile the project report.

**9. Course Outcomes of B. Tech. ECE Fourth Year – Second Semester**

Course Name with Code	CO No.	Course Outcome
Machine Learning & Artificial Intelligence (C421)	C421.1	Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
	C421.2	Describe the mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised learning.
	C421.3	Describe the mathematical relationships within and across Machine Learning algorithms and the paradigms of un-supervised learning.
	C421.4	Understand artificial neural networks concept and apply techniques to train the neural networks.
	C421.5	Understand how graphical models are used for supervised and unsupervised learning.
	C421.6	Understand Reinforcement Learning concept and applications.
Cyber Security & Cryptography (C422)	C422.1	Understand the existence of cybercrime and its classification
	C422.2	Explain the different forms of attack on computer systems
	C422.3	Analyse the process of investigation about cybercrime
	C422.4	Apply the process of prevention from cyber crime
	C422.5	Explain the computer forensics fundamentals
	C422.6	Understand the legal perspective about cybercrime
Project - Part II (C423)	C423.1	Identify the problem by applying acquired knowledge.
	C423.2	Use literature to identify the objective, scope and the concept of the work.
	C423.3	Analyse and categorize executable project modules after considering risks.
	C423.4	Choose efficient tools for designing project modules.
	C423.5	Integrate all the modules through effective team work after efficient testing.
	C423.6	Explain the completed task and compile the project report.