

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

2022 SCHEME

Course Name	Course Code	CO. No.	Course Outcomes
AV Mathematics- III	BMATEC301	CO1	Demonstrate the Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing, and field theory
		CO2	To use Fourier transforms to analyze problems involving continuous-time signals
		CO3	To apply Z-Transform techniques to solve difference equations
		CO4	Understand that physical systems can be described by differential equations and solve such equations
		CO5	Make use of correlation and regression analysis to fit a suitable mathematical model for statistical data
DIGITAL SYSTEM DESIGN USING VERILOG	BEC302	CO1	Apply K-Map And Quine- Mccluskey Minimization Techniques To Simplify Boolean Function
		CO2	Apply The Principles Of Logic Gates In The Design Of Combinational Circuits.
		CO3	Construct Shift Registers And Counters Using Different Types Of Flip-Flops.
		CO4	Illustrate The Instruction Set, Operators And Data Types In Verilog Programming.
		CO5	Model The Dataflow, Behavioral And Structural Constructs For Digital Circuits.
		CO6	Simulate And Verify Combinational Circuits And Sequential Circuits Using Verilog Descriptions.
		CO7	Demonstrate Interfacing Of Input Output Devices With FPGA
ELECTRONIC PRINCIPLES AND CIRCUITS	BEC303	CO1	Explain The Small Signal Model And Analysis Of BJT Voltage Amplifiers In CE,CB,CC Mode To Study The Nonlinear Behaviour Of Circuits
		CO2	Apply Small Signal Model Analysis To Study The Behaviour Of MOSFET Amplifier In CS,CD,CG Modes
		CO3	Design Of Linear And Nonlinear Circuits Using OPAMP For Applications Such As Oscillators, ADC, DAC, Timers.
		CO4	Apply Negative Feedback Topologies In The Design Of Amplifiers And Filters
		CO5	Describe The Operation Of Power Amplifiers And Thyristors Used In The Design Of Power Electronic

			Circuits
		CO6	Simulate Feedback Circuits And Verify The Characteristics For Amplifiers And Oscillators
		CO7	Simulate Wave Shaping Circuits And Verify Its Characteristics For Signal Conditioning
NETWORK ANALYSIS	BEC304	CO1	Determine Currents And Voltages Using Source Transformation/ Source Shifting/ Mesh/ Nodal Analysis And Reduce Given Network Using Star- Delta Transformation
		CO2	Solve Problems By Applying Network Theorems And Electrical Laws To Reduce Circuit Complexities And To Arrive At Feasible Solutions
		CO3	Analyse The Circuit Parameters During Switching Transients And Apply Laplace Transform To Solve The Given Network
		CO4	Evaluate The Frequency Response For Resonant Circuits And The Network Parameters For Two Port Networks
ANALOG AND DIGITAL SYSTEMS DESIGN LAB	BECL305	CO1	Design And Analyze Amplifier And Oscillator Circuits Using BJT
		CO2	Design Combinational And Sequential Logic Circuits And Verify Its Functionality
		CO3	Design And Test OPAMP Circuits To Realize The Mathematical Computations
		CO4	Demonstrate Active Filters, Timers, Power Supply, Audio Amplifier To Understand The Operational Response.
COMPUTER ORGANIZATION AND ARCHITECTURE	BEC306C	CO1	Explain The Basic Organization Of A Computer System.
		CO2	Describe The Addressing Modes, Instruction Formats And Program Control Statement.
		CO3	Explain Different Ways Of Accessing An Input/ Output Device Including Interrupts.
		CO4	Illustrate The Organization Of Different Types Of Semiconductor And Other Secondary Storage Memories.
		CO5	Illustrate Simple Processor Organization Based On Hard Wired Control And Microprogrammed Control.
SOCIAL CONNECT AND RESPONSIBILITY	BSCK307	CO1	Provide A Formal Platform For Students To Communicate And Connect To The Surrounding
		CO2	Create A Responsible Connection With The Society.
		CO3	Identify The Needs And Problems Of The Community And Involve Them In Problem –Solving
		CO4	Develop Among Themselves A Sense Of Social & Civic Responsibility & Utilize Their Knowledge In Finding Practical Solutions To Individual And Community

			Problems.
		CO5	Develop Competence Required For Group-Living And Sharing Of Responsibilities & Gain Skills In Mobilizing Community Participation To Acquire Leadership Qualities And Democratic Attitudes.
LABVIEW PROGRAMMING	BEC358A	CO1	Use Labview To Create Data Acquisition, Analysis And Display Operations
		CO2	Create User Interfaces With Charts, Graph And Buttons
		CO3	Use The Programming Structures And Data Types That Exist In Labview
		CO4	Build Simple Virtual Instruments For Control Applications
ELECTROMAGNETICS THEORY	BEC401	CO1	Apply The Principles Of Electrostatics To The Solutions Of Problems Relating To Electric Field And Electric Potential, Boundary Conditions And Electric Energy Density
		CO2	Apply The Principles Of Magneto Statics To The Solutions Of Problems Relating To Magnetic Field And Magnetic Potential, Boundary Conditions And Magnetic Energy Density
		CO3	Understand The Concepts Related To Faraday'S Law, Induced Emf And Maxwell'S Equations.
		CO4	Apply Maxwell'S Equations To Solutions Of Problems Relating To Transmission Lines And Uniform Plane Wave Propagation.
PRINCIPLES OF COMMUNICATION SYSTEMS	IPCC BEC402	CO1	Bring Out The Significance Of Random Variables And Random Process In Communication System Design
		CO2	Analyse The Analog Modulation And Demodulation Schemes To Compare Their Performance.
		CO3	Design Of PCM Systems Through The Processes Sampling, Quantization And Encoding.
		CO4	Describe The Ideal Condition, Practical Considerations Of The Signal Representation For Baseband Transmission Of Digital Signals.
		CO5	Simulation Of Signals And Systems To Understand The Concepts Of Communication
CONTROL SYSTEMS	IPCC BEC403	CO1	Deduce Transfer Function Of A Given Physical System Using Differential Equations
		CO2	Obtain The Transfer Function Of A Given System Using Block Diagram And Signal Flow Graphs Reduction Techniques.
		CO3	Compute The Time Response Specifications To Analyze The First And Second Order System
		CO4	Determine The Stability Of The System Using RH Criterion And Root Locus Techniques
		CO5	Use Bode Plots And Nyquist Criterion To Determine

			The Stability Of The Systems In Frequency Domain
		CO6	Simulate A Given System To Determine Its Transfer Functions And Verify Its System Properties
COMMUNICATION LAB	BECL404	CO1	Design The Circuit For Given Specifications.
		CO2	Conduct Experiment With Given Specifications.
		CO3	Tabulate, Validate The Readings And Infer The Results Graphically/Mathematically.
		CO4	Interpret The Concepts And Results Both Orally And Written.
MICROCONTROLLERS	AEC BEC405A	CO1	Describe The Features And Architecture Of 8051 Microcontroller.
		CO2	Illustrate The Types Of 8051 Microcontroller Addressing Modes & Instructions With Assembly Language Programs.
		CO3	Describe The Programming Operation Of Timers/Counters And Serial Port Of 8051 Microcontroller
		CO4	Write Assembly Language Programs To Use Timers/Counters And Interrupts For Data Transfer Applications .
		CO5	Develop C Programs To Interface I/O Devices With 8051 Microcontroller.
DATA STRUCTURES LAB USING C BEC405D DATA STRUCTURES LAB USING C	BEC405D	CO1	1. Describe Basic Concepts In Programming Such As Arrays And Pointers, Memory Allocation, And Mechanisms To Pass Arguments Across Functions. -
		CO2	2. Apply The Concepts Of Stack To Realize Evaluation Of Arithmetic And Logical Expressions. - L3
		CO3	3. Apply The Concept Of Linked List To Realize Insertion And Deletion Operations In Stacks And Queues. - L3
		CO4	4. Implement Algorithms For Tasks Involving Searching, Sorting, And Traversal Using Trees And Graphs - L3
		CO5	5. Utilize Data Structures And Algorithms To Enhance Software Performance And Scalability. - L3
		CO1	1. Describe Basic Concepts In Programming Such As Arrays And Pointers, Memory Allocation, And Mechanisms To Pass Arguments Across Functions. -
UNIVERSAL HUMAN VALUES COURSE	BUHK408	CO1	To Become More Responsible In Life, And In Handling Problems With Sustainable Solutions, While Keeping Human Relationships And Human Nature In Mind.
		CO2	To Become Sensitive To Their Commitment Towards What They Have Understood (Human Values, Human Relationship And Human Society).
		CO3	Able To Apply What They Have Learnt To Their Own Self In Different Day-To-Day Settings In Real Life, At

			Least A Beginning Would Be Made In This Direction.
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2021 SCHEME

Course Name	Course Code	CO. No.	Course Outcomes
TRANSFORM CALCULUS, FOURIER SERIES & NUMERICAL TECHNIQUES (COMMON TO ALL)	21MAT31	CO1	Understand The Concepts Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations
		CO2	Demonstrate Various Physical Phenomena Using The Concepts Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations
		CO3	Apply The Knowledge Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations In Modeling Various Physical And Engineering Phenomena.
		CO4	Relate The Concepts Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations To Their Respective Branches.
DIGITAL SYSTEM DESIGN USING VERILOG	IPCC 21EC32	CO1	Apply K-Map And Quine-Mccluskey Minimization Technique Simplify Noolean Functions
		CO2	Analyse And Design For Combinational Circuits
		CO3	Analyse The Concept Of Flip Flops And Design The Synchronous Sequential Circuits Using Flip Flops
		CO4	Write Combinational Circuits And Sequential Circuits Using Verilog Descriptions
BASIC SIGNAL PROCESSING	IPCC 21EC33	CO1	Understand The Fundamentals Of Linear Algebra, Signals And Systems
		CO2	Perform Linear And Non-Linear Operations On Signals And Systems To Identify Its Properties In Time And Z-Domain.
		CO3	Solve N-Dimension Vector Spaces Using Matrix Representation.
		CO4	Verify Mathematical Operations Performed With Matrices, Signal And System Properties In Time And Z-Domain
ANALOG ELECTRONIC CIRCUITS	PCC 21EC34	CO1	Explain The Biasing Of Transistors, Working Of Oscillator, Functioning Of Linear Ics And Basics Of Power Electronics
		CO2	Analyze Amplifiers With And Without Feedback.
		CO3	Analyze Power Amplifiers And Linear IC Based

			Circuits
		CO4	Design Of Linear IC Based Circuits And Power Electronic Circuit
ANALOG & DIGITAL ELECTRONICS LAB	21ECL35	CO1	Explain The Biasing Of Transistors, Working Of Oscillator, Functioning Of Linear Ics And Basics Of Power Electronics
		CO2	Analyze Amplifiers With And Without Feedback.
		CO3	Analyze Power Amplifiers And Linear IC Based Circuits
		CO4	Design Of Linear IC Based Circuits And Power Electronic Circuit
UHV SOCIAL CONNECT AND RESPONSIBILITY	21UH36	CO1	Understand Social Responsibility And Ethics Towards Mankind And Environment
		CO2	Practice Sustainability And Creativity To Have An Impact On The Society.
		CO3	Exhibit Planning And Organizational Skills In A Given Platform
		CO4	Effectively Communicate The Ideas/Process/Solutions In Both Verbal And Written
ABILITY ENHANCEMENT COURSE - III	AEC 21EC387	CO1	Perform Arithmetic And Boolean Operation Using Graphical Programming
		CO2	Simple Applications Using For Loop, While Loop Using Labview Structure.
		CO3	Build Virtual Instrument To Control Room Temperature, Water Level Detection. Calculator.
		CO4	Build Virtual Instrument To Find Area, Perimeter Of Circle
		CO5	Use Various Editing And Debugging Techniques.
COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS	21MAT41	CO1	Understand The Concepts Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations
		CO2	Demonstrate Various Physical Phenomena Using The Concepts Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations
		CO3	Apply The Knowledge Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations In Modeling Various Physical And Engineering Phenomena.
		CO4	Relate The Concepts Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Numerical Techniques And Calculus Of Variations To Their Respective Branches.

DIGITAL SIGNAL PROCESSING	IPCC 21EC42	CO1	Outline The Concepts Of Discrete Fourier Transform (DFT), Filter Design And Processors.
		CO2	Compute DFT For Short/Long Duration Input Sequence Using DFT Properties And FFT Algorithms
		CO3	Design Digital IIR/FIR Filter For Given Specifications
		CO4	Realize Digital IIR /FIR Filters In Direct Forms And Cascade, Lattice Structure
		CO5	Simulate And Verify The Properties Of DFT ,Magnitude And Phase Response Of IIR And FIR Filters For Given Specifications.
CIRCUITS & CONTROLS	IPCC 21EC43	CO1	Solve Electric Circuit Parameters By Applying Loop Analysis, Nodal Analysis And Network Theorems.
		CO2	Evaluate Two Port Parameters Of A Network And Apply Laplace Transforms To Solve Electric Networks
		CO3	Apply Block Diagram Reduction Technique To Deduce Transform Function
		CO4	Analyze The Performance And Stability Using Transfer Function Of Feedback Systems
COMMUNICA TION THEORY	21EC44	CO1	Explain The Fundamental Concept Of Different Modulation And Demodulation Techniques Used In Analog Communication.
		CO2	Compute Various Parameters Related To Analog Communication System..
		CO3	Analyze The Performance Of The Analog Communication System In The Presence Of Noise.
		CO4	Analyze And Compute Performance Of Digital Formatting Processes With Quantization Noise.
BIOLOGY FOR ENGINEERS	AEC 21BE45	CO1	To Know The Fundamentals Of Biological Cellular Systems And To Familiarize The Students With The Basic Biological Concepts And Their Engineering Applications.
		CO2	To Enable The Students With An Understanding Of Biodesign Principles To Create Novel Devices And Structures.
		CO3	To Provide The Students An Appreciation Of How Biological Systems Can Be Re-Designed As Substitute Products For Natural Systems.
		CO4	To Motivate The Students Develop The Interdisciplinary Vision Of Biological Engineering.
COMMUNICAT ION LABORATORY	PCC 21ECL46	CO1	Demonstrate AM Generation And Detection Using Suitable Electronic Circuits
		CO2	Test The Concepts Of FM Circuits For Modulation, Demodulation And Noise Suppression
		CO3	Test And Analyze Sampling, Multiplexing And Pulse Modulation Techniques Using Electronic Hardware Components.

		CO4	Demonstrate RF Transmitters And Receivers Using Electronic Circuits.
ABILITY ENHANCEMENT COURSE-IV EMBEDDED C BASICS	AEC 21EC481	CO1	Write 8051 C Program for Solving Problems
		CO2	Simulate /Demonstrate The Experiments With Given Specification
		CO3	Tabulate, Validate The Readings And Infer The Results Logically
		CO4	Interpret The Concept And Results Both Orally And Written
UNIVERSAL HUMAN VALUES	UHV 21UH49	CO1	Demonstrate Sound Knowledge In The Chosen Domain Through Skill Up Gradation.
		CO2	Correlate The Knowledge Gained For Different Applications Scenarios.
		CO3	Work As Individual Or As Good Team Player In An Environment.
		CO4	Communicate The Content Effectively Through Written And Oral Presentations.
INTER/INTRASTITUTIONAL INTERNSHIP	INT 21INT49	CO1	Demonstrate Sound Knowledge In The Chosen Domain Through Skill Up Gradation.
		CO2	Correlate The Knowledge Gained For Different Applications Scenarios.
		CO3	Work As Individual Or As Good Team Player In An Environment.
		CO4	Communicate The Content Effectively Through Written And Oral Presentations.
DIGITAL COMMUNICATION	21EC51	CO1	Apply The Knowledge Of Spectral Analysis, Theory Of Detection And Estimation In DCS.
		CO2	Analyze Digital Modulation Schemes, ISI And Spread Spectrum Techniques(SST).
		CO3	Determine Performance Parameters Of Digital Modulation Techniques And SST.
		CO4	Compute Entropy, Efficiency And Redundancy Of Source Codes
		CO5	Detect And Correct Errors Using Channel Coding Technique
CO & ARM	IPCC 21EC52	CO1	Describe The Basic Structure & I/O Organization Of A Computer.
		CO2	Explain Memory Organization And Management For Processing In Computer.
		CO3	Describe The Architecture Of ARM Based Embedded Systems
		CO4	Illustrate The ARM & Thumb Instruction Set In Writing Programs.
		CO5	Write An Assembly Program (ARM And Thumb Instructions) And Simulate Using Keil Microvision.
		CO6	Demonstrate The Application Of Interfacing IO Devices

			To ARM Controller
COMPUTER COMMUNICATION NETWORKS	PCC 21EC53	CO1	Describe The Roles And Services Of Layering Architecture In TCP/IP /OSI Model
		CO2	Discuss Services Standards And Protocols Associated With Data Link Layer And Network Layer
		CO3	Obtain The Performance Parameters Of Dta Link Layer And Routing Protocols
		CO4	Identify The Function And Protyocols Associated With Transport Layer
		CO5	Differentiate Different Types Of Coordinate Systems And Use Them For Solving The Problems Of Electromagnetic Field Theory.
ELECTROMAGNETICS WAVE	PCC 21EC54	CO1	Describe Static Electric And Magnetic Fields, Their Behaviour In Different Media, Associated Laws, Boundary Conditions And Electromagnetic Potentials.
		CO2	Use Integral And Point Form Of Maxwell'S Equations For Solving The Problems Of Electromagnetic Field Theory.
		CO3	Calculate Magnetic Force, Potential Energy And Magnetization With Respect To Magnetic Materials And Voltage Induced In Electric Circuits.
		CO4	Describe Time Varying Fields, Propagation Of Electromagnetic Waves In Different Media, Poynting Theorem, Their Sources &Effects And To Apply The Theory Of Electromagnetic Waves In Practical Problems.
COMMUNICATION LAB II	PCC 21ECL55	CO1	Design And Demonstrate Communication Circuits For Different Digital Modulation Techniques.
		CO2	To Simulate Source Coding Algorithms Using C/C++/ MATLAB Code.
		CO3	To Simulate Error Correcting And Detecting Codes Using C/C++/ MATLAB Code.
		CO4	Simulate The Networking Concepts And Protocols Using C/C++/ Network Simulation Tool.
		CO5	Understand Entropies And Mutual Information Of Different Communication Channels.
RESEARCH METHODOLOGY & INTELLECTUAL PROPERTY RIGHTS	AEC 21EC56	CO1	Explain The Concepts Of Engineering Research And Ethics Associated With It .
		CO2	Illustrate The Procedure Of Literature Review, Technical Reading And Citations.
		CO3	Describe The Fundamentals Of Intellectual Property, Patent Laws And Drafting Procedure.
		CO4	Explain The Copyright Laws, Related Rights And Concepts Of Trademarks.
		CO5	Describe The Principles Of Industrial Designs, Design Rights And Geographical Indications Concepts.



ACHARYA INSTITUTE OF TECHNOLOGY

Affiliated to Visvesvaraya Technological University, Belagavi,
Approved by AICTE, New Delhi, Recognized by Govt. of Karnataka and
Accredited by NBA (AE, BT, CSE, ECE, ME, MT)

ENVIRONMENTAL STUDIES	HSMC 21CIV57	CO1	Gain Knowledge Of Ecology, Environment, Environmental Policies And Regulations, Clean Energy Sources, Natural Resource Management And Sustainability Natural Resource Management And Sustainability
		CO2	Understand The Factors Causing Pollution To Water, Soil, Noise And Air And Their Global Environmental Concerns.
ABILITY ENHANCEMENT COURSE-V	AEC 21EC58X	CO1	Understand Internet Of Things And Its Hardware And Software Components
		CO2	Interface I/O Devices, Sensors & Communication Modules To Node MCU
		CO3	Write Program To Send Data To The Thingspeak Cloud
		CO4	Build IOT Based System To Remotely Monitor Data And Control Devices

2018 SCHEME COURSE OUTCOMES

Course Name	Course Code	CO. No.	Course Outcomes
TRANFORM CALCULUS, FOURIER SERIES & NUMERICAL TECHNIQUES	18MAT31	CO1	Have The Knowledge Of Laplace Transforms, Fourier Series, Fourier Transforms, Z-Transforms, Calculus Of Variations And Numerical Methods.
		CO2	Solve Engineering Problems Using Laplace Transforms, Fourier Series, Fourier Transforms, Numerical Methods And Calculus Of Variation.
		CO3	Communicate And Reflect On Applications Of Mathematics As Tool.
NETWORK ANALYSIS	18EC32	CO1	Simplify The Complex Networks Using Network Reduction And Source Conversion Techniques.
		CO2	Solve For Different Electrical Network Variables Using Mesh And Nodal Analysis.
		CO3	Apply The Network Theorems To Find AC/DC Network Variables.
		CO4	Analyze The Performance Of Electrical Network For A Given Set Of Initial Conditions.
ELECTRONIC DEVICES	18EC33	CO1	Explain The Structure Of Semiconductor Materials And Devices
		CO2	Describe The Characteristics And Parameters Of Different Types Of Semiconductor Devices
		CO3	Compute The Equivalent Models And Parameters Of Different Semiconductor Devic
		CO4	Discuss Fabrication Process Of Semiconductor Devices
DIGITAL SYSTEM DESIGN	18EC34	CO1	Describe Different Combinational And Sequential Logic Circuits Using Logic Gates.
		CO2	Apply Various Minimization Techniques For Simplification Of Boolean Functions To Study Digital Circuits.
		CO3	Design Combinational And Sequential Circuits For Given Specifications.
		CO4	Construct The State Diagram For Synchronous Sequential Circuits Using State Machine Notation.
COMPUTER ORGANIZATION AND ARCHITECTURE	18EC35	CO1	Describe Basic Organization And Functional Units Of Computer With Its Instruction Set Architecture
		CO2	Illustrate Computer Arithmetic Operations On Integers And Floating-Point Numbers Using 2's Complement And IEEE Floating Point Representation.
		CO3	Apply Suitable Control Sequence To Complete Data Transfer, Arithmetic And Logical Operations
		CO4	Analyze Different Ways Of Accessing An Input / Output Device Including Interrupts.
POWER	18EC36	CO1	Describe The Power Devices, Triggering Circuits,

ELECTRONICS AND INSTRUMENTATION			Converters And Their Applications.
		CO2	Compute The Design Parameters Of Controlled Rectifier, DC To DC Converters, DC To AC Inverters And SMPS.
		CO3	Describe The Principle Of Operation Of Digital Instruments And Plcs.
		CO4	Compute The Design Parameters Of Multi-Range Ammeters, Voltmeters And Bridges To Measure Passive Component Values And Frequency.
ELECTRONIC DEVICES & INSTRUMENTATION LAB	18ECL37	CO1	Design/Verify Circuit With Given Specification.
		CO2	Conduct / Simulate Circuit With Given Specification For Functional Verification
		CO3	Tabulate And Validate The Readings And Infer The Results Graphically.
		CO4	Interpret The Concepts And Results Both Orally And Written.
DIGITAL SYSTEM DESIGN LAB	18ECL38	CO1	Design / Write The Program With Given Specification.
		CO2	Conduct / Simulate The Experiments With Given Specification.
		CO3	Tabulate And Validate The Readings And Infer The Results Graphically.
		CO4	Interpret The Concepts And Results Both Orally And Written.
ANALOG CIRCUITS	18EC42	CO1	Explain The Biasing Of Bjts/Mosfets, Working Of Oscillators And Functioning Of Linear Ics.
		CO2	Compute The Values Of Various Parameters In Linear And Nonlinear BJT/MOSFET Circuits.
		CO3	Analyze The Power And Feedback Amplifier Circuits.
		CO4	Design Of Linear IC Based Circuits
CONTROL SYSTEMS	18EC43	CO1	Develop Mathematical Modeling For Simple Mechanical & Electrical Systems By Applying Block Diagram Reduction Techniques & Signal Flow Graph
		CO2	Analyze The Given First & Second Order Systems Under Time & Frequency Domain
		CO3	Evaluate The Stability Of The System With The Aid Of Bode Plots, Nyquist Plot & Root Locus
		CO4	Evaluate The State Variables & Obtain The Solution For State Equations.
ENGINEERING STATISTICS AND LINEAR ALGEBRA	18EC44	CO1	Describe Single/Multiple Random Variables, And Their Extension To Random Process.
		CO2	Compute The Quantitative Parameters For Functions Of Single Random Variable, Multiple Random Variables And Random Process.
		CO3	Determine The Rank, Determinant, Eigen-Values And Eigenvectors, Diagonalization And Different Factorizations Of A Matrix.

		CO4	Verify The Existence And Uniqueness Of The Solution Of A Linear System, Special Properties Of A Matrix Such As Symmetric , Hermitian , Positive Definite, Etc.
SIGNALS AND SYSTEMS	18EC45	CO1	Perform Linear And Nonlinear Operations On Signals And Systems To Identify Its Properties
		CO2	Compute The Output Of LTI System Using Convolution Integral/Sum And Impulse Response
		CO3	Apply Fourier Representation/ZT To Study The Behavior Of Periodic And Non-Periodic Signals.
		CO4	Analyze The Behavior Of Continuous/ Discrete LTI Systems In Frequency/ZT Domain
MICROCONTROLLERS	18EC46	CO1	Explain The Internal Organization And Operation Of Microcontroller
		CO2	Describe Various Instruction Set And Addressing Modes Of 8051 Microcontroller
		CO3	Write Assembly Language Programs Using Instruction Set Addressing Modes Of 8051 Microcontroller
		CO4	Develop Embedded System Using C Programming For 8051 Based Microcontroller To Interface With I/O Devices.
MICROCONTROLLER LAB	18ECL47	CO1	Write The Program With Given Specification
		CO2	Demonstrate / Simulate The Experiments With Given Specification
		CO3	Tabulate And Validate The Readings And Infer The Results.
		CO4	Interpret The Concepts And Results Both Orally And Written.
ANALOG CIRCUITS LABORATORY	18ECL48	CO1	Design/Verify Opamp, BJT /FET Based Circuit With Given Specification.
		CO2	Test / Simulate Circuit With Given Specification For Functional Verification
		CO3	Tabulate And Infer The Results Obtained Either Graphically Or Logically.
		CO4	Interpret The Concepts And Results Both Orally And Written.
TECHNOLOGICAL INNOVATION MANAGEMENT AND ENTREPRENEURSHIP	18ES51	CO1	Discuss The Fundamental Concepts Involved And Required In Management And Entrepreneurship
		CO2	Illustrate The Functions Of Managers, Entrepreneurs And Their Social Responsibilities In Order To Setup A Business.
		CO3	Choose Suitable Management And Leadership Skills To Handle A Given Problem Situation.
		CO4	Write A Business Plan And Identify Various Sources Of Funding And Institutions Supporting Entrepreneurs
DIGITAL SIGNAL	18EC52	CO1	Outline The Concept Of Discrete Fourier Transform (DFT), Fast Fourier Transform(FFT), Digital Filters

PROCESSING			And Digital Signal Processors
		CO2	Compute DFT For Short/Long Duration Input Sequence Using DFT Properties And FFT Algorithm
		CO3	Design Digital IIR/FIR Filter For Given Specification
		CO4	Realize Digital IIR /FIR Filters In Direct Forms And Cascade, Lattice Structure
PRINCIPLES OF COMMUNICATION SYSTEMS -	18EC53	CO1	Explain The Fundamental Concept Of Different Modulation And Demodulation Techniques Used In Analog Communication.
		CO2	Compute Various Parameters Related To Analog Communication Systems.
		CO3	Analyze The Performance Of The Analog Communication System In The Presence Of Noise.
		CO4	Analyze The Performance Of Digital Formatting Processes With Quantization Noise.
INFORMATION THEORY AND CODING	18EC54	CO1	Apply The Concept Probability Theory For Study Of Discrete Information Source.
		CO2	Apply Various Source Encoding Techniques To Measure Efficiency And Redundancy Of Information Source.
		CO3	Compute The Channel Capacity & Efficiency Of Discrete/Continuous Channels In Presence And Absence Of Noise.
		CO4	Design Encoders/Decoders For Linear Block Codes, Cyclic Codes & Convolution Codes.
ELECTRO MAGNETIC WAVES	18EC55	CO1	Explain Basic Laws Of Electromagnetism, Magnetic Boundary Conditions And Various Other Parameters Associated With Static Electromagnetic Field.
		CO2	Compute Forces Between Charges, Electric Field, Potential, Energy, Magnetization With Respect To Magnetic Materials And Voltage Induced In Electric Circuits. And Various Other Parameters That Governs The Static Electromagnetic Fields.
		CO3	Verify Various Theorems And Laws Wrt Static Electromagnetic Fields.
		CO4	Apply Maxwell's Equations For Time Varying Fields, EM Waves In Free Space And Conductors And Evaluate Power Associated With EM Waves Using Poynting Theorem
VERILOG HDL	18EC56	CO1	Illustrate HDL Constructs And Identify The Suitable Abstraction Level For Modeling Digital Circuits.
		CO2	Design And Verify The Functionality Of Digital Circuits Using Test Benches.
		CO3	Interpret The Various Constructs In Logic Synthesis.
		CO4	Write The Programs More Effectively Using Verilog Tasks, Functions And Directives.

DSP LAB	18ECL57	CO1	Write Programs To Simulate/Implement DSP Concepts Like, Discrete Computations And Digital Filters
		CO2	Simulate/Implement Discrete Computations On Signals/Systems And Verify Its Properties
		CO3	Simulate/Implement Digital IIR And FIR Filters And Verify Its Frequency Response
		CO4	Communicate The Results Both Orally And Written
HDL LABORATORY	18ECL58	CO1	Write Verilog HDL Code Using Different Levels Of Abstraction For Modeling Digital Designs.
		CO2	Simulate HDL Code & Verify The Functionality Of Digital Circuits Using Test Bench
		CO3	Synthesize, Implement And Validate The Digital Designs On FPGA.
		CO4	Interpret The Concepts And Results Both Orally And Written.
DIGITAL COMMUNICATION	18EC61	CO1	Apply The Concept Of Bandpass Sampling To Well Specified Signals And Channels
		CO2	Compute Various Parameter Of Band Pass Signal And Band Limited Channel For Digital Communication System.
		CO3	Analyze The Performance Of Various Digital Modulation And Demodulation Techniques With And Without Effect Of Noise.
		CO4	Analyze The Performance Of Band Limited Channel With Spread Spectrum Technique.
ARM MICROCONTROLLER & EMBEDDED SYSTEMS	18EC62	CO1	Explain The Architecture Of ARM Processors, Memory Types And Principles Of RTOS
		CO2	Illustrate Various Instructions In ARM Cortex M3
		CO3	Write Assembly Language Programs Using Instruction Set Of ARM Cortex M3.
		CO4	Relate The Need Of Real Time Operating System For Embedded System Applications.
MICROWAVE & ANTENNA -	18EC63	CO1	Describe The Active & Passive Microwave Devices Used In Microwave Communication Systems.
		CO2	Compute Various Parameters Related To Transmission Lines, Microwave Devices And Antenna For Building An RF System Using S-Parameters, Signal Flow Graphs And Smith Charts.
		CO3	Analyze The Performance Of The Microwave Devices (Active & Passive) And Different Type Of Antenna For Various Application.
		CO4	Design And Analyze Antenna And Antenna Array As Per The Requirements.
DATA STRUCTURES USING C++	18EC643	CO1	Describe The Fundamental Concepts Of Arrays, Pointers, And Linked Lists Using C++.
		CO2	Apply Arrays And Linked List Concepts To Design And



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			Analyze Stacks, Queues And Applications Of These Data Structures To Real Time Applications
		CO3	Apply Arrays And Linked List Concepts To Design And Analyze The Skip Lists, Binary Trees And Applications Of These Data Structures To Real Time Applications
		CO4	Apply Arrays And Linked List Concepts To Design And Analyze The Priority Queues, Binary Search Trees And Applications Of These Data Structures To Real Time Applications
PYTHON APPLICATION PROGRAMMING	18EC646	CO1	Describe The Essential Features Python Programming Language
		CO2	Illustrate The Python Specific Features Such As Lists, Tuples, Sets Etc.
		CO3	Write Python Programs Using Conditional Statements, Functions, And Libraries Such As Beautifulsoup, Urllib, Httplib, Socket Programming, Xml, Json, Sql Etc.
		CO4	Employ The Applicability Of Suitable Python Features To Solve A Given Problem Statement.
EMBEDDED SYSTEM LABORATORY	18ECL66	CO1	Write The Program With Given Specification
		CO2	Demonstrate / Simulate The Experiments With Given Specification
		CO3	Tabulate And Validate The Readings And Infer The Results.
		CO4	Interpret The Concepts And Results Both Orally And Written.
COMMUNICATION LABORATORY	18ECL67	CO1	Design/Write The Program With Given Specification For: Various Types Of Digital Transmission & Reception Techniques, Antennas, Microwave Devices And Optical Waveguides.
		CO2	Demonstrate /Simulate The Experiments/Program To Meet The Given Specification.
		CO3	Compute (Or Determine) The Various Parameters Of Micro Strip Resonators, Coupler's And Optical Fibers.
		CO4	Interpret The Concepts And Results Both Orally & Written For The Conducted Experiment.
MINI PROJECT	18ECMP68	CO1	Demonstrate An Ability To Identify And Formulate A Hypothesis For A Given Problem And Test Through Appropriate Experiments.
		CO2	Apply Relevant Modern Tools To Solve The Identified Technical Problem.
		CO3	Analyze And Evaluate The Experimental Results And Propose Suitable Modifications To Improve Performance.
		CO4	Work Effectively As A Member Or A Leader Of A Team.
		CO5	Communicate Technical Content Effectively Through

			Written Reports And Oral Presentations.
COMPUTER NETWORKS	18EC71	CO1	Apply The Knowledge Of Network Components, Frame Formats & Functionalities For Data Transmission.
		CO2	Make Use Of Routing Protocols For A Given Network Topology To Send Data Through Optimal Path.
		CO3	Analyze/Apply Different Access Techniques And Protocols In Data Link Layer.
		CO4	Design Subnet Masks And Address For A Given Network.
VLSI DESIGN	18EC72	CO1	Explain The Characteristics, Parameters Of MOS Circuits And CMOS Fabrication Process.
		CO2	Apply Design Rules To Draw Schematic And Layout Of CMOS Circuits.
		CO3	Design Of Combinational , Sequential And Dynamic Logic Circuits
		CO4	Compute The Performance Of CMOS Circuits In Terms Of Memory, Speed, Power And Area.
SATELLITE COMMUNICATIONS	18EC732	CO1	Describe The Satellite Orbits And Its Trajectories With The Definitions Of Parameters Associated With It.(Such As Signal Propagation Affects, Link Design, Rain Fading And Link Availability And Perform Interference)
		CO2	Illustrate The Importance Of The Earth Segment And Its Relation To The DBS TV.
		CO3	Compute The Satellite Orbital And Link Parameters Under Various Propagation Conditions With The Illustration Of Multiple Access Techniques.
		CO4	Analyze The Importance And Performance Of Space Segment Equipment's And Earth Segment Equipment Used In Satellite Systems.
DIGITAL IMAGE PROCESSING	18EC733	CO1	Use Image Enhancement And Restoration Techniques For Required Visualization
		CO2	Apply Morphological Operations And Segmentation Techniques For Extracting Useful Information From Image.
		CO3	Compare Various Enhancement/Morphological/Segmentation Techniques In Spatial And Frequency Domain.
		CO4	Choose Appropriate Image Processing Technique For Different Applications.
MACHINE LEARNING	18EC745	CO1	Describe The Concepts And Issues Associated With Machine Learning Algorithms.
		CO2	Apply Machine Learning Algorithms To Solve Classification And Regression Task
		CO3	Choose Suitable Machine Learning Techniques For The Application Under Consideration.

		CO4	Analyze The Performance Of Various Machine Learning Algorithms For Different Applications.
IOT AND WSN	18EC741	CO1	Describe The OSI Model, Communication Protocol, Architecture And Design Principles Used In Iot Devices.
		CO2	Describe The Architecture, Hardware And Software Components, Cloud Computing Infrastructure, And Various Protocols Applicable To Wsns In Iot Based Applications.
		CO3	Illustrate The Design Of Iot Applications Using Arduino, And Other Relevant Ides.
		CO4	Apply Suitable MAC And Routing Protocols In Interfacing Sensors With Iot Infrastructure.
COMPUTER NETWORKS LAB	18ECL76	CO1	Write NS2/C Program To Implement Different Networking Concepts.
		CO2	Execute The Program To Meet The Specified Network Configuration.
		CO3	Interpret The Results Of Execution To Simulate A Given Computer Network
		CO4	Communicate The Results Both Orally And Written
VLSI LAB	18ECL77	CO1	Design Analog And Digital CMOS Circuits For The Given Specifications.
		CO2	Simulate & Verify The Functionality Of The Circuits With The Given Specification.
		CO3	Validate And Infer DRC & LVC Results Graphically
		CO4	Interpret The Concepts And Results Both Orally And Written.
PROJECT WORK PHASE 1	18ECP78	CO1	Demonstrate An Ability To Identify And Formulate A Hypothesis For A Given Problem And Test Through Appropriate Experiments.
		CO2	Apply Relevant Modern Tools To Solve The Identified Technical Problem.
		CO3	Analyze And Evaluate The Experimental Results And Propose Suitable Modifications To Improve Performance
		CO4	Work Effectively As A Member Or A Leader Of A Team.
		CO5	Communicate Technical Content Effectively Through Written Reports And Oral Presentations.
WIRELESS CELLULAR & LTE 4G BROAD BAND	18EC81	CO1	Discuss The Basic Architecture And The Functional Standards Specified In LTE 4G.
		CO2	Explain The System Architecture Of LTE And E-UTRAN Based On The Use Of OFDMA And SC-FDMA Principles.
		CO3	Apply The Concepts Of UMTS UTRAN And EPS Handling Processes For The Configuration Of Call

			Processing System For Variety Of Data Call Scenarios.
		CO4	Analyze The Role Of LTE Radio Interface Protocols And EPS Data Convergence Protocols To Set Up, Reconfigure And Release Data And Voice From The Subscribers.
NETWORK SECURITY	18EC821	CO1	Describe Various Types Of Security Attacks, Security Approaches, Viruses, Countermeasures For Networked Devices Against Attacks.
		CO2	Identify Different Network Protocols, Which Can Protect Networked Devices Against Attacks
		CO3	Apply Suitable Network And Transport Layer Solutions To Defend Networked Devices Against Possible Attacks.
		CO4	Apply Suitable Application Layer Solutions To Defend Networked Devices Against Possible Attacks.
PROJECT WORK PHASE 2	18ECP83	CO1	Demonstrate An Ability To Identify And Formulate A Hypothesis For A Given Problem And Test Through Appropriate Experiments.
		CO2	Apply Relevant Modern Tools To Solve The Identified Technical Problem.
		CO3	Analyze And Evaluate The Experimental Results And Propose Suitable Modifications To Improve Performance
		CO4	Work Effectively As A Member Or A Leader Of A Team.
		CO5	Communicate Technical Content Effectively Through Written Reports And Oral Presentations.
TECHNICAL SEMINAR	18ECS84	CO1	Select Recent Advances In A Specific Technical Field By Performing A Comprehensive literature Survey.
		CO2	Compare The Different Solution Methods, Various Software Tools And Methods For The Identified Problem.
		CO3	Discuss The Advantages And Disadvantages Of Approach, Along With Possible Future Directions.
		CO4	Communicate Technical Content Effectively Through Written And Oral Presentations.
INTERNSHIP	18ECI85	CO1	Demonstrate Sound Technical Knowledge In The Chosen Domain Through Skill Up Gradation.
		CO2	Correlate The Knowledge Gained For Different Applications Scenarios.
		CO3	Work As Individual Or As Good Team Player In An Organization.
		CO4	Communicate Technical Content Effectively Through Written And Oral Presentations.