SJBIT

||JAI SRI GURUDEV||
Sri AdichunchanagiriShikshana Trust (R)
SJB INSTITUTE OF TECHNOLOGY
BGS Health & Education City, Kengeri, Bangalore – 60.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Course Outcomes and CO-PO-PSO Articulation Matrix

Batch 2017-21

Semester-I/II															
Subject: Basic Electronics												**Subject Code:** 15ELN15/25			
Course Outcomes															
CO1	Ability to apply the applications of diode in rectifiers, filter circuits and BJT														
CO2	Ability to analyse the biasing of BJT. Design simple circuits like amplifiers (inverting and non-inverting), comparators, adders, integrator and differentiator using OPAMPS														
CO3	Understand the basic concepts of number systems .Design different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates														
CO4	Analyse the functioning of flip-flops. Describe the architecture and interfacing of microcontroller														
CO5	Understand the functioning of a communication system ,analyse different modulation technologies. Understand the basic principles of different types of Transducers.														
CO-PO-PSO Mapping															
COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2											2		
CO2	2	2	2										2		
CO3	2	2	2										2		
CO4	2	2											2		
CO5	2	2											2		
Average	2	2	2										2		

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Semester- III

Subject: Engineering Mathematics -III	Subject Code: 17MAT31
Course Outcomes	
CO1	Know the use of periodic signals and Fourier series to analyse circuits and system communication.
CO2	Explain the general linear system theory for continous-time signals and digital signal processing using the Fourier transforms and Z-transforms.
CO3	Employ appropriate numerical methods to solve algebraic and transcendental equations.
CO4	Apply Greens theorem ,Divergence theorem and Stokes theorem in various application in the field of electro-magnetic and gravitational fields and fluid flow problems.
CO5	Determine the extremals of functional and solve the simple problems of the calculus of variations.Utilize the concepts of functional and thier variation in the applications of communication systems,decision theory,synthesis and optimization of digital circuits.

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2													
CO2	3	2													
CO3	3	2													
CO4	3	2													
CO5	3	2													
Average	3	2													

Subject: Electronic Instrumentation	Subject Code:17EC32
Course Outcomes	
CO1	Describe instrument measurement errors and calculate them.
CO2	Describe the operation of Ammeters, Voltmeters, Multimeters and develop circuits for multirange Ammeters and Voltmeters.
CO3	Describe functional concepts and operation of Digital voltmeters and instruments to measure voltage, frequency, time period, phase difference of signals, rotation speed, capacitance and pH of solutions.
CO4	Describe functional concepts and operation of various Analog measuring instruments to measure field Strength, impedance, stroboscopic speed, in/out of phase, Q of coils, insulation resistance.
CO5	Describe and discuss functioning and types of Oscilloscopes, Signal generators and Transducers.
CO6	Utilize AC and DC bridges for passive component and frequency measurements.

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2										2		
CO2	2	2	3										3		
CO3	2	1	1										3		
CO4	2	1	2										3		
CO5	2		2										3		
CO6	2	1	2										2		
Average	2	2	2										3		

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Subject: Analog Electronics												Subject Code: 17EC33		
Course Outcomes														
CO1	Develop the Ability to understand the design and working of BJT / FET amplifiers with small signal analysis.													
CO2	Analyse the low and high frequency responses of common amplifier circuits using BJT/FET.													
CO3	Evaluate the effect of negative feedback on different parameters of an Amplifier and different types of negative feedback topologies													
CO4	Describe the effect of positive feedback and understand the working of different Oscillators using BJTS/FETs													
CO5	Evaluate the efficiency of Class A and Class B power amplifiers and voltage regulators													
CO-PO-PSO Mapping														
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2										2		
CO2	3	2											2		
CO3	3	2											2		
CO4	3	2											2		
CO5	3	2	2										2		
Average	3	2	2										2		

Subject: Digital Electronics												Subject Code: 17EC34		
Course Outcomes														
CO1	Develop and simplify switching equation using Karnaugh Maps and QuineMcClusky techniques.													
CO2	Explain the operation of decoders, encoders, multiplexers, demultiplexers, adders, subtractors and comparators													
CO3	Clasify and Demonstarate the working of Latches and Flip Flops (SR,D,T and JK).													
CO4	Design and construct Synchronous/Asynchronous Counters and Shift registers using Flip Flops.													
CO5	Develop and construct Mealy/Moore Models and state diagrams for the given clocked sequential circuits.													
CO-PO-PSO Mapping														
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1											2		
CO2	1	1	3										2		
CO3	1	2	2										2		
CO4	2	1	2										2		
CO5		2	3										2		
Average	1.75	1.75	2.5										2		

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Subject: Network Analysis	Subject Code: 17EC35
Course Outcomes	
CO1	Distinguish the networks and discuss various circuit analysis techniques
CO2	Analyse the circuit parameters during switching transients and apply Laplace transform to solve the given network
CO3	Apply network theorems to solve a given network
CO4	Evaluate the frequency response for resonant circuits and the network parameters for two port networks

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	1										2		
CO2	2	2	1										2		
CO3	2	2	1	1									2		
CO4	2	2	2	1									2		
Average	2	2	1.25	1									2		

Subject: -Engineering Electromagnetics	Subject Code: 17EC36
Course Outcomes	
CO1	Evaluate problems on electric field due to point, linear, volume charges by applying conventional methods or by Gauss law.
CO2	Determine potential and energy with respect to point charge and capacitance using Laplace equation.
CO3	Calculate magnetic field, force, and potential energy with respect to magnetic materials.
CO4	Apply Maxwell's equation for time varying fields, EM waves in free space and conductors.
CO5	Evaluate power associated with EM waves using Poynting theorem.

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2											2		
CO2	1	2													
CO3	2	2													
CO4	2	2											2		
CO5	1			2											
Average	2	2		2									2		

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Subject: - Analog Electronics Lab	**Subject Code:** 17ECL37

Course Outcomes

CO1	Test circuits of rectifiers, clipping circuits, clamping circuits and voltage regulators.
CO2	Determine the characteristics of BJT and FET amplifiers and plot its frequency response.
CO3	Compute the performance parameters of amplifiers and voltage regulators
CO4	Design and test the basic BJT/FET amplifiers, BJT Power amplifier and oscillators

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3							3				2		
CO2	3	3							3				2		
CO3	3	3							3				2		
CO4	3	3											2		
Average	3	3							3				2		

Subject: - Digital Electronics Lab	**Subject Code:** 17ECL38

Course Outcomes

CO1	Demonstrate the truth table of various expressions and combinational circuits using logic gates.
CO2	Design and test various combinational circuits such as adders, subtractors, comparators, multiplexers and demultiplexers.
CO3	Realize Boolean expression using decoders.
CO4	Construct and test flip flops, counters and shift registers.
CO5	Simulate full adder and up/ down counters.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2												2		
CO2		1	3										2		
CO3		2	2										2		
CO4	2	1	2										2		
CO5		2	3										2		
Average	2	2	2										2		

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Semester- IV

Subject: Engineering Mathematics -III	Subject Code: 17MAT31
Course Outcomes	
CO1	Solve first and second order ordinary differential equations arising in flow problems using single step and multistep numerical methods
CO2	Solve problems of Quantum, mechanics employing Bessel's function relating to cylindrical polar coordinate systems and Legendre's polynomials relating to spherical polar coordinate systems.
CO3	Understand the analyticity, potential fields, residues and poles of the complex potential in the field theory and electromagnetic theory.Describe conformal and bilinear tranformation arising in aerofoil theory, fluid flow visualisation and image processing.
CO4	Solve problems on probability distributions relating to digital signal processing.Determine joint probability distributions and stochastic matrix connected with the multivariable correlation problems for feasible random events..
CO5	Draw the validity of the hypothesis processed for the given sampling distribution in accepting or rejecting the hypothesis.Define transition probability matrix of a Markov chain and solve problems related to discrete parameter random process.

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2													
CO2	3	2													
CO3	3	2													
CO4	3	2													
CO5	3	2													
Average	3	2													

Subject: - Signal & System	Subject Code: 17EC42
Course Outcomes	
CO1	Classify the signals as continuous/ discrete, periodic and aperiodic even and odd, energy power and deterministic/ random signals.
CO2	Determine the linearity, causality, time-invariance and stability properties of continuos and discrete time systems.
CO3	Compute the response of a continuous and Discrete LTI system using convolution integral and convolution sum.
CO4	Determine the spectral characteristics of continuous and discrete time signal using Fourier analysis
CO5	Compute Z-transforms,inverse Z-transforms and transfer function of complex LTI systems.

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	2										2		
CO2	2	2	2										2		
CO3	2	2	2										2		
CO4	2	2	2										2		
CO5	2	2	2										2		
Average	2	2	2										1.9		

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Subject: - Control Systems	**Subject Code:** 17EC43

Course Outcomes

CO1	Develop the mathematical model of mechanical and electrical systems
CO2	Develop transfer function for a given control system using block diagram reduction techniques and signal flow graph method
CO3	Determine the time domain specifications for first and second order systems
CO4	Determine the stability of a system in the time domain using Routh-Hurwitz criterion and Root-locus technique
CO5	Determine the stability of a system in the frequency domain using Nyquist and bode plots
CO6	Develop a control system model in continuous and discrete time using state variable techniques

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2											2		
CO2	2	2	2										2		
CO3	2	2	2										2		
CO4	2	2	2										2		
CO5	2	2	2										2		
CO6	2	2	2												
Average	2	2	2										**2**		

Subject: - **Principles of Communication Systems**	**Subject Code:** 17EC44

Course Outcomes

CO1	Determine the performance of analog modulation schemes in time and frequency.
CO2	Determine the performance of systems for generation and detection of modulated analog signal.
CO3	Characterize the influence of channel on analog modulated signals
CO4	Analyse and demonstrate the process of the use of digital formatting in multipliers , vocoders and video transmission.
CO5	Understand the characteristics of pulse amplitude modulation, pulse position modulation and pulse code modulation systems.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2											2		
CO2	2	2											2		
CO3	2	2											2		
CO4	2	2											2		
CO5	2	2											2		
Average	2	2											**2**		

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Subject: - Linear IC's & Applications													Subject Code: 17EC45		
Course Outcomes															
CO1	Acquire the knowledge to solve problems related to Operational amplifiers														
CO2	Analyze the performance of Op-amp and its applications.														
CO3	Interpretation of Performance Characteristics of Practical Op-amps.														
CO4	Apply the knowledge gained in the design of practical circuits for amplifiers, filters, oscillators, multivibrators, voltage regulators and electronic systems														
CO-PO-PSO Mapping															
COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2												2		
CO2		1	3										2		
CO3		2	2										2		
CO4	2	1	2										2		
Average	2	2	2										**2**		

Subject: - Microprocessor													Subject Code: 17EC46		
Course Outcomes															
CO1	Explain the History of evaluation of Microprocessors, Architecture and instruction set of 8086, CISC & RISC, Von-Neumann & Harvard CPU Architecture, Configuration & Timing diagrams of 8086 and Instruction set of 8086.														
CO2	Develop 8086 Assembly level programs using the 8086 instruction set, modular programs using procedures														
CO3	Develop 8086 Stack and Interrupts programming, Use INT 21 DOS interrupt function calls to handle Keyboard and Display														
CO4	Interface 8086 to Static memory chips and 8255, 8254, 0808 ADC, 0800 DAC, Keyboard, Display and Stepper motors.														
CO-PO-PSO Mapping															
COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	1											2		
CO2	1	1	3										2		
CO3	1	2	2										2		
CO4	2	1	2										2		
Average	1.75	1.25	1.75										2		

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Subject: - Microprocessor Lab	**Subject Code:** 17ECL47

Course Outcomes

CO1	Write and execute 8086 assembly level programs to perform data transfer, arithmetic and logical operations.
CO2	Understand assembler directives, branch, loop operations and DOS 21H Interrupts
CO3	Write and execute 8086 assembly level programs to sort and search elements in a given array.
CO4	Perform string transfer, string reversing, searching a character in a string with string manipulation instructions of 8086
CO5	Utilize procedures and macros in programming 8086.
CO6	Demonstrate the interfacing of 8086 with 7 segment display, matrix keyboard, logical controller, stepper motor, ADC, DAC, and LDR for simple applications.

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2	1									2		
CO2	3	2	2	1									2		
CO3	3	2	2	1									2		
CO4	3	1	2	1									2		
CO5	3	1	1	1									2		
CO6	3	3	2	1	1								2		
Average	3	1.8	1.8	1	1								2		

Subject: - Linear ICs and Communication Lab	**Subject Code:** 17ECL48

Course Outcomes

CO1	Gain hands-on experience in AM and FM techniques, frequency synthesis
CO2	Gain hands-on experience in pulse and flat top sampling techniques
CO3	Make the right choice of an IC and design the circuit for a given application.
CO4	Design and analyze the performance of instrumentation amplifier, LPF, HPF, DAC and oscillators using linear IC.
CO5	Understand the applications of Linear IC for addition, integration and 555 timer operations to generate signals/pulses.

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1										2		
CO2	3	2	1										2		
CO3	3	2	1										2		
CO4	3	2	2										2		
CO5	3	2											2		
Average	3	2	1.25										2		

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Semester- V

Subject: - Management and Entrepreneurship Development	**Subject Code:** 17ES51

Course Outcomes

CO1	Understand the fundamentals concepts of management and entrepreneurship
CO2	Select a best entrpreneurship model for the requires domain of establishment and compare various types of entrepreneurs
CO3	Describe the functions of managers ,entrepreneurs and social responsibilties
CO4	Analyse the institutional support by various state and central governament agencies analyze the institutional support by various central governament agency
CO5	Abilities to engage in independent sectors demonstrate knowledge and understanding of the engineeringand mangement prncipal with effective communication

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2													2
CO2	2	2													2
CO3	2	2					2								2
CO4	2	2							2						2
CO5	2	2					2								2
Average	2	2					2		2						2

Subject: - Digital Signal Processing	**Subject Code:** 17EC52

Course Outcomes

CO1	Ability to apply the knowledge f sampling in frequency dmain and recnstructin of aperiodic Discrete time signals.
CO2	Analyze the LTI system response in frequency domain for real and cmplex discrete time signals.
CO3	Develop FFT algorithms for DFT cmputation
CO4	Design of digital IIR and FIR filters.
CO5	Realization of filter in direct form,cascade,parallel and lattice structure.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2												2	
CO2	3	3	3										2	2	
CO3	3	3	3											2	
CO4	2	3	3										2		
CO5	2	2	3											1	
Average	2.6	2.6	3										2	1.75	

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Subject: - Verilog HDL	**Subject Code:** 17EC53

Course Outcomes

CO1	Design Verilog HDL programs in gate, dataflow , behavioral and switch modeling levels of Abstraction
CO2	Build simple programs in VHDL in different styles.
CO3	Design and verify the functionality of digital circuit/system using test benches and perform timing and delay Simulation.
CO4	Explain the programs more effectively using Verilog tasks and directives and suitable abstraction level for a particular digital design.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	2										2	2	
CO2	3	2	2												
CO3	3	3	2	1									2	2	
CO4	3	2	2										2	2	
Average	3	2	2	1									2	2	

Subject: - Information Theory & Coding	**Subject Code:** 17EC54

Course Outcomes

CO1	Explain concept of Dependent & Independent Source, measure of information, Entropy, Rate of Information and Order of a source
CO2	Represent the information using Shannon Encoding, Shannon Fano, Prefix and Huffman Encoding Algorithms
CO3	Model the continuous and discrete communication channels using input, output and joint probabilities
CO4	Determine a codeword comprising of the check bits computed using Linear Block codes, cyclic codes & convolutional codes
CO5	Design the encoding and decoding circuits for Linear Block codes, cyclic codes, convolutional codes, BCH and Golay codes.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2											2		
CO2	2	3	3										2		
CO3	2	2											2		
CO4	2	2	1										2		
CO5	2	2	3										2		
Average	2.2	2.2	2.3										2		

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Subject: - Operating systems	Subject Code: 17EC553
Course Outcomes	
CO1	Explain the goals, structure, operation and types of operating systems.
CO2	Apply scheduling techniques to find performance factors
CO3	Explain organization of file systems and IOCS.
CO4	Apply suitable techniques for contiguous and non-contiguous memory allocation.
CO5	Describe message passing, deadlock detection and prevention methods.

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3											1		
CO2	3	3	3												
CO3	3	2	1												
CO4	2	3	1										1		
CO5	3	3	3												
Average	3	3	2										1		

Subject: - AUTOMOTIVE ELECTRONICS	Subject Code: 17EC561
Course Outcomes	
CO1	Acquirean overview of automotive components, subsystems, and basics of Electronic Engine Control in today's automotive industry.
CO2	Use available automotive sensors and actuators while interfacing with microcontrollers / microprocessors during automotive system design
CO3	Understand the networking of various modules in automotive systems, communication protocols and diagnostics of the sub systems.
CO4	Design and implement the electronics that attribute the reliability, safety, and smartness to the automobiles, providing add-on comforts and get fair idea on future Automotive Electronic Systems

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2											2		
CO2	2	2											2		
CO3	2	2											2		
CO4	2	2											2		
Average	2	2											2		

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Subject: - Digital Signal Processing Lab	**Subject Code:** 15ECL57

Course Outcomes

CO1	Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals.
CO2	Modelling of discrete time signals and systems and verification of its properties and results.
CO3	Implementation of discrete computations using DSP processor and verify the results.
CO4	Realize the digital filters using a simulation tool and a DSP processor and verify the frequency and phase response.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	3											1		
CO2	3	2													
CO3	3	3	3												
CO4	1	2	3	2											
Average	2.3	2.3	3	2									1		

Subject: - HDL Lab	**Subject Code:** 15ECL58

Course Outcomes

CO1	Write the Verilog/VHDL programs to simulate Combinational circuits in Dataflow, Behavioural and Gate level Abstractions.
CO2	Describe sequential circuits like flip flops and counters in Behavioural Description and obtain simulation waveforms.
CO3	Synthesize Combinational and Sequential circuits on programmable ICs and test the hardware.
CO4	Interface the hardware to the programmable chips and obtain the required output.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2	2	1	1								2	1	
CO2	3	2	1	1	1								2	1	
CO3	3	2	2	1	1								2	1	
CO4	3	2	2	1	1								2	1	
Average	3	3	3	1	1								2	1	

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Semester- VI

Subject: - Digital Communication												**Subject Code:** 17EC61		
Course Outcomes														
CO1	Associate and apply the concepts of bandpass sampling to well specified signals and channels													
CO2	Analyse symbol processing at the transmitter and the performance parameters at the receiver under ideal and correpted bandlimited channels													
CO3	Demostrate bandpass signals subjected to corrupt and distorted symbols in a bandlimited channel, can be demodulated and estimated at receiver to meet specific													
CO4	Analyse and compute spread spectrum techniques.													
CO-PO-PSO Mapping														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2	2										2	2	
CO2	2	3	2										2	2	
CO3	2	2	2										3	2	
CO4	3	2	3										2	3	
Average	2	2	2										2	2	

Subject: - ARM Microcontroller & EmbeddedSystems												**Subject Code:** 17EC62		
Course Outcomes														
CO1	Understand the architectural features and instruction set of 32 bit microcontroller ARM Cortex M3													
CO2	Program ARM Cortex M3 using the various instructions and C language for different applications.													
CO3	Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system													
CO4	Develop the hardware software co-design and firmware design approaches.													
CO5	Explain the need of real time operating system for embedded system applications													
CO-PO-PSO Mapping														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2											2		
CO2	2	2	2										2		
CO3	2	2	2										2		
CO4	2	2											2		
CO5	2	2	3										2		
Average	2	2	1.75										2		

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Subject: - VLSI Design	**Subject Code:** 17EC63

Course Outcomes

CO1	Understanding of MOS transistor theory, CMOS favbrication and scaling
CO2	Understanding concept of basic gates using the stick and layout diagram
CO3	interpret memory elements along with timing considerations.
CO4	Demonstrate knowledge of FPGA based system design.
CO5	Analyze CMOS subsystems and architectural issues and Interpret testing and teastability issues in VLSI design

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3												1		
CO2	2	2											1		
CO3	2												2		
CO4	2														
CO5	2	2											1		
Average	2.5	2											1		

Subject: - Computer Communication Networks	**Subject Code:** 17EC64

Course Outcomes

CO1	Describe the layering architecture of computer networks and distinguish between the OSI reference model and TCP/IP protocol suite.
CO2	Identify the protocols and services of Data link layer.
CO3	Distinguish the basic network configurations and standards associated with each network.
CO4	Construct a network model and determine the routing of packets using different routing algorithms.
CO5	Identify the protocols and functions associated with the transport layer services.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2											2		
CO2	2	2											2		
CO3	2	2											2		
CO4	2	2											2		
CO5	2	2											2		
Average	2	2											2		

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Subject: - Artificial Neural Networks	**Subject Code:** 17EC653
Course Outcomes	
CO1	Understand the role of neural networks in engineering, artificial intelligence, and cognitive modeling.
CO2	Understand the concepts and techniques of neural networks through the study of the most important neural network models.
CO3	Evaluate whether neural networks are appropriate to a particular application.
CO4	Apply neural networks to particular applications, and to know what steps to take to improve performance.

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2											1		
CO2	3	1													
CO3	3	2	2												
CO4	1	2	3	1	1								2		
Average	2.2	1.75	2.5	1	1								1.25		

Subject: - Digital Switching Systems	**Subject Code:** 17EC654
Course Outcomes	
CO1	Understand the electromechanical switching systems and its comparison with the digital switching
CO2	Determine the telecommunication traffic and its measurements.
CO3	Understand the technologies associated with the data switching operations.
CO4	Describe the software aspects of switching systems and its maintenance.

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2											2		
CO2	2	1											2		
CO3	2												2		
CO4	2												2		
Average	2	1.5											2		

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Subject: - Digital System Design Using Verilog	**Subject Code:** 17EC663

Course Outcomes

CO1	Understand the embedded systems, using small microcontrollers, larger CPUs/DSPs, or hard or soft processor cores.
CO2	Design & Construct the combinational circuits using discrete gates and programmable logic devices.
CO3	Develop the Verilog model for sequential circuits and test pattern generation
CO4	Explore the different types of semiconductor memories and their usage for specific chip design
CO5	Analyse and synthesis of processor and I/O controllers that are used in embedded system design

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	1										2		
CO2	3	2	3										2		
CO3	3	2	3	2									2		
CO4	2	3	2										2		
CO5	2	3	3										1		
Average	2.6	2.6	2.4	2									2		

Subject: - Python Application Programming	**Subject Code:** 17CS664

Course Outcomes

CO1	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions
CO2	Demonstrate proficiency in handling Strings and File Systems.
CO3	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
CO4	Interpret the concepts of Object-Oriented Programming as used in Python.
CO5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	1											2		
CO2	1	2													
CO3	2	2	1												
CO4	2	1		1											
CO5	2	2													
Average	1.8	1.8	1	1									2		

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Subject: - Embedded Controller Lab												**Subject Code:** 17ECL67		
Course Outcomes														
CO1	Interpret the instruction set of 32 bit microcontroller ARM Cortex M3, and the software tool required for programming in Assembly and C language.													
CO2	Develop assembly language programs using ARM Cortex M3 for different applications.													
CO3	Interface external devices and I/O with ARM Cortex M3.													
CO4	Develop C language programs and library functions for embedded system applications..													
CO-PO-PSO Mapping														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	3	3								2	2	
CO2	2	3	2	2	3								2	2	
CO3	3	2	2	2	3								2	2	
CO4	2	2	2	2	3								2	2	
Average	2.5	2.5	2.3	2.3	3								2	2	

Subject: - Computer Networks Lab												**Subject Code:** 17ECL68		
Course Outcomes														
CO1	Choose suitable tools to model a network and understand the protocols at various OSI reference levels.													
CO2	Design a suitable network and simulate using a Network simulator tool.													
CO3	Simulate the networking concepts and protocols using C/C++ programming.													
CO4	Model the networks for different configurations and analyze the results.													
CO-PO-PSO Mapping														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	1	2											2		
CO2	1		2										2		
CO3	1				2								2		
CO4	2	1											2		
Average	1.3	1.5	2		2								2		

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Semester- VII

Subject: - Microwave and Antennas	**Subject Code:** 17EC71

Course Outcomes

CO1	Understand and analyze the various parameters related to microwave transmission lines and waveguides
CO2	Analyze the behavior of microwave devices using scattering parameters and Identify microwave devices for different applications.
CO3	Apply the knowledge of electromagnetic theory to understand the basics of antenna theory.
CO4	Analyze various antenna configurations according to the application.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2											2		
CO2	2	2	2										2	2	
CO3	2	2											2		
CO4	2	2	2										2	2	
Average	2	2	2										2	2	

Subject: - Digital Image Processing	**Subject Code:** 17EC72

Course Outcomes

CO1	Understand image formation and the role human visual system plays in perception of gray and color image data.
CO2	Apply image processing techniques in both the spatial and frequency (Fourier) domains.
CO3	Analysis of image segmentation techniques and to evaluate the Methodologies for segmentation.
CO4	Conduct independent study and analysis of Image Enhancement techniques.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	2											3		
CO2	3	2													
CO3	1	2													
CO4	2			3									2		
Average	2.25	2		3									2.5		

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Subject: -	Power Electronics	Subject Code: 17EC73
	Course Outcomes	
CO1	Understand the construction & working of various power devices	
CO2	Design & analysis of thyristor circuits with different triggering conditions	
CO3	Learn the applications of power devices in cintrolled rectifiers converters to the society	
CO4	Demonstrate & understanding the power electronics circuits & models using moderntools under various load	

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2												2		
CO2		1	3										2		
CO3		2	2										2		
CO4	2	1	2										2		
Average	2	2	1.75										2		

Subject: -	Real Time Systems	Subject Code: 17EC743
	Course Outcomes	
CO1	Understand the embedded systems, using small microcontrollers, larger CPUs/DSPs, or hard or soft processor cores.	
CO2	Design & Construct the combinational circuits using discrete gates and programmable logic devices.	
CO3	Develop the Verilog model for sequential circuits and test pattern generation	
CO4	Explore the different types of semiconductor memories and their usage for specific chip design	
CO5	Analyse and synthesis of processor and I/O controllers that are used in embedded system design	

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2											2		
CO2	3	2	1										2		
CO3	2	2	2										2		
CO4	2	2	3										2		
CO5	3	2	1										2		
Average	2.4	2	1.75										2		

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Subject: -	DSP Algorithms and Architecture	**Subject Code:** 17EC751

Course Outcomes

CO1	Comprehend the knowledge and concepts of digital signal processing techniques.
CO2	Understand of the architecture of DSP computational building blocks and apply the knowledge to achieve speed in DSP architecture or processor.
CO3	Apply knowledge of various types of addressing modes, instructions, interrupts, peripherals and pipelining structure of DSP processor and develop programs to solve simple problems using programming language or tool.
CO4	Develop basic algorithms using DSP processors and conduct experiments with assembly level language programming using Code composer Studio tool.
CO5	Discuss about synchronous serial interface and multichannel buffered serial port (McBSP) of DSP device and demonstrate the implementation of Bio-telemetry Receiver, Speech Processing System , Image Processing System using CODEC interfacing on DSP Processor.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2	2										2		
CO2	2	2	2										2		
CO3	2	2	2		2								2		
CO4	2	2	2		2								2		
CO5	2	2	2										2		
Average	2	2	2		2										

Subject: -	**IoT & WSN**	**Subject Code:** 17EC752

Course Outcomes

CO1	Describe the OSI model for the IoT/M2M Systems.
CO2	Understand the architecture and design principles for IoT.
CO3	Learn the programming for IoT Applications
CO4	Understand the Architecture and challenges of WSNs.
CO5	Identify the communication protocols which best suits the WSNs.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2											2		
CO2	2	2											2		
CO3	2	2											2		
CO4	2	2											2		
CO5	2	2											2		
Average	2	2											2		

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Subject: - Advanced Communication Lab	Subject Code: 17ECL76
Course Outcomes	
CO1	Determine the characteristics and responses of microwave devices
CO2	Determine the characteristics of microstrip antenna and compute the parameters associated with it
CO3	Simulate the digital modulation schemes with the display of waveforms and compute the parameters using MATLAB
CO4	Design and test the digital modulation circuits/systems and display the waveforms.
CO5	Dtermine the losses in optical fibre and measure NA using OFC link

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1		3		3									3		
CO2		3		3									3		
CO3	3			3	3										3
CO4	3		3	3										3	
CO5				3										3	
Average	3	3	3	3	3								3	3	3

Subject: - VLSI Lab	Subject Code: 17ECL77
Course Outcomes	
CO1	Develop the test bench to simulte the various digital circuits.
CO2	Examine and simulate basic CMOS circuits like inveter,common source amplifier and high level circuits like OPAMP,ADC,circuits to meet desired parameter.
CO3	Analyse the concepts of AC,DC and transient analysis in analog circuits.
CO4	Design the gates and realize the shift register,adder using gates to meet desired parameter.

CO-PO-PSO Mapping

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	2		2								2		
CO2	3	3	2		2								2		
CO3	3	2	2										2	1	
CO4	2	3	3		2								2		
Average	2.75	2.5	2.25		2								2	1	

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Semester- VIII

Subject: - Wireless Cellular and LTE4GBroadband												**Subject Code:** 17EC81		
Course Outcomes														
CO1	Understand the system architecture and the functional standard specified in LTE 4G													
CO2	Analyze the role of LTE radio interface protocols and EPS data convergence protocols													
CO3	Understand the UTRAN and EPS handling processes from setup to mobility management for data call scenarios.													
CO4	Evaluate the performance of resource management, packet data processing and transport algorithms.													
CO-PO-PSO Mapping														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2														
CO2		2											2		
CO3	2														
CO4	2	2											2		
Average	2	2											2		

Subject: - Fiber Optics & Networks												**Subject Code:** 17EC82		
Course Outcomes														
CO1	Understand and describe the basic concepts of optical fiber, classify different types and modes of propagation, transmission characteristics and losses in optical fiber communication.													
CO2	Understand and analyze the construction, working principle of optical sources, detectors and receiver.													
CO3	Explain and demonstrate the concepts of WDM, active and passive elements and optical amplifiers.													
CO4	Illustrate the networking aspects of optical fiber and describe various standards associated with it.													
CO-PO-PSO Mapping														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2											2		
CO2	2	2											2		
CO3	2	2											2		
CO4	2	2											2		
Average	2	2											2		

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Subject: - Artificial Neural Networks													Subject Code: 17EC834		
Course Outcomes															
CO1	Understand the core concepts of Machine learning.														
CO2	Analyse the underlying mathematical relationships within and across Machine Learning algorithms.														
CO3	Explain paradigms of supervised and un-supervised learning.														
CO4	Recognize a real world problem and apply the learned techniques of MachineLearning to solve the problem.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2											2		
CO2	3	3											1		
CO3	3	2													
CO4	3	1	2	2									1	2	
Average	3	2	2	2									1	2	

Subject: - Network & Cyber Security													Subject Code: 17EC835		
Course Outcomes															
CO1	Understand various networking protocols to provide security of the data over the network														
CO2	Understand and analyse the vulnerabilities in any computing system for different applications and design a security solution														
CO3	Apply scientific method to design antipatterns and perform investigations														
CO4	Discussion on implementating the concept of cyber security framework in computer system administration														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	1										2		
CO2		2													
CO3	2		1										2		
CO4	1		1												
Average	1.66	2	1										2		

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Subject: - Internship/Professional Practice	**Subject Code:** 17EC84

Course Outcomes

CO1	Ability to develop employee-valued skills such as teamwork, communication, ethical values, multidisciplinary critical thinking and adaptability.
CO2	Manifest the student to the environment and expectations of performance on the part of technical and professional to practice in private and public sectors.
CO3	Develop work habits and attitudes necessary for successful employability.
CO4	Adopting theory and practices learnt by the students to enhance their abilities in the field of study.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1		2	2		2	1		3	3	2				2	2
CO2	2	2	2	2			2				3		2	2	
CO3								2	2	2	1	3		1	2
CO4	3	2		2		2	1		1			3	3	2	
Average	2.5	2	2	2	2	1.5	1.5	2.5	2	2	2	3	2.5	1.75	2

Subject: - Project Work	**Subject Code:** 17ECP85

Course Outcomes

CO1	Identify the domain of interest and problem with multidisciplinary approach by applying acquired knowledge.
CO2	Perform requirement analysis and identify design methodologies with novelty & societal relevance in it.
CO3	Apply advanced engineering tools and perform hardware/software design from a product perspective.
CO4	Combine all the modules through effective team work after efficient testing.
CO5	Task completion and compilation of the project report.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3		3				3					3		
CO2		3	3	3		2		2	2		3		3		
CO3	3	3			3		3		3						3
CO4	3	3			3	3			3					3	
CO5	3	3							3	3	3	3			3
Average	3	3	3	3	3	2.5	3	2.5	2.8	3	3	3	3	3	3

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Subject: - Seminar	**Subject Code:** 15EC86

Course Outcomes

CO1	Study, understand and emphasize the information from literal and beyond literal of various cutting edge technologies.
CO2	Based on the engineering knowledge, analyze the comprehensive solution to the issues like societal, health, safety identified in survey
CO3	To impart skills in preparing detailed report describing the paper and results.
CO4	Ability to work independently and demonstrate for effective collection, analyze and organize scientific information.

CO-PO-PSO Mapping

COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	3		2	1							1	2		1
CO2	2	2		2		1		1					2		1
CO3											2		1	2	2
CO4	1	1		2	1	2		1	3	3	1		2		
Average	1.7	2	-	2	1	1.5	-	1	3	3	1.5	1	1.8	2	1.3

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