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 2015-19

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										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:15MAT31
Course Outcomes	
CO1	Know the use of perodic signals and Fourier series to analyze circuits and systems communication.
CO2	Explain the general linear system theory for continous - time signals and digital signal processing using the Fourier transform and z-transform.
CO3	Employ appropriate numerical methods to solve algebraic and transcedental equations.
CO4	Apply Green's 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 extermals of functional and solve the simple problems for calculus of variations. Utilize the concepts of functional and their variations 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: Analog Electonics	Subject Code:15ELN15/25
Course Outcomes	
CO1	Describe the working principle and characteristics of BJT, FET, Single stage, cascaded and feedback amplifiers.
CO2	Describe the Phase shift, Wien bridge, tuned and crystal oscillators using BJT/FET/UJT.
CO3	Calculate the AC gain and impedance for BJT using re and h parameters models for CE and CC configuration.
CO4	Determine the performance characteristics and parameters of BJT and FET amplifier using small signal model
CO5	Determine the parameters which affect the low frequency and high frequency responses of BJT and FET amplifiers and draw the characteristics.

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	1										2		
CO4	2	1											2		
CO5	2	1											2		
Average	2	1.6	1										2		

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Subject: Digital Electronics	**Subject Code:** 15EC33

Course Outcomes

CO1	Acquire knowledge of Combinational Logic, Simplification Techniques using Karnaugh Maps, Quine-McClusky Technique.
CO2	Acquire knowledge of : Operation of Decoders, Encoders, Multiplexers, Adders and Subtractors
CO3	Acquire knowledge of : Working of Latches, Flip-Flops, Designing Registers, Counters, Designing Mealy, Moore Models and State Diagrams
CO4	Analyse the performance of: Simplification Techniques using Karnaugh Maps, Quine-McClusky Technique and Synchronous Sequential Circuits
CO5	Design and Develop Mealy and Moore Models for digital circuits
CO6	Apply the knowledge gained in the design of Counters and Registers.

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						1		2	
CO2	3	3	3	1								1	2	2	
CO3	3	3	3	2	2	1			1			1		2	1
CO4	2	3	3	2					1				2		
CO5	2	2	3	3	2									1	
CO6	2	2	3	3	2								1	1	
Average	2.5	2.5	3	2.2	2	2	-	-	1	-	-	1	1.7	1.6	1

Subject: Network Analysis	**Subject Code:** 15EC34

Course Outcomes

CO1	Determine currents and voltages using source transformation/sourse shifting, mesh/nodal analysis and reduce given network using star-delta transformation
CO2	Solve network problems by applying Superposition,Reciprocity,Millman's, Thevinin's, Norton's and Maximum power transfer theorems to reduce circuit complexities and to arrive at feasible solutions
CO3	Calculate current and voltages for the given circuit under transient conditions.Apply Laplace transform to solve the given network.
CO4	Evaluate for RLC elements/frequency response related parameters like resonant frequency,quality factor,half power frequencies,voltage across inductor & capacitor, current through the RLC elements in resonant circuits
CO5	Solve the given network using specified two port network parameter like Z,Y,T and h.

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	2									2		
CO5	2	2	2	2									2		
Average	2	2	1.4	1.7									2		

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Subject: Electronic Instrumentation	**Subject Code:** 15EC35

Course Outcomes

CO1	Acquire knowledge and solve problems related to Accuracy and precision. Explain functioning of various types of analog and digital measuring instruments
CO2	Analyse quantization, resolution and sensitivity in digital instruments such as frequency meters, tachometers, pH meters etc. Explain Microprocessor based instrumentation
CO3	Describe functioning of various types of Oscilloscopes and signal generators.
CO4	Describe functioning of Measuring Instruments and design AC and DC bridges.
CO5	Analyse the working of different types of transducers in various 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	3				1							2	2	
CO2	2	2	2			1							2	2	
CO3	2	2	1			1							2	2	
CO4	2	2	3			1							2	2	
CO5	2		2			1							2	2	
Average	2	2.3	2			1							2	2	

Subject: -Engineering Electromagnetics	**Subject Code:** 15EC36

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 equations 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	2	2											2		
CO3	2	2											2		
CO4	2	2											2		
CO5	2		2	2									2		
Average	2	2	2	2									2		

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Subject: - Analog Electronics Lab	**Subject Code:** 15ECL37
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:** 15ECL38
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	3	3		3									2		
CO2	3	3	3	3									2		
CO3	3	3	3	3									2		
CO4	3	3	3										2		
CO5	3	3	3		3								2		
Average	3	3	3	3	3	-	-	-	-	-	-	-	2		

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Semester- IV

Subject: - Engineering Mathematics IV	Subject Code: 15MAT41

Course Outcomes

CO1	Solve first and second order ODE 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 complex potentials in field theory and electromagnetic theory. Describe conformal and bilinear transformation arising in aerofoil theory, fluid flow visualization and image processing.
CO4	Solve problems on probability distributions relating to digital signal processing. Describing joint probability distributions and stochastic matrix connected with the multivariable correlation problems for feasible random events.
CO5	Draw the validity of the hypothesis proposed 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.
CO6	Solve first and second order ODE arising in flow problems using single step and multistep numerical 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	2													
CO2	3	2													
CO3	3	2													
CO4	3	2													
CO5	3	2													
CO6	3	2													
Average	3	2													

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Subject: - Microprocessor	**Subject Code:** 15EC42

Course Outcomes

CO1	Explain the History of evaluation of Microprocessors, Architecture and instruction set of 8086, 8088, 8087, CISC & RISC, Von-Neumann & Harvard CPU Architecture, Configuration & Timing diagrams of 8086 and Instruction set of 8086.
CO2	Write8086 Assembly level programs using the 8086 instruction set
CO3	Write modular programs using procedures and macros.
CO4	Write 8086 Stack and Interrupts programming
CO5	Interface 8086 to Static memory chips and 8255, 8254, 0808 ADC, 0800 DAC, Keyboard, Display and Stepper motors.
CO6	Use INT 21 DOS interrupt function calls to handle Keyboard and Display.

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	2										2		
CO3	3	2	2										2		
CO4	2	2	2										2		
CO5	3	3	2										2	1	
CO6	2												2	1	
Average	2.6	2.3	2										**1.9**	**2**	

Subject: - Control Systems	**Subject Code:** 15EC43

Course Outcomes

CO1	Know the benefits of using control systems, developing mathematical model of various control systems (electrical circuit, mechanical and electromechnical systems) continued with finding transfer function of same systems using block diagram and signal flow graph.
CO2	Describe quantitatively the transient response of first and second order systems
CO3	Understand the determine the stability using the Routh-Hurwitz technique, root-locus design to meet stability and to find the transient response
CO4	Find the stability of system in frequency domain using Bode plot and Nyquist plot.
CO5	Find the digital responses from the transfer function draw the block diagram from the dynamic equation and represent the time.

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									2		
CO2	2	2	2	2									2		
CO3	2	3	2	2									2		
CO4	3	2	3	2									2		
CO5	2	3	2	2									2		
Average	2.4	2.4	2	2									**2**		

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Subject: - Signals and Systems												**Subject Code:** 15EC44		
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 continuous 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 functions 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	3	2	2										2		
CO2	3	2	2										2		
CO3	3	2	2										2		
CO4	3	2	2										2		
CO5	3	2	2										2		
Average	3	2	2										**2**		

Subject: - Principles of Communication Systems												**Subject Code:** 15EC45		
Course Outcomes														
CO1	Determine the performance of analog modulation schemes in time and frequency domains.													
CO2	Determine the performance of systems for generation and detection of modulated analog signals.													
CO3	Characterize analog signals in time domain as random processes and in frequency domain using Fourier transforms.													
CO4	Characterize the influence of channel on analog modulated signals													
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	1	2											2		
CO2	2	2											2		
CO3	3	1											2		
CO4	2	2											2		
CO5	3	3											2		
Average	2.2	2											**2**		

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Subject: - Linear Integrated Circuits	**Subject Code:** 15EC46

Course Outcomes

CO1	Explain Op-Amp circuit and parameters including CMRR, PSRR, Input & Output Impedances and Slew Rate.
CO2	Design Op-Amp based Inverting, Non-inverting, Summing & Difference Amplifier, and AC Amplifiers including Voltage Follower.
CO3	Test circuits of Op-Amp based Voltage/ Current Sources & Sinks, Current, Instrumentation and Precision Amplifiers.
CO4	Test circuits of Op-Amp based linear and non-linear circuits comprising of limiting, clamping, Sample & Hold, Differentiator/ Integrator Circuits, Peak Detectors, Oscillators and Multiplier & Divider.
CO5	Design first & second order Low Pass, High Pass, Band Pass, Band Stop Filters and Voltage Regulators using Op-Amps.
CO6	Explain applications of linear ICs in phase detector, VCO, DAC, ADC and Timer.

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**	**2**	**3**	**2**									2		
CO3	**1**	**2**	**2**	**1**											
CO4	**1**	**2**	**2**	**1**											
CO5	**1**	**2**	**3**	**2**									2		
CO6	**2**	**2**	**2**												
Average	2	1.8	2										2		

Subject: - Microprocessor Lab	**Subject Code:** 15ECL47

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		

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Subject: - Linear ICs and Communication Lab												**Subject Code:** 15ECL48		
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	3		3									3		
CO2	3	3		3									3		
CO3	3			3									3		
CO4	3	3	3	3										3	
CO5	3		3	3										3	
Average	3	3	3	3									3	3	

Semester- V

Subject: - Management and Entrepreneurship Development												**Subject Code:** 15ES51		
Course Outcomes														
CO1	Learn and explain basic is management and acquire basic managerial skills.													
CO2	Analyze the nature, purpose & objectives of Planning, Organizing & Staffing.													
CO3	Develop the factual leadership qualities for development of organizations.													
CO4	Learn and build the qualities and characteristics of business ethics and entrepreneurs.													
CO5	Describe the importance of small scale industries in economic development and institutional support to start a small scale industry and implement.													
CO6	Demonstrate the project management, product planning, project design and network analysis.													
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								3	2						2
CO4										3		2			2
CO5									2		2				2
CO6	2							2			2				2
Average	2	-	-	-	2	-	-	2.5	2	3	2	2			2

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Subject: - Digital Signal Processing	**Subject Code:** 15EC52
Course Outcomes	
CO1	Determine the response of LTIsystems using time domain and DFT techniques
CO2	Compute DFT of real and complex discrete time signals
CO3	Computation of DFT using FFT algorithms and linear filtering approach
CO4	Design of Digital IIR and FIR filters
CO5	Realization of filters in direct form, cascade form, parallel form and lattice structures

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									3		
CO2	3	2	2	3									3		
CO3	2	2	3	2									3		
CO4	2	2	3	1									3		
CO5	2	2	1										3		
Average	2.2	2	2	2									3		

Subject: - Verilog HDL	**Subject Code:** 15EC53
Course Outcomes	
CO1	Determine the response of LTIsystems using time domain and DFT techniques
CO2	Compute DFT of real and complex discrete time signals
CO3	Computation of DFT using FFT algorithms and linear filtering approach
CO4	Design of Digital IIR and FIR filters
CO5	Realization of filters in direct form, cascade form, parallel form and lattice structures

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	1										2		
CO2	2	1	1										2	1	
CO3	3	2	1										2	1	
CO4	3	1	2										2	1	
CO5	3	1	1										2	1	
Average	2.6	1.2	1.2										2	1	

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Subject: - Information Theory & Coding												**Subject Code:** 15EC54		
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 code word 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		

Subject: - Operating systems												**Subject Code:** 15EC553		
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	1											1		
CO2	1	2	3												
CO3	2	1												1	
CO4	1	2	3										1		
CO5	1	2	3												
Average	1.6	1.6	3	-	-	-	-	-	-	-	-	-	1	1	

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Subject: - Programming in C++												**Subject Code:** 15EC562		
Course Outcomes														
CO1	Explain the object oriented programming c++ program structure with all its components													
CO2	Develop fuctions using classes and objects.													
CO3	Apply the concept of constructors , destructors and operator overloading for efficient programming.													
CO4	Apply the concept of inheritance, pointers, virtual functions and polymorphism features.													
CO5	Develop programs using suitable I/O and file operations for different 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	2	
CO2	2	2	2										2	2	
CO3			2										2	2	
CO4		2	2										2	2	
CO5	2	2	2										2	2	
Average	2	2	2										2	2	

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											2	1	
CO2	3	2											2	1	
CO3	3	3	3		3								2	1	
CO4	1	2	3	2	3								2	1	
Average	2.3	2.3	3	2	3								2	1	

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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	3	3	2									2		
CO2	3	3	3	2									2		
CO3	3	3	3	2									2		
CO4	3	3	3	2	2								2		
Average	3	3	3	2	2								2		

Semester- VI

Subject: - Digital Communication												**Subject Code:** 15EC61		
Course Outcomes														
CO1	Associate and apply the concepts of bandpass sampling to well specified signals and channels													
CO2	Analyse performance paramters and trasfer rates for low pass and band pass symbol under ideal and corrupted non band limited channels.													
CO3	Analyse symbol processing and performance parameters at the receiver under ideal and correpted bandlimited channels													
CO4	Demostrate bandpass signals subjected to corrupt and distorted symbols in a bandlimited channel, can be demodulated and estimated at receiver to meet specific performance criteria													
CO5	Analyze 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	3	2	2										2	2	
CO2	3	3	2										2	2	
CO3	3	2	2										3	2	
CO4	3	2	2										2	3	
CO5	3	3	2										3	3	
Average	2.4	2.4	2.4	-	-	-	-	-	-	-	-	-	2.4	2.4	-

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Subject: - ARM Microcontroller & EmbeddedSystems	**Subject Code:** 15EC62

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	3		2										3		
CO2	3		2										3		
CO3	3	2											3		
CO4	3	2	2	1									3		
CO5	3												3		
Average	3	2	2	1	-	-	-	-	-	-	-	-	3	-	-

Subject: - VLSI Design	**Subject Code:** 15EC63

Course Outcomes

CO1	Learn about basic construction and operation of MOSFT, Fabrication steps, Static and Switching characteristics of inverters
CO2	Learn Layout, Stick diagrams and understand MOS transistor parasitic characteristics, i.e., its resistance and capacitance
CO3	Understand the trends in semiconductor technology, and how it impacts scaling and performance and design digital systems using MOS circuits.
CO4	Design functional units like multipliers, parity generator, adders, multipliers, ROMs, SRAMs, and PLAs
CO5	Describe the sources and effects of clock skew and verify and validate the 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		
CO2	1	2	2										2		
CO3		2	1										2		
CO4	2	1	2										2		
CO5		2		2									2		
Average	1.7	1.8	1.7	-	-	-	-	-	-	-	-	-	3	1	-

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Subject: - Computer Communication Networks	**Subject Code:** 15EC64

Course Outcomes

CO1	Identify the protocols and functions associated with the transport layer services
CO2	Describe the layering architecture of computer networks and distinguish between the OSI reference model and TCP/IP protocol suite.
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.

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	3											2		
CO3	2	2											2		
CO4	2	2											2		
Average	2	2.2											2		

Subject: - Artificial Neural Networks	**Subject Code:** 15EC653

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	2	3									3		
CO2	2	3	3	1									2		
CO3	2	2	1	3	1										
CO4	1	3	2	2	3									3	
Average	2	2.5	2.3	2	2								2	3	

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Subject: - Digital Switching Systems	**Subject Code:** 15EC654

Course Outcomes

CO1	Describe the electromechanical switching systems and its comparison with the digital switching.
CO2	Determine the telecommunication traffic and its measurements.
CO3	Define 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	3	3											2		
CO2	3	3											2		
CO3	3						2						2		
CO4	3						3						2		
Average	3	3	-	-	-	-	2.3	-	-	-	-	-	2		

Subject: - Digital System Design Using Verilog	**Subject Code:** 15EC663

Course Outcomes

CO1	Design 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	Describe 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	Design and synthesis of different types 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	1	2										2		
CO2	2	3	3										2		
CO3	2	3	3										2	1	
CO4	2	2	3										2		
CO5	2	3	2										1		
Average	2.2	2.4	2.6										2	1	

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Subject: - Python Application Programming	**Subject Code:** 15CS664

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												2	
Average	1.8	1.6	1	1	-	-	-	-	-	-	-	-	2	2	-

Subject: - Embedded Controller Lab	**Subject Code:** 15ECL67

Course Outcomes

CO1	Understand the instruction set of ARM Cortex M3, a 32 bit microcontroller and the
CO2	Program ARM Cortex M3 using the various instructions in assembly level language
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	3	3
CO2	2	3	2	2	3								2	1	1
CO3	3	2	2	2	3									1	1
CO4	2	2	2	2	3								3		1
Average	2.5	2.5	2.3	2.3	3	-	-	-	-	-	-	-	2.3	1.6	2

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Subject: -	Computer Networks Lab	**Subject Code:** 15ECL68
	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		

Semester- VII

Subject: -	Microwave and Antennas	**Subject Code:** 15EC71
	Course Outcomes	
CO1	Apply the knowledge of electromagnetic theory to understand and analyze waveguides, coaxial line, planar transmission lines, different antennas and its parameters.	
CO2	Design solutions for transmission lines involving primary and secondary constants and to use the 'Smith Chart' tool for impedance matching	
CO3	Understand and analyze the behavior of microwave devices using scattering parameters and Identify microwave devices for several applications	
CO4	Understand and 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	3	2													
CO2	2	2	2										2	2	
CO3	2	2											2		
CO4	2	2	2										2	2	
Average	2.3	2	2										2	2	

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Subject: -	Digital Image Processing	**Subject Code:** 15EC72
	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	3	2											
CO3	1	2			3								2		
CO4	2			3											
Average	2.3	2	3	2.5	3	-	-	-	-	-	-	-	2.5		

Subject: -	Power Electronics	**Subject Code:** 15EC73
	Course Outcomes	
CO1	Understand the construction and working of various power devices	
CO2	Design and analysis of thyristor circuits with different triggering conditions. •	
CO3	Learn the applications of power devices in controlled rectifiers, converters and inverters to the society	
CO4	Demonstrate and understanding the power electronics circuits and models using modern tools under various load conditions	

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	2	2											2		
CO3	2			3		2						2	1		
CO4			2		2						2				
Average	2.3	2	2	3	2	-	-	-	-	-	2	2	2		

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Subject: -	Multimedia Communication	**Subject Code:** 15EC741
	Course Outcomes	
CO1	Understand the basics of different multimedia networksand applications	
CO2	Understand the different compression techniques to compress audio and video	
CO3	Describe multimedia communication across networks	
CO4	Analyse different media types to represent them in digital form.	
CO5	compress different types of text and images using different compressiontechniques and analyse DMS	

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	2	2											2		
CO3	2	2											2		
CO4	3	2											2		
CO5	2	2											2		
Average	2.2	1.8											2		

Subject: -	DSP Algorithms and Architecture	**Subject Code:** 15EC751
	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	3	2										2		
CO2	2	3	3										2		
CO3	3	3	3		2								3		
CO4	3	2	2		3								3		
CO5	3	2	2		3								3		
Average	2.6	2.6	2.4	-	2.6	-	-	-	-	-	-	-	2.6		

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Subject: -	Advanced Communication Lab	**Subject Code:** 15ECL76
	Course Outcomes	
CO1	Determine the characteristics and response of microwave devices.	
CO2	Determine the characteristics of micro strip antennas and compute the parameters associated with it.	
CO3	Simulate the digital modulation schemes with the display of waveforms and computation of performance parameters using MATLAB.	
CO4	Design and test the digital modulation circuits/systems and display the waveforms.	
CO5	Determine the losses in optical fiber and measure numerical aperture using optical fiber 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									2		
CO2		3		3									3		
CO3	3			3	3										3
CO4	3		3	3									3		
CO5				3									3		
Average	3	3	3	3	3	-	-	-	-	-	-	-	2	-	3

Subject: -	VLSI Lab	**Subject Code:** 15ECL77
	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								3	1	
CO2	3	2			2								3	1	
CO3	2	3	2		2								3	1	
CO4	3	2	2		2								3	1	
Average	2.8	2.3	2		2								2	1	

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Semester- VIII

Subject: - Wireless Cellular and LTE4GBroadband	**Subject Code:** 15EC81

Course Outcomes

CO1	Explain the concepts of propagation mechanisms in wireless channels ,system architecture and functional standard specified in LTE 4G
CO2	Analyse the role of LTE radio interface protocols and also understand the concept if multiple antenna transmision and reception
CO3	Demostrate the concepts of protocols used , spectrum allocation and distinguish different transmission modes
CO4	Test and Evaluate the performance of resource management and 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	3	2				2							3	3	
CO2	3	2				2							2	3	
CO3	2	3				3							2	2	
CO4	2	3				3							3	2	
Average	2.5	2.5	-	-	-	2.5	-	-	-	-	-	-	2.5	2.5	

Subject: - Fiber Optics & Networks	**Subject Code:** 15EC82

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	3	3	3										2		
CO2	3	3											2		
CO3	2	2	2										2		
CO4	2	2											1		
Average	2.5	2.5	2.5										1.8		

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Subject: - Network & Cyber Security												**Subject Code:** 15EC835			
Course Outcomes															
CO1	Ability to learn various networking protocols to provide security of the data over the network														
CO2	Understand and analyze 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	Implement 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	3	1									3	3	3	
CO2	3	3	3	3				2				2		2	2
CO3			3	3				3					3	2	2
CO4			3									2	1		2
Average	2.5	3	2.5	3	-	-	-	2.5	-	-	-	2.3	2.3	2.3	2

Subject: - Internship/Professional Practice												**Subject Code:** 15EC84			
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	2.3	2

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Subject: - Project Work	**Subject Code:** 15ECP85

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

Subject: - Seminar	**Subject Code:** 15ECS85

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

HOD

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