

**Department of Electrical & Electronics Engineering****Course Outcomes and CO-PO-PSO Articulation Matrix****Batch 2015-19****Semester-I/II**

Subject: Basic Electrical Engineering										Subject Code:15ELE13/23					
Course Outcomes															
CO1	Understand the basic concepts of DC circuits and Magnetic circuits and also able to solve problems related to DC and magnetic circuits.														
CO2	Analysis of Single Phase and three phase AC Circuits and the representation of alternating quantities and also determining the power and other parameters in these circuits														
CO3	Explain the construction, basic principle of operation, applications and also determine performance parameters of electrical Machines.														
CO4	Practice Electrical Safety Rules & standards and types of electrical wiring and domestic earthing.														
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				2							3		
CO3	3	2				2							3		
CO4	2					2		2					3		
Average	2.75	2				2		2					3		

Semester-III

Subject: Engineering Mathematics-III										Subject Code:15MAT31					
Course Outcomes															
CO1	Know the use of periodic 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 transcendental equations.														
CO4	Apply Green's theorem, Divergence theorem and Stokes theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems.														
CO5	Determine the external 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: Electric Circuit Analysis										Subject Code:15EE32					
Course Outcomes															
CO1	To familiarize the basic laws, theorems and the methods of analyzing electrical circuits														
CO2	To explain and analyze the resonance and concept of coupling in electric circuits														
CO3	Analyze networks based on two port network and state variables														
CO4	To analyze the transient response of circuits with DC and sinusoidal AC input														
CO5	To impart basic knowledge on network analysis using Laplace transforms														
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	2	2													3
CO3	2	2													3
CO4	3	2													3
CO5	3	2													2
Average	2.6	2													2.8

Subject: Transformers & Generators										Subject Code:15EE33					
Course Outcomes															
CO1	Explain the construction, operation and performance of transformers, understanding different connections for the three phase operations, their advantages and applications.														
CO2	Understand the working and operation of dc generator and Synchronous machines.														
CO3	Analyze and explain the operation of the synchronous machine connected to infinite machine.														
CO4	Demonstrate the effects of various reactances on the performance of synchronous machine and Dc generator.														
CO5	Demonstrate and evaluate the regulation of Synchronous machines by different 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				1							2	2	
CO2	3	2				1							2	2	
CO3	3	2				1							2	2	
CO4	3	2				1							2	2	
CO5	3	2				1							2	2	
Average	3	2				1							2	2	

Subject: Analog electronic circuits										Subject Code:15EE34					
Course Outcomes															
CO1	To understand and utilize the characteristics of diodes and transistor for different applications														
CO2	To design and analyze biasing circuits for transistor and FETs														
CO3	To design, analyze and test transistor circuitry as amplifiers and oscillators and analyze them at different frequencies														
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	2	2	1									1			3
CO3	3	2	2									1			3
Average	2.66	2	1.33									1			2.66

Subject: Digital system design									Subject Code:15EE35						
Course Outcomes															
CO1	Design and analyze combinational & sequential circuits														
CO2	Design circuits like adder, subtractors, code converter, encoder, decoder, multiplexer, demultiplexer.														
CO3	Design counters and sequence generators														
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												3
CO2	2	2	2												3
CO3	2	2	2												3
Average	2	2	2												3

Subject: Electrical and Electronics Measurements										Subject Code:15EE36					
Course Outcomes															
CO1	Explain the importance of Units and dimensions														
CO2	Measure resistance , Inductance and capacitance by different methods														
CO3	Explain the working of various meters used for measurement of Power and energy														
CO4	Explain the working of different electronic instruments and display devices														
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										3		
CO2	3	2	2										3		
CO3	3	2	2										3		
CO4	3	2	1					2					3		
Average	3	2	1.5					2					3		

Subject: Electrical Machines Lab 1										Subject Code:15EEL37					
Course Outcomes															
CO1	Conduct different tests on transformers and synchronous generators and evaluate their performance.														
CO2	Connect and operate two single phase transformers of different KVA rating in parallel.														
CO3	Connect single phase transformers for three phase operation and phase concersion.														
CO4	Assess the performance of synchronous generator connected to infinite bus.														
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	2	
CO2	3	2		2		1							2	2	
CO3	3	2		2		1							2	2	
CO4	3	2		2		1							2	2	
Average	3	2		2		1							2	2	

Subject: Electronics laboratory										Subject Code: 15EEL38									
Course Outcomes																			
CO1		Design and test of diode circuits																	
CO2		Design and test of oscillator and amplifier, analyze the circuit performance.																	

CO3	Use of universal gates and lcs for code conversion and arithmetic operation.														
CO4	Design and verify of different 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	3		3											2
CO2	3	2		2											2
CO3	3	2		2											3
CO4	3	2		2											3
Average	2.75	2.25		2.25											2.2

Semester-IV

Subject: Engineering Mathematics-IV										Subject Code:15EE41					
Course Outcomes															
CO1	Solve first and second 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 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, Determine joint probability distributions and stochastic matrix connected with multivariate 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.														
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: Power Generation and Economics										Subject Code:15EE42					
Course Outcomes															
CO1	Understand and Describe the working of hydroelectric, Thermal, nuclear and gas power plants and state functions of major equipment of the power plants.														
CO2	Understand and discuss types of substations and explain the importance of grounding.														
CO3	Discuss the importance of economic aspects of power system operation and its effects. 9- \														
CO4	Explain the importance of power factor and methods used for PF improvement 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	2						3		
CO2	3					2	2						3		
CO3	3					1							2		
CO4	3												2		

Average	3					1.67	2						2.5		
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Subject: Transmission and Distribution									Subject Code:15EE43						
Course Outcomes															
CO1	Explain the conceptes of various methods of generation power														
CO2	Explain the importance of HVAC,EHVAC,UHVAC and HVDC tranmission														
CO3	Design and analyze overhead transmission system for a given voltage level														
CO4	Calculate the parameters of the transmission line for different configurations and assess the performance of line														
CO5	Explain the use of underground cables and evaluate different types of distribution 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				1	1								
CO2	3	2				1	1								
CO3	3	2				1	1								
CO4	3	2				1	1								
CO5	3	2				1	1								
Average	3	2				1	1								

Subject: Electric Motors										Subject Code:15EE44					
Course Outcomes															
CO1	Explain the constructional features of Motors and select a suitable drive for specific application.														
CO2	Analyze and assess the performance characteristics of DC motors by conducting suitable tests and control the speed by suitable method.														
CO3	Explain the constructional features of Three Phase and Single phase induction Motors and assess their performance														
CO4	Control the speed of induction motor by a suitable method.														
CO5	Explain the operation of Synchronous motor and special 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	2											1	2	
CO2	3	2											2	3	
CO3	3	2											2	2	
CO4	3	2											2	3	
CO5	3	2											1	2	
Average	3	2											1.6	2.4	

Subject: Electromagnetic field theory		Subject Code: 15EE45
Course Outcomes		
CO1	To use different coordinate systems to explain the concept of gradient, divergence and curl of a vector	
CO2	To understand and use Coulomb’s Law and Gauss Law for the evaluation of electric fields produced by different charge configurations and Calculate the energy and potential due to a system of charges.	
CO3	To explain the behavior of electric field across a boundary between a conductor and dielectric and between two different dielectrics	
CO4	To explain the behaviour of magnetic fields and magnetic materials.	

CO5	To understand and assess time varying fields and propagation of waves in different media.														
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
CO2	3	3	2									1			2
CO3	2	2	1									1			2
CO4	2	2	1									1			2
CO5	2	2	1									1			2
Average	2.4	2.2	1.2									1			1.8

Subject: Op-amp and LIC										Subject Code:15EE46					
Course Outcomes															
CO1	To understand the basics of Linear ICs such as Op-amp, Regulator, Timer & PLL														
CO2	To learn the designing of various circuits using linear ICs..														
CO3	To use these linear ICs for specific applications														
CO4	To understand the concept and various types of converters.														
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			3
CO2	2	1										1			3
CO3	2	1										1			3
CO4	1	1										1			3
Average	1.75	1.25										1.25			3

Subject: Electrical Machines lab-II										Subject Code:15EEL47					
Course Outcomes															
CO1	Demonstrate and understanding the performance of DC motors by conducting suitable experiments and report the results.														
CO2	Test and analyze the performance of induction and synchronous motor by conducting suitable experiments and report the results.														
CO3	Experiment and analyze the speed control techniques for single phase and three-phase induction 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	2		2		1			1	1				3	
CO2	3	2		2		1			1	1				3	
CO3	3	2		2		1			1	1				3	
Average	3	2		2		1			1	1				3	

Subject: Op-amp and LIC lab										Subject Code:15EEL48						
Course Outcomes																
CO1	To conduct experiment to determine the characteristic parameters of OP-Amp															
CO2	To design test the OP-Amp as Amplifier, adder, subtractor, differentiator and integrator															
CO3	To design test the OP-Amp as oscillators ,filter and regulator.															
CO4	Design and study of Linear IC's as multivibrator ,comparators and converter.															
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					1	2					3
CO2	2	2		1					1	2		1			3
CO3	2	2		1					1	2		1			3
CO4	2	2		1					2	2					2
Average	2	2		1					1.25	2		1			2.75

Semester-V

Subject: Management and Entrepreneurship										Subject Code:15EE51					
Course Outcomes															
CO1	Explain the field of management, task of the manager, planning and the need of proper staff, recruitment and selection process.														
CO2	Explain the field of management, task of the manager, planning and the need of proper staff, recruitment and selection process.														
CO3	To explain need of coordination between the manager and staff in exercising the authority and delegating duties and to explain the social responsibility of business and leadership														
CO4	Explain the concepts of entrepreneurship and the role and importance of the entrepreneur, Small Scale Industries, business plan in economic development.														
CO5	Discuss the concepts of project management, capitol building process, project feasibility study, project appraisal and project financing and state /central level institutions / agencies supporting business enterprises .														
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	3	2			1		
CO2		2						2	3	2					
CO3		2	1					2	2	2					
CO4		2	2					2	2	1	2		1		
CO5		2	2					2	2	1	2		1		
Average		2	1.66					2	2.4	1.6	2		1		

Subject: Microcontroller										Subject Code:15EE52					
Course Outcomes															
CO1	To discuss the history of the 8051 and features of other 8051 family members and the internal architecture of the 8051														
CO2	To discuss and explain the use of an 8051 assembler, the stack and the flag register, loop, jump, and call instructions.														
CO3	Discuss 8051 addressing modes, accesing data and I/O port programming, arithmetic, logic instructions, and programs.														
CO4	Develop 8051C programs for time delay, I/O operations, I/O bit manipulation, Logic and arithmetic operations, data conversion and data serialization														
CO5	Discuss the hardware connection of the 8051 chip, its timers, serail data communication and its interfacing of 8051 to the RS232, interrupts and writing interrupt handler programs.														
CO6	Interface 8051 with real-world devices such as LCDs and keyboards, ADC, DAC chips & sensors.														
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			3										

CO4	3	2	2		3										
CO5	3	2	2		2										
CO6	3	2	2												
Average	3	2	2		2.67										

Subject: Power Electronics										Subject Code:15EE53					
Course Outcomes															
CO1	Explain different types of power diodes, their characteristics and the effects of power diodes on RL circuits. Explain the techniques for design, operation and analysis of single phase diode rectifier circuits.														
CO2	Explain steady state, switching characteristics and gate control requirements of different Power transistors and their limitations.														
CO3	Discuss different types of Thyristors, their operation, characteristics and applications .														
CO4	Explain working of different controllers like controlled rectifiers,AC voltage controllers ,inverters and choppers.														
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												3	2
CO2	2	2										2		3	2
CO3	2	2												3	2
CO4	2	2										2		3	2
Average	2	2.25										2		3	2

Subject: Signals and Systems										Subject Code:15EE54					
Course Outcomes															
CO1	Classify the signals and systems and explain basic operations on signals and properties of systems.														
CO2	Use convolution in both continuous and discrete domain for the analysis of systems given the impulse response of a system for a LTI system and to represent it in block diagram.														
CO3	Apply continuous time Fourier transform representation to study signals and linear time invariant systems.														
CO4	Apply discrete time Fourier transform representation to study signals and linear time invariant systems. Use Z-transform and properties of Z transform for the analysis of discrete time 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									1			2
CO2	3	2	2		1							1			2
CO3	3	2	2		1							1			3
CO4	3	2	1		1							1			3
Average	2.75	2	1.75		1							1			2.5

Subject: Electrical Estimating and Costing										Subject Code: 15EE553									
Course Outcomes																			
CO1		Explain the purpose of estimation and costing. Discuss market survey, estimates, purchase enquiries, tenders, comparative statement and payment of bills and Indian electricity act and some of the rules.																	
CO2		Discuss distribution of energy in a building, wiring and methods of wiring, cables used in internal wiring, wiring accessories, fittings and fuses & its types.																	
CO3		Discuss design of lighting points and its number, total load, sub-circuits, size of conductor.																	

CO4	Discuss different types of service mains and estimation of power circuits.														
CO5	Discuss estimation of overhead transmission and distribution system and its components														
CO6	Discuss main components of a substation, their graphical representation and preparation of single line diagram of a substation														
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				1	1						2		
CO3	3	2				1	1						2		
CO4	3	2				1	1						2		
CO5	3	2				1	1						2		
CO6	3	2				1	1						2		
Average	3	2				1	1						2		

Subject: Renewable Energy Sources										Subject Code:15EE563						
Course Outcomes																
CO1	Summarize the energy sources of India and world, classification of non -conventional energy sources. Explain the energy consumption as a measure of prosperity. Define solar constant, basic sun-Earth Angles and their representation related to solar geometry.															
CO2	Describe the different types of solar thermal energy collectors used for various thermal applications, describe the working solar cell system, characteristics and their applications.															
CO3	Understand and explain the different types of energy production from hydrogen, Wind and geothermal system. Calculate the power available in the wind turbines. Explain the importance of solid waste and agriculture refuse.															
CO4	Describe the biomass and biogas energy conversion system and also Explain the different types of biomass and biogas plants.															
CO5	Discuss the importance of tidal power generation , tidal energy availability and explain the methods tidal power generation.															
CO6	Discuss the importance and explain the power generation process from sea wave energy and ocean thermal energy.															
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	3			
CO2	2	2					2					1	3			
CO3	2	2					2					1	3			
CO4	2						2					1	3			
CO5	2						2					1	3			
CO6	2						2					1	3			
Average	2	2					2					1	3			

Subject: Microcontroller Laboratory										Subject Code:15EEL57					
Course Outcomes															
CO1	To write assembly language program for arithmetic, data transfer, Boolean and logical expressions and code conversions														
CO2	To write programs tro employ timers, counters, SFR to generate delay.														
CO3	To perform interfacing of stepper motor, dc motor, elevator, keypad, DAC, ADC														
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										2

CO2	3	2			3									2
CO3	3	2			3									2
Average	3	2.3			2.6									2

Subject: Power Electronics Lab									Subject Code:15EEL58						
Course Outcomes															
CO1	Explain Characteristics of power semiconductor devices.														
CO2	Understand and able to Trigger the SCR by different methods .														
CO3	Develop single phase controlled full wave rectifier and AC voltage controller with R and RL loads.														
CO4	Construct different converters to Control the speed of a dc motor, universal motor 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	2		1					3	2		2		2	3
CO2	3	2		1					3	2		2		2	3
CO3	3	3		1					3	2		2		2	3
CO4	3	3		1					3	2		2		2	3
Average	3	2.5		1					3	2		2		2	3

Semester-VI

Subject: Control System										Subject Code: 15EE61					
Course Outcomes															
CO1	Demonstrate the knowledge of mathematical modeling of control systems and components and discuss the effects of feedback and types of feedback control systems.														
CO2	Evaluate the transfer function and stability of a linear time invariant sysytem														
CO3	Apply block diagram manipulation and signal flow graph methods to obtain transfer function of systems														
CO4	Determine transient and steady state time response of a simple control system and investigate the performance of a given system in time and frequency domains														
CO5	Discuss stability and analysis using Root locus, Bode plot and Nyquist plot and determine the controller or compenstaor configuration and 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	1												1
CO2	2	2	2												2
CO3	1	1	1												1
CO4	2	2	1												2
CO5	2	2	2												2
Average	1.8	1.8	1.4												1.6

Subject: Power System Analysis-1										Subject Code: 15EE62									
Course Outcomes																			
CO1		Show understanding of per unit system, computation and its implementation in problems of one-line diagram power system																	

CO2	Model and analyze power systems using complex mathematical transformations under short circuit and unbalanced conditions														
CO3	Analyze different unsymmetrical faults on unloaded alternator and on complex power systems using symmetrical component transformations														
CO4	Apply mathematical techniques to evaluate system stability														
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	2	
CO2	3	2				1	1						2	2	
CO3	3	2				1	1						2	2	
CO4	3	2											3	2	
Average	3	2				1	1						2.5	2	

Subject: Digital Signal Processing										Subject Code:15EE63					
Course Outcomes															
CO1	Analyze signals and perform various signal processing operations using DFT.														
CO2	Explain and Apply FFT algorithms for efficient computation of DFT and IDFT of a given sequence.														
CO3	Design of IIR analog and digital filters by using Butterworth and Chebyshev technique.														
CO4	Design of IIR digital filters by using impulse invariant technique and bilinear transformation technique.														
CO5	Design a digital IIR and FIR filter by using direct, cascade, parallel and linear phase methods of realization.														
CO6	Design FIR filters by use of window functions and frequency sampling method.														
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
CO2	3	2			2							1			3
CO3	3	2	2		2							1			3
CO4	3	2	2		2							1			2
CO5	2	2	2		2							1			2
CO6	2	2	2		2							1			2
Average	2.5	2	2		2							1			2.5

Subject: Electrical Machine Design										Subject Code:15EE64					
Course Outcomes															
CO1	Ability to analyze the magnetic material that used to design electrical machines and magnetic circuit of electrical machine.														
CO2	Ability to analyze the performance, design winding and core of transformer														
CO3	Ability to analyze the performance, design winding and core of DC machine														
CO4	Appreciate the importance of magnetic, thermal and electrical loadings														
CO5	Ability to analyze the performance, design of Induction motor														
CO6	Ability to analyze the performance, design winding and core of synchronous machine														
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	3	2									2	3	
CO3	2	2	3	2										3	

	using a software package.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1				3										2
CO2	1	2	2												2
CO3	1			2											2
CO4	1	2		2	2										2
CO5	1	2		2	2										2
Average	1	2	2	2	2										2

Subject: Digital Signal Processing Lab										Subject Code:15EEL68					
Course Outcomes															
CO1	Utilize MATLAB platform to perform interpretation of sampling theorem in time and frequency domains.														
CO2	Perform the impulse response, Linear and circular convolution of given sequences.														
CO3	Compute DFT and IDFT of a given sequence using the basic definition and also using FFT algorithms.														
CO4	Design and implementation of IIR and FIR filters for the given specifications.														
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			3					1		1			3
CO2	2	2			3					1		1			3
CO3	2	2			3					1		1			3
CO4	2	2			3					1		1			3
Average	2	2			3					1		1			3

Semester-VII

Subject: Power System Analysis-2										Subject Code:15EE71					
Course Outcomes															
CO1	Formulate network matrices and models for solving load flow problems. Perform steady state power flow analysis of power systems using numerical iterative techniques														
CO2	Suggest a method to control voltage profile.Show knowledge of optimal operation of generators on a bus bar and optimal unit commitment														
CO3	Discuss optimal scheduling for hydro-thermal system, power system security and reliability. Analyze short circuit faults in power system networks using bus impedance matrix														
CO4	Perform numerical solution of swing equation for multimachine stability														
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				1	1						3		
CO4	3	2											3		
Average	3	2				1	1						3		

Subject: Power System Protection										Subject Code: 15EE72									
Course Outcomes																			
CO1		Discuss the performance of protective relays, components of protection scheme and relay																	

	terminology, over current protection.														
CO2	Explain the working of distance relays & effect of arc resistance, power swings, line length & source impedance on performance of distance relay														
CO3	Discuss construction, operating principles & performance of differential relays for differential protection.														
CO4	Discuss protection of generators, motors, Transformers & Bus-zone protection														
CO5	Explain the principle of circuit interruption in different types of circuit breakers & fuse														
CO6	Discuss protection against over-voltages & Gas insulated Substation-GIS														
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						3		
CO2	3	2				2	2						3		
CO3	3	2				2	2						3		
CO4	3	2				2	2						3		
CO5	3	2				2	2						3		
CO6	3	1				2	2						3		
Average	3	1.67				2	2						3		

Subject: High Voltage Engineering										Subject Code:15EE73					
Course Outcomes															
CO1	Explain conduction and breakdown phenomenon in gases, liquid dielectrics.														
CO2	Explain breakdown phenomenon in solid dielectrics.														
CO3	Explain generation of high voltages and currents														
CO4	Discuss measurement techniques for high voltages and currents														
CO5	Discuss overvoltage phenomenon and insulation coordination in electric power systems.														
CO6	Discuss non-destructive testing of materials and electric apparatus and high-voltage testing of electric apparatus														
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					1								
CO3	3	3					1								
CO4	3	2					1								
CO5	3	2				1	1								
CO6	3	2				1	1								
Average															

Subject: Utilization of Electrical Power		Subject Code: 15EE742
Course Outcomes		
CO1	Understand the importance and types of electric heating, electric welding used for industrial applications and solve related problems.	
CO2	Explain the laws of electrolysis, extraction and refining of metals, electro deposition and solve problems related electro deposition of various metals.	
CO3	Explain the concept of illumination, laws, construction and working of different lamps, design lighting scheme for domestic and commercial applications and solve related problems.	
CO4	Discuss the concept of electric traction, speed time curves for train movement, various motors used for traction purpose, characteristics and speed control mechanism and solve problems.	
CO5	Discuss the importance of braking, types of braking employed for traction systems and also the importance of power supply used for traction purpose.	

CO6	Explain the importance of Electric Vehicles and working of electric and hybrid electric vehicles used.														
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											3		
CO2	3	2											3		
CO3	2	2											3		
CO4	3	2					2						3		
CO5	3	2					2						3		
CO6	2						2						3		
Average	2.5	2					2						3		

Subject: Power Systems Planning

Subject Code:15EE744

Course Outcomes

CO1	Discuss primary components of power system planning, planning methodology for optimum power system expansion, various types of generation, transmission and distribution.
CO2	Show knowledge of forecasting of future load requirements of both demand and energy by deterministic and statistical techniques using forecasting tools.
CO3	Discuss methods to mobilize resources to meet the investment requirement for the power sector
CO4	Understand economic appraisal to allocate the resources efficiently and appreciate the investment
CO5	Discuss expansion of power generation and planning for system energy in the country, evaluation of operating states of transmission system, their associated contingencies, reliability criteria, evaluation, power market and the stability of the system.
CO6	Discuss principles of distribution planning, supply rules, network development and the system studies

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	1	1					2		
CO2	2	1				2	1	1					1		
CO3	2	1				2	1	1					2		
CO4	2	1				2	1	1					3		
CO5	2	1				2	1	1					2		
CO6	3	1				2	1	1					2		
Average	2.33	1				2	1	1					2		

Subject: Testing and Commissioning of Power System Apparatus

Subject Code:15EE752

Course Outcomes

CO1	Describe the process to plan, control and implement commissioning of electrical equipment's.
CO2	Differentiate the performance specifications of transformer and induction motor.
CO3	Demonstrate the routine tests for synchronous machine, induction motor, transformer & switchgears.
CO4	Identification of tools and equipment's used for installation and maintenance of electrical equipment.
CO5	Explain the operation of an electrical equipment's such as isolators, circuit breakers, insulators and switchgears.

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	2	

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

Subject: Power System Simulation Lab										Subject Code:15EEL76					
Course Outcomes															
CO1	Ability to form the Y-bus and Z-bus for the given power system														
CO2	Ability to determination of efficiency and regulation of transmission lines														
CO3	Ability to determine the Jacobian matrix, bus currents, bus power and line flow and line losses for the given power system														
CO4	Ability to determine the power angle diagram, swing curve for the given synchronous machines power system														
CO5	Ability to perform load flow studies, short circuit studies and ELD for the given power system														
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				2	2			3	2	
CO2	3	2		2	3				2	2			3	2	
CO3	3	2		2	3				2	2			3	2	
CO4	3	2		2	3				2	2			3	2	
CO5	3	2		2	3				2	2			3	2	
Average	3	2		2	3				2	2			3	2	

Subject: Relay & HV Lab										Subject Code:15EEL77					
Course Outcomes															
CO1	Student will be able to apply knowledge on conduct experiment for obtaining breakdown characteristic of air insulation subjected for HVAC, HVDC applications to distinguish between Uniform/Non-uniform field conditions.														
CO2	Student will be able to apply knowledge on the quality of transformer oil sample by conducting experiment as per standards and assessing dielectric strength of it.														
CO3	Student can analyse the experiment on an Electromechanical type overcurrent relay, Static over-voltage relay, Static undervoltage relay, Microprocessor based overcurrent relay and Microprocessor based overvoltage/under-voltage relay.														
CO4	Student can acquire the knowledge experimentally by map field lines for co-axial cable model using electrolytic tank.														
CO5	Students will acquire the skills of safety handling high voltage sources/units and prepare the effective report of experiments conducted.														
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	2			3	2	
CO2	3	2				2	2		2	2			3	2	
CO3	3	2				2	2		2	2			3	2	
CO4	3	2				2	2		2	2			3	2	
CO5	3	2				2	2		2	2			3	2	
Average	3	2				2	2		2	2			3	2	

Subject: Project Phase I										Subject Code:15EEP78					
Course Outcomes															
CO1	Ability to research literature, and formulate a complex engineering problem of their selected project topic.														
CO2	Apply the fundamental knowledge of mathematics, science and engineering principles in design of Solutions or system components.														
CO3	Identify, Select, Apply a suitable engineering/IT tool in modeling/data interpretation/analytical Studies, conduct experiments leading to a logical solution.														
CO4	Design engineering solutions to complex problems utilising a systems approach.														
CO5	Communicate effectively to a diverse audience and develop technical reports and publications.														
CO6	Work as a team member/leader to manage projects in a multidisciplinary environment.														
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	3		
CO2	3	2											3		
CO3	3	2			3								3	3	
CO4	1	2	3	3									3	2	
CO5	1									3		3	3		
CO6	1								3	3			3	2	
Average	2	2	3	3	3				3	3		3	3	2.33	

Semester-VIII

Subject: Power System Operation and Control										Subject Code:15EE81					
Course Outcomes															
CO1	Describe various levels of controls in power systems, the vulnerability of the system, components, architecture and configuration of SCADA and solve unit commitment problems														
CO2	Explain issues of hydrothermal scheduling and solutions to hydro thermal problems														
CO3	Explain Basic generator control loops, function of automatic generation control, speed govners														
CO4	Explain and analyze mathematical models of Automatic Load Frequency Control														
CO5	Explain automatic generation control, voltage and reactive power control in an interconnected power system.														
CO6	Explain reliability, security, contingency analysis, state estimation and related issues of power 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	3	1		2								2	3	
CO2	3	3	1		1								2	3	
CO3	3	3	1										2	3	
CO4	3	3	1										2	3	
CO5	3	3	1		1								2	3	
CO6	3	3	1										2	3	
Average	3	3	1		1.33								2	3	

Subject: Industrial Drives & Application										Subject Code: 15EE82									
Course Outcomes																			
CO1		Explain the advantages and choice of electric drive																	
CO2		Explain dynamics and modes of operation of electric drives.																	

CO3	Suggest a motor for a drive and control of dc motor controlled rectifiers.														
CO4	Analyze the performance of induction motor drives under different conditions.														
CO5	Control of induction motor, synchronous motor and stepper motor drives														
CO6	Suggest a suitable electrical drive for specific application in the industry														
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							3	
CO2	3	2				1	1							3	
CO3	3	2				1	1							3	
CO4	3	3				1	1							3	
CO5	3	2												3	
CO6	3	2				1	1							3	
Average	3	2.2				1	1							3	


Subject: Smart Grid										Subject Code:15EE831					
Course Outcomes															
CO1	Explain methods to promote smart grid awareness and making the existing transmission system smarter by investing in new technology and discuss the progress made by different stakeholders in the design and development of smart grid.														
CO2	Explain measurement techniques using Phasor Measurement Units and smart meters														
CO3	Discuss tools for the analysis of smart grid and design, operation and performance														
CO4	Discuss classical optimization techniques and computational methods for smart grid design, planning and operation.														
CO5	Explain predictive grid management and control technology for enhancing the smart grid performance and discuss the computational techniques, communication, measurement, and monitoring technology tools essential to the design of the smart grid.														
CO6	Develop cleaner, more environmentally responsible technologies for the electric system.														
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						1	2	
CO2	3	2				2	2						1	2	
CO3	3	2				2	1						1	2	
CO4	3	2				1	1						1	2	
CO5	3	2				2	2						1	2	
CO6	3	2				2	3						1	2	
Average	3	2				1.67	1.83						1	2	

Subject: Internship										Subject Code:15EE84					
Course Outcomes															
CO1	Demonstrate the ability to assess and report														
CO2	Assess interests and abilities in their field of study														
CO3	Demonstrate the ability to plan, implement, professional, ethical practice and evaluate engineering studies														
CO4	Develop communication, interpersonal and other critical skills in the job interview 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	2	2
CO2	2											3	2	2	2

CO3								2			2		3	3	3
CO4								2	3				2	2	2
Average	2.5							2	2	3	2	3	2.25	2.25	2.25

Subject: Project Phase II										Subject Code:15EEP85					
Course Outcomes															
CO1	Ability to research literature, and formulate a complex engineering problem of their selected project topic.														
CO2	Apply the fundamental knowledge of mathematics, science and engineering principles in design of Solutions or system components.														
CO3	Identify, Select, Apply a suitable engineering/IT tool in modeling/data interpretation/analytical Studies, conduct experiments leading to a logical solution.														
CO4	Design engineering solutions to complex problems utilising a systems approach.														
CO5	Communicate effectively to a diverse audience and develop technical reports and publications.														
CO6	Work as a team member/leader to manage projects in a multidisciplinary environment.														
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	3		
CO2	3	2											3		
CO3	3	2			3								3	3	
CO4	1	2	3	3									3	2	
CO5	1									3		3	3		
CO6	1								3	3			3	2	
Average	2	2	3	3	3				3	3		3	3	2.33	

Subject: Seminar										Subject Code:15EES86						
Course Outcomes																
CO1	Work in actual working environment and utilize technical resources															
CO2	Find appropriate sources that can be summarised, give oral presentations related to the work and integrated into multimedia presentation															
CO3	Engage in independent learning															
CO4	Be aware of importance of access to data, knowledge and results of engineering studies															
CO5	Demonstrate the ability to assess and report															
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		3	3	3	
CO2										2			2	2	2	
CO3												3	3	3	3	
CO4											2		2	2	2	
CO5									2				1	1	1	
Average	2	2							2	2	2	3	2.2	2.2	2.2	


Co-ordinator
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 Dr. Babu N V