Course Outcomes and CO-PO-PSO articulation Matrix

Batch: 2020-24

Semester-I/II

Subject: Basic Electrical Engineering													**Subject Code:**18ELE13/23		
Course Outcomes															
CO1	Understand the basic concepts of DC and AC circuits and solve the problems on circuits														
CO2	Analysis of Single Phase and three phase AC Circuits														
CO3	Apply the basic knowledge to obtain the desired parameters/performance characteristics of Transformer and Electric Machines														
CO4	Discuss types of domestic wiring with electrical safety Rules & standards														
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	2					2		2							
Average	**2.75**														

Subject: Basic Electrical Engineering Lab													**Subject Code:**18ELEL17/27		
Course Outcomes															
CO1	Analysis and verification of Kirchoff's law, OC&SC of a Electrical Circuit														
CO2	Evaluate impedance, power & power factor of a 1 phase / 3 phase load														
CO3	Determine earth resistance and demonstration of control of lamp, safety devices, cut section of machines & UPS														
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	2	2													
CO3	2	2				1									
Average	2	2				1									

Semester-III

Subject: Engineering Mathematics-III	**Subject Code:**18MAT31
Course Outcomes	
CO1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
CO2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
CO3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising
CO4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
CO5	Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

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													
Avg.	3	2													

Subject: Electric Circuit Analysis	**Subject Code:**18EE32
Course Outcomes	
CO1	Understand and apply the basic concepts and laws to analyze DC and AC networks
CO2	Apply network theorems to solve complex electric circuits
CO3	Analyze the resonant circuits and discuss transient analysis with Initial conditions
CO4	Synthesize waveforms using Laplace transformation
CO5	Analyze unbalanced three phase systems and also evaluate the performance of 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	3	3													3
CO2	3	3													3
CO3	3	3													3
CO4	3	1													2
CO5	3	2													2
Average	3	2.4													2.6

Subject: Transformers and Generators	**Subject Code:**18EE33
Course Outcomes	
CO1	Understanding the construction and operation of transformers and autotransformers.
CO2	Explain the performance of transformer by various tests, phase conversion and parallel operation.
CO3	Analyze and explain the operation of the DC Generator, synchronous machine connected to infinite machine.
CO4	Compare and analyze the performance of Synchronous machines by various tests, parallel operation, and performance of Synchronous machines on 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	1			1	1	3					3	2	
CO2	3	2	1			1	1	3					3	2	
CO3	3	3	1			1	1	3					3	2	
CO4	3	3	1			1	1	3					3	2	
Average	3	2.5	1			1	1	3					3	2	

Subject: Analog Electronic Circuits												**Subject Code:**18EE34		
Course Outcomes														
CO1	Illustrate the construction and working of diodes, BJT and FET													
CO2	Design and analyze the different amplifiers oscillators and signal conditioning circuits using diodes, BJT and FET													
CO3	Analysis of transistor behavior 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	2	1	1									1			3
CO2	2	2	2		1							1			3
CO3	2	2	2									1			3
Average	2	1.67	1.67		1							1			3

Subject: Digital System Design												**Subject Code:**18EE35		
Course Outcomes														
CO1	solve problems based on different Boolean expression minimization Technique													
CO2	Analyse and Design Different Combinational circuits and Sequential Circuits													
CO3	Explain and analyze state machine models													
CO4	Describe the structure of Memories													
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				2	2						3	2	
CO3	3	3				2	2						3	2	
CO4	3	3				2	2						3	2	
Average	3	3				2	2						3	2.25	

Subject: Electrical and Electronic Measurements												**Subject Code:**18EE36		
Course Outcomes														
CO1	Illustrate the measurement of resistance, Inductance and capacitance using bridges and determine													
CO2	Explain the working of various meters used for measurement of Power, Energy and demonstrate the													
CO3	Apply or develop the techniques of extending the range of instruments and instrument transformers													
CO4	Extend the working of different instruments, display and recording 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											3		

CO3	3	2	1									3		
CO4	3	2				1						3		
Average	3	2	1			1						3		

Subject: Electrical Machines Lab 1												**Subject Code:**18EEL37		
Course Outcomes														
CO1	Conduct different tests on transformers to evaluate the performance characteristics of the 1-phase and 3-phase transformers.													
CO2	Connect and operate transformers of different KVA rating in parallel and connect three transformers for three phase operation and phase conversion.													
CO3	Compute the voltage regulation of synchronous generator using the test data obtained in the laboratory and also evaluate the performance of synchronous generators from the test data.													
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			1	1			3	2	
CO2	3	2	2	2		2			1	1			3	2	
CO3	3	2	2	2		2			1	1			3	2	
Average	3	2	2	2		2			1	1			3	2	

Subject: Electronics Laboratory												**Subject Code:**18EEL38		
Course Outcomes														
CO1	Design and test different diode circuits.													
CO2	Design and test amplifier and oscillator circuits and analyze their performances.													
CO3	Utilize universal gates and IC's for code conversion and arithmetic operation													
CO4	Design and verify different 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	3	2		2	3				2	2					3
CO2	3	2		2	3				2	2					3
CO3	3	2		2	3				2	2					3
CO4	3	2		2	3				2	2					3
Average	**3**	**2**		**2**	**3**				**2**	**2**					**3**

Semester-IV

Subject: Engineering Mathematics 4												**Subject Code:**18EE41		
Course Outcomes														
CO1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory													
CO2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing													
CO3	Apply discrete and continuous probability distributions in analysing the probability models arising in engineering field													
CO4	Make use of correlation and regression analysis to fit a suitable mathematical model for the statistical data													
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.													
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:**18EE42
Course Outcomes	
CO1	Interpret the working of hydroelectric power plant and analyse the different turbine uses and economic aspects of hydro generation.
CO2	Understand and explain the operation of different thermal plants and compare them w.r.t to economic aspects.
CO3	Illustrate and infer the operation and importance of nuclear power plants and its benefits to economy.
CO4	Understand and classify various substations, explaining the importance of grounding and power factor improvement.

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	2	
CO2	2					2	2						3	2	
CO3	2	2				2	2						2	2	
CO4	2	2				2	2						2	2	
Averag	2	2				2	2						2.5	2	

Subject: Transmission and Distribution	**Subject Code:**18EE43
Course Outcomes	
CO1	Explain transmission and distribution scheme, identify the importance of different transmission systems and type of insulators
CO2	Analyse and compute the parameters of the transmission line for different configurations.
CO3	Assess the performance of overhead lines
CO4	Interpret corona, explain the use of underground cables
CO5	Classify different types of distribution systems; examine its quality & reliability

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	3	2	1		2							3		
CO3	3	3	2	1		2							3		
CO4	3	3				2							3		
CO5	3	3	2	1		2							3		
Average	3	2.8	2	1		2							3		

Subject: Electric Motors	**Subject Code:**18EE44

Course Outcomes	
CO1	Explain the constructional features, classifications and operation of DC, AC & special Motors.
CO2	Analyze and assess the performance characteristics and speed control of DC motors by conducting suitable tests.
CO3	Explain the constructional features of three phase and single-phase Induction Motors and assess their performance.
CO4	Explain the operation, speed control & starting methods of Synchronous motor and 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							2	2	
CO2	3	2				2							2	3	
CO3	3	2				2							2	3	
CO4	3	2				2							2	3	
Average	3	2				2							2	2.75	

Subject: Electromagnetic Field Theory	**Subject Code:**18EE45

Course Outcomes	
CO1	Apply different coordinate systems, Coulomb's Law and Gauss Law for the evaluation of electric fields produced by different charge configurations.
CO2	Calculate the energy and potential due to a system of charges & explain the behavior of electric field across a boundary condition.
CO3	Exhibit the knowledge of properties of conductors, dielectrics, capacitance
CO4	Explain the Poisson's, Laplace equations and behavior of magnetic fields and materials.
CO5	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											2		1
CO2	3	2											2		1
CO3	3	2											2		1
CO4	3	2											2		1
CO5	3	2											2		1
Avg.	3	2											2		1

Subject: Operational Amplifiers and LIC	**Subject Code:**18EE46

Course Outcomes	
CO1	Describe ideal and practical opamps and design amplifier circuits using opamps.
CO2	Design and analyze Opamp Filters, oscillators, Signal processing and non-linear circuits like Schmitt triggers, comparators and converters
CO3	Analyse and employ voltage regulator circuits and Ics.
CO4	Understand and explain PLL, VCO and timer circuits

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									1	1		2
CO2	3	3	3	1								1			2
CO3	3	3	3	1								1			2
CO4	2	1	1									1			2

Average	2.5	2	2	1								1	1		2

Subject: Electrical Machines Lab 2												**Subject Code:**18EEL47			
Course Outcomes															
CO1	Experiment with DC machines to pre-determine their performance characteristics and also control and analyze the speed of DC motor.														
CO2	Conduct different tests to pre-determine the performance characteristics of induction and synchronous motor.														
CO3	Analyze and compare performance of induction motors by conducting load test on 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	2		2			1	1			3	2	
CO2	3	2	2	2		2			1	1			3	2	
CO3	3	2	2	2		2			1	1			3	2	
Average	3	2	2	2		2			1	1			3	2	

Subject: Op-amps and Linear ICs Lab												**Subject Code:**18EEL48			
Course Outcomes															
CO1	Determine the characteristics of OP-Amp and utilize it as linear circuit like amplifier, rectifier, signal processing circuit, oscillators, filters etc, and test using simulation package.														
CO2	Design and test the OP-Amp as non-linear circuit like differentiator and integrator, ZCD, Schmitt trigger, comparators and test using simulation package.														
CO3	Design and study of Linear IC's as multivibrator power supplies, voltage regulator														
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		1			2
CO2	3	2	2		1				2	2		1			3
CO3	3	2	1		1				2	2		1			3
Average	3	2	1.67		1				2	2		1			2.67

Semester-V

Subject: Management & Entrepreneurship												**Subject Code:**18EE51			
Course Outcomes															
CO1	Explain the nature, characteristic, needs and process of management, entrepreneurship and intrapreneurship														
CO2	Apply the knowledge of project proposal for getting the funding from different private and government agencies and also apply knowledge of cpm/ pert algorithm for enterprise														
CO3	Utilize the schemes and facilities provided by government, for enterprise & SSI, social responsibility														
CO4	Manage the human, material resources and capital in enterprise														
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	1							3	2	2	2			1	
CO3						1	1	3	2	2			1	1	
CO4	1					1		2	2	2	2	1	1	1	

Average	1					1	1	2.5	2.25	2	2	1	1	1	

Subject: Microcontrollers											**Subject Code:**18EE52			
Course Outcomes														
CO1	Discuss the architectural details of microcontrollers and instruction set													
CO2	Develop and analyse the assembly and C language programs to facilitate the data movement, arithmetic, logical, branching operation and other operations													
CO3	Design and apply the knowledge of on-chip peripherals and also to interface external hardware to microcontroller													
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	3	2			2										3
CO3	2	2	2	1	2							1			3
Average	2.3	2	2	1	2							1			2.66

Subject: Power Electronics											**Subject Code:**18EE53			
Course Outcomes														
CO1	Illustrate types of power electronics circuits with applications, design and analyze power diode circuits													
CO2	To explain steady state, switching and gate characteristics of power transistors and Thyristors													
CO3	To design and analyze the performance parameters of various Converters													
CO4														
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									1		2	
CO2	3	3	1									1		2	
CO3	3	3	1									1		2	
CO4	3	3	1			1						1		2	
Average	3	3	1			1						1		2	

Subject: Signals and Systems											**Subject Code:**18EE54			
Course Outcomes														
CO1	Explain Basic signals, its classification and properties of various systems													
CO2	Analysis of the given continuous and discreate LTI Systems using frequency response and convolution methods, Solve difference and differential equations and block diagram representation of LTI system													
CO3	Explain Fourier transform representation of continuous time and discrete time non –periodic signals and the properties of Fourier Transforms, the applications of transform representation to study signals and linear time invariant systems.													
CO4	Interpret the use of Z-transform in the complex exponential representation of discrete time signals and the analysis of 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		1								1			3
CO2	2	2	1	1								1			3
CO3	2	2	1	1								1			3
CO4	2	2	1	1								1			3

Average	2	2	1	1								1			3

Subject: Electrical Machines Design												**Subject Code:**18EE55			
Course Outcomes															
CO1	Compare electrical engineering materials and its properties, fundamental aspects of electrical machine design														
CO2	Design of main dimension, shunt and series field windings of DC machine.														
CO3	Design output equations, main dimension, estimate the number of cooling tubes and leakage reactance of transformer														
CO4	Design output equation, stator and rotor circuits of Induction machine and 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	2														
CO2	3	3	2	2		2	2							2	
CO3	3	3	2	2		2	2							3	
CO4	3	3	2	2		2	2						2	3	
Average	2.75	3	2	2		2	2						2	2.67	

Subject: High Voltage Engineering												**Subject Code:**18EE56			
Course Outcomes															
CO1	Apply their knowledge to distinguish breakdown phenomenon in dielectrics and specifications of Equipment conforming to standards.														
CO2	Explain different types of generation of high AC & DC voltages and currents.														
CO3	Understand the practical measurement techniques for high voltages and currents														
CO4	Summarize overvoltage phenomenon and insulation coordination in electric power systems														
CO5	Acquire the knowledge of testing various materials and electric apparatus in 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	2	2				2	2						3	2	
CO2	3	2				2	2						2	2	
CO3	3	2				2	2						2	2	
CO4	2	1				1	1						3	2	
CO5	3	2				2	2						3	2	
Average	2.6	1.8				1.8	1.8						2.6	2	

Subject: Microcontroller Laboratory												**Subject Code:**18EEL57			
Course Outcomes															
CO1	Formulate programs to handle data movement, arithmetic and logical instructions														
CO2	Develop codes to handle different data types														
CO3	Interface and control the external peripherals using microcontroller														
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		3				2	2					3
CO2	2	3	2		3				2	2					3
CO3	2	3	2	2	3				2	2		1			3
Average	2	3	2	2	3				2	2		1			3

Subject: Power Electronics Lab												**Subject Code:**18EEL58		
Course Outcomes														
CO1	To Study the Static characteristics and performance of semiconductor devices.													
CO2	To learn the different methods of triggering SCR													
CO3	To Verify the performance of single phase controlled Full wave rectifier and AC voltage controller With R and RL Loads.													
CO4	To analyze the speed Control of different motors													
CO-5	To discuss the performance of single phase full bridge inverter connected to resistive load													
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						1	1		1		3	
CO2	3	3	1						1	1		1		3	
CO3	3	3	1			1	1		1	1		1		2	
CO4	3	3	1			1	1		1	1		1		2	
CO5	3	2	1			1	1		1	1		1		2	
Averag	**3**	**2.8**	**1**			**1**	**1**		**1**	**1**		**1**		**2.4**	

Semester-VI

Subject: Control Systems												**Subject Code:**18EE61		
Course Outcomes														
CO1	Analyze and model electrical and mechanical system using analogous.													
CO2	Apply block diagram reduction techniques and signal flow graph methods to obtain transfer function of systems.													
CO3	Design of control systems and determine transient and stady state time response and frequency response													
CO4	Analyze the stability of the control system performance using root locus, bode plots and Nyquist plots.													
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	2	
CO2	1	2	1										2	1	
CO3	2	3	2			1							2	2	2
CO4	2	3	2			1							2	1	2
Average	**2.7**	**2.7**	**2.7**			**2.7**							**2.7**	**2.7**	**1.6**

Subject: Power System Analysis-1												**Subject Code:**18EE62		
Course Outcomes														
CO1	Understand one-line diagram, per unit system & construct per unit impedance diagram of power system.													
CO2	Analyze three phase symmetrical faults on power system and understand selection of circuit breaker rating.													
CO3	Compute unbalanced phasors in terms of sequence components and also develop sequence networks.													
CO4	Analyze various unsymmetrical faults on power system													
CO5	Inspect dynamics of synchronous machine and determine the power 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	3											3	3	
CO2	3	3				2	2						3	2	

CO3	3	3				2	2						3	2	
CO4	3	3				2	2						3	2	
CO5	3	2											3	2	
Average	**3**	**2.8**				**2**	**2**						**3**	**2.2**	

Subject: Digital Signal Processing												**Subject Code:**18EE63		
Course Outcomes														
CO1	Analyze signals using the discrete Fourier transform (DFT). And solve problems on circular convolution using periodic, matrix and tabular methods.													
CO2	Solve problems on efficient computation of DFT using DIT and DIF- FFT and composite DFT algorithms.													
CO3	Implement digital systems (FIR and IIR systems) in a variety of forms (direct form I and II, parallel, cascade, ladder structure and linear phase realization).													
CO4	Apply design (IIT and BLT) techniques for IIR type (Butterworth and Chebyshev) digital filters.													
CO5	Design FIR type digital filters using windowing method 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													3
CO2	3	2													3
CO3	2	2													3
CO4	3	3	2												3
CO5	3	3	2												3
Average	2.6	2.4	2												3

Subject: Embedded Systems												**Subject Code:18EE644**		
Course Outcomes														
CO1	Understand about the components and interfaces of embedded systems.													
CO2	Enumerate about trade-offs and challenges of embedded systems													
CO3	Apply software aspects and programming to design embedded system													
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
CO2	2	2	1									1			1
CO3	2	2	1		1										1
Average	2	2	1		1							1			1

Subject: Electric Vehicle Technology												**Subject Code:18EE646**		
Course Outcomes														
CO1	Understand types of EV and utilize the concepts of kinetics, dynamics, performance parameters and characteristics of vehicles.													
CO2	Model energy storage systems for EV and HEV, charging methods and power electronic converter for batteries													
CO3	Explain and adopt different drive trains and propulsion systems for EV and HEV.													
CO4	Design and analyse electric and hybrid electric vehicles.													
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	1							1	

CO2	2	2	2	2		2	2						1	3	
CO3	2	2	2	2		2	2						1	3	
CO4	2	2				2	2						1	3	
Average	2	2	1.6	2		1.7	1.7						1	2.5	

Subject: Control system lab	**Subject Code:**18EEL66
Course Outcomes	
CO1	Assessing the time and frequency domain responses of a given second order system by using software package and discreate components
CO2	Design, analyze and simulate Lead, Lag and Lag Lead compensators for given specifications
CO3	Determine the performance characteristics of AC and DC Servomotors and synchro- Transmitter receiver pair used in control systems
CO4	simulate the DC Position and feedback control systems to study the effect of P, PI, PD and PID Controller and Lead compensator on the step response of the system
CO5	Write a script file to plot root locus, bode plot, Nyquist plots to study and compare the stability aspects of the system 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	3	1			2				2	2				2	2
CO2	3	1			2				2	2				2	2
CO3	3								2	2				2	1
CO4	3	2			2				2	2				1	2
CO5	3	2			2				2	2					3
Average	**3**	**1.5**			**2**				**2**	**2**				1.75	2

Subject: Digital Signal Processing Lab	**Subject Code:**18EEL67
Course Outcomes	
CO1	Compute the frequency Response and time Response of the given system using sampling theorem.
CO2	Solve impulse response and step response of a given difference equation theoretically & by using suitable software and compare the results.
CO3	Compute N-point DFT as well N-point FFT (Both DIT and DIF) of a given sequence and also plot magnitude and phase response
CO4	Perform Convolution of linear and circular two sequences using DFT and IDFT.
CO5	Design and implement IIR and FIR digital filter to meet the given specification using suitable software

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

Subject: Mini Project	**Subject Code: 18EEMP68**

CO1	Apply the fundamental knowledge of mathematics, science and engineering principles in design of solutions to problems addressing societal and environmental concerns
CO2	Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task
CO3	Communicate effectively and to present ideas clearly and coherently in both the written and oral forms
CO4	Work in a team member/leader to manage projects and costs in a diversified 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										2	2	2	2
CO2	3	2			2							2	3	3	3
CO3										3			3	3	3
CO4						3			3	3	3		2	2	2
Average	**3**	**2**			**2**	**3**			**3**	**3**	**3**	**2**	2.5	2.5	2.5

Semester-VII

Subject: Power System Analysis-2	**Subject Code: 18EE71**

Course Outcomes

CO1	Formulate network matrices for solving load flow problems.
CO2	Perform load flow studies using iterative techniques.
CO3	Solve economic load dispatch and unit commitment problems.
CO4	Analyze short circuit faults using bus impedance matrix and power system stability by numerical 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	3		2									3		
CO2	3	3	2	2									3		
CO3	3	3	2	2		2	2				3		3	2	
CO4	3	3	2	2		2							3		
Average	3	3	2	2		2	2				3		3	2	

Subject: Power System Protection	**Subject Code: 18EE72**

Course Outcomes

CO1	Discuss various components of protection, scheme, performance of relays and overcurrent protection.
CO2	Explain the protection of generators, motors, transformer & bus-zone .
CO3	Enumerate the construction and operation of different types of circuit breakers.
CO4	Emphasize the features of fuse, causes of over voltages and its protection & modern trends in power system protection.

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

Subject: Integration of Distributed Generation												Subject Code:18EE733		
Course outcomes														
CO1	Understand and Explain the concepts of Distributed Generation by various Sources of Energy.													
CO2	Analyse the Power System Performance, Overloading and Losses impacts on Distributed Generation													
CO3	Interpret Voltage Magnitude Variations impacts on Distributed Generation													
CO4	Study Power Quality Disturbances impacts on Distributed Generation													
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						1	1	
CO2	3	2				1	1						1	1	
CO3	3	2				1	1						1	1	
CO4	3	2				1	1						1	1	
Average	3	2				1	1						1	1	

Subject: Smart Grid												Subject Code:18EE744		
CO1	Explain the concept of smart grid enabling the ElectricNet, benefits and drivers of DC power delivery system, intelligrid architecture for the smart grid.													
CO2	Describe the smart energy efficient electric end-use devices for whole building control system, dynamic energy management system, electro -technologies for residential, commercial and industrial sectors													
CO3	Discuss demand side planning and evaluation													
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	2	1			2							3		
Average	3	2	1			2							3		

Subject: Power System Simulation Lab												Subject Code: 18EEL76		
Course Outcomes														
CO1	Determine the performance of transmission lines.													
CO2	Obtain the power angle characteristics of Synchronous machine and calculation of bus current, bus power & line flows.													
CO3	Assess the transient stability under three phase faults													
CO4	Develop bus admittance, bus impedance and Jacobian matrices of interconnected power systems													
CO5	Analyse and solve problems on load flow, economic load dispatch and short circuit 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	2		2	3				3	3			3		2
CO2	3	3		2	3				3	3			3	2	2
CO3	3	3		2	3				3	3			3		2
CO4	3	3		2	3				3	3			3		2
CO5	3	3	3	2	3	2	2		3	3	3		3		

Average	3	2.8	3	2	3	2	2		3	3	3		3	2	2

Subject: Relay and High Voltage Lab												**Subject Code: 18EEL77**			
CO1	Apply knowledge for obtaining breakdown characteristic of air insulation subjected for HVAC, HVDC applications to distinguish between uniform/non-uniform field conditions.														
CO2	Apply knowledge to assess quality of transformer oil sample by conducting experiment as per standards and assessing dielectric strength of it.														
CO3	Analyze the electromechanical & microprocessor based type of negative sequence relay, over current, over and under voltage relays.														
CO4	Acquire the knowledge experimentally by map field lines for co-axial cable model using electrolytic tank and protection of motor & generator.														
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		
CO2	3	2				2	2		2	2			3		
CO3	3	2				2	2		2	2			3		
CO4	3	2				2	2		2	2			3		
Average	3	2				2	2		2	2			3		

Subject: Project Phase I												**Subject Code:** 18EEP78			
Course Outcomes															
CO1	Apply the fundamental knowledge of mathematics, science and engineering principles in design of solutions or system components.														
CO2	Identify, select, apply a suitable engineering/IT tool in modelling/data interpretation/analytical studies, conduct experiments leading to a logical solution														
CO3	Design multidisciplinary engineering solutions to complex problems addressing societal and environmental concerns.														
CO4	Communicate effectively to a diverse audience and develop technical reports and publications.														
CO5	Work as a team member/leader to manage projects and costs in a diversified 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	3		3				1				3	3	3	3
CO2	3	3	3		3			1					3	3	3
CO3	3	3	2			3	3	1					3	3	3
CO4	3							2	2	3			3	3	3
CO5	3					3		2	3	3	3	3	3	3	3
Average	3	3	2.5	3	3	3	3	1.4	2.5	3	3	3	3	3	3

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