K L UNIVERSITY
DEPARTMENT OF MECHANICAL ENGINEERING
PROGRAM DEVELOPMENT DOCUMENT
B.Tech in Electrical and Electronics Engineering
2017

Vision of the University

To be a globally renowned university.

Mission of the university:

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

VISION of the Department

To Produce globally renowned leader in education, extension activities and Carrying out research and technology development in frontier areas of electronics and electrical engineering and allied fields

MISSION of the Department

To produce quality electrical and electronics engineers having strong theoretical foundation, innovative, good design experience , exposure to research and development and responsible for social needs.

Program Educational Objectives

Apply their immense knowledge acquired in Electrical & Electronics Engineering with modern computational tools to serve the needs of ongoing research, industry.
Apply immense knowledge acquired in electrical and Electronics Engineering to pursue higher education.
Employ leadership qualities with professional and ethical values in effectively dealing with societal challenges.
Inculcate in students, self and lifelong learning, effective interpersonal communication skills when working with multidisciplinary teams.

ProgramOutcome's and PSO'S

PO 1	Engineering knowledge
PO 2	Problem analysis
PO 3	Design/ development of solutions
PO 4	Conduct investigations of complex problems
PO 5	Modern tool usage
PO 6	The engineer and society
PO 7	Environment and sustainability
PO 8	Ethics
PO 9	Individual and team work
PO 10	Communication
PO 11	Project management and finance

PO 12	Lifelong learning
PSO 1	An ability to demonstrate the knowledge, skill to analyze the cause and effects on Electrical system, processes and systems.
PSO 2	An ability to apply the acquired Electrical Engineering knowledge for the advancement of society and self.

MAPPING OF PEOs WITH THE MISSION OF THE DEPARTMENT

Key components From Department Mission	**MISSION 1**	**MISSION 2**	**MISSION 3**	**MISSION 4**
	Training the leaders of tomorrow	Training the innovators of tomorrow	Training the outstanding career professionals of tomorrow	Conducting fundamental research
Apply their immense knowledge acquired in Electrical & Electronics Engineering with modern computational tools to serve the needs of ongoing research, industry.		√	√	√
Apply immense knowledge acquired in electrical and Electronics Engineering to pursue higher education.		√	√	√
Employ leadership qualities with professional and ethical values in effectively dealing with societal challenges.	√	√	√	

Inculcate in students, self and lifelong learning, effective interpersonal communication skills when working with multidisciplinary teams.	√	√	√	

MAPPING OF PEOs WITH POs

PONo	PO'S

		Apply their immense knowledge acquired in Electrical & Electronics Engineering with modern computational tools to serve the needs of ongoing research, industry.	Apply immense knowledge acquired in electrical and Electronics Engineering to pursue higher education.	Employ leadership qualities with professional and ethical values in effectively dealing with societal challenges.	Inculcate in students, self and lifelong learning, effective interpersonal communication skills when working with multidisciplinary teams.
		PEO 1	PEO 2	PEO 3	PEO 4
PO 1	Engineering knowledge	3	3	3	
PO 2	Problem analysis	3	3	2	
PO 3	Design/ development of solutions	3	3	2	
PO 4	Conduct investigations of complex problems	3	3	3	
PO 5	Modern tool usage	3	3	3	
PO 6	The engineer and society	2	2	3	
PO 7	Environment and sustainability	2	2	3	1
PO 8	Ethics	2	2	3	2
PO 9	Individual and team work	2	2	2	3
PO 10	Communication	1	1	2	3

PO 11	Project management and finance	1	1	3	2
PO 12	Lifelong learning	3	3	2	3
PSO 1	An ability to demonstrate the knowledge, skill to analyze the cause and effects on Electrical system, processes and systems.	3	3	2	3
PSO 2	An ability to apply the acquired Electrical Engineering knowledge for the advancement of society and self.	3	3	3	3

K L UNIVERSITY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

2017 Course Outcomes

Course Articulation Matrix

	Item Description				MAPPING of POs													
Course Code	**Course Title**	**S NO**	**CO NO**	**Description of the Course Outcome**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
17 MT 1101	SINGLE VARIABLE CALCULUS AND MATRIX ALGEBRA		1	Model the physical laws and relations mathematically as a first order differential equations, solve by analytical and numerical methods also interpret the solution	**1**													
			2	Model physical laws and relations mathematically as a second/higher order differential equations, solve by analytical method and interpret the solution	**2**													
			3	Obtain the Fourier series expansions of periodic functions and use the series to solve ordinary differential equations	**2**													
			4	Model physical problems mathematically as a system of linear equations and solve them by analytical and numerical methods. Also, determine the nature of Quadratic form using Eigen values	**1**													
			5	Verify the solution of problems through MATLAB					2									
17 MT 1102	FOUNDATIONS OF COMPUTATIONAL MATHEMATICS		1	Evaluate mathematical expressions by using different types of operations on numbers	**3**													

			2	Simplify expressions and solve equations & inequations.	**3**													
			3	Apply different types of arithmetic expressions to solve given problems.	**3**													
			4	Apply methods to find areas , volumes and use graphs to reduce non-linear to linear forms	**3**													
17 MT 1203	MULTIVARIATE CALCULUS		1	Determine extreme values for functions of several variables	**2**													
			2	**Determine area, volume moment of inertia through multiple integrals in Cartesian or polar co ordinates**	**2**													
			3	Apply the concepts of vector calculus to calculate the gradient, directional derivative, arc length , areas of surfaces and volume of solids in practical problems	**3**													
			4	Obtain analytical and numerical solutions of Heat and wave equations	**3**													
			5	Verify the solution of problems through MATLAB	**2**													
17 MT 1204	LOGIC AND REASONING		1	Apply the fundamental principle of counting and use them to measure the uncertainty in random experiments	**3**													
			2	Apply Venn diagrams to find the conclusion of statements , solve puzzles using binary logic and problems relating to cubes	**3**													
			3	Apply the available models for Data sufficiency & redundancy and interpret it , when given, in tabular and graphical forms.	**3**													

			4	Apply the Reasoning techniques to solve problems on arrangements, series, analogies, coding and decoding	**3**													
17 CY 1001	ENGINEERING CHEMISTRY		1	Predict potential complications from combining various chemicals or metals			**2**	**2**										
			2	Discuss fundamental aspects of electrochemistry and materials science			**2**	**2**										
			3	Examine water quality and select appropriate purification technique			**3**	**3**										
			4	Apply polymers, conducting polymers ,green chemistry and nano chemistry			**3**											
			5	An ability to analyze & generate experimental skills			**3**	**3**										
17CS1101	PROBLEM SOLVING AND COMPUTER PROGRAMMING		1	Illustrate how problems are solved using computers and programming.	**3**	**3**												
			2	Illustrate and use Control Flow Statements in C.	**2**	**2**												
			3	Interpret & Illustrate user defined C functions and different operations on list of data.	**3**	**3**												
			4	Implement Linear Data Structures and compare them.				**3**										
			5	Apply the knowledge obtained by the course to solve real world problems.	**2**	**2**		**2**										

17CS1202	DATA STRUCTURES		1	Illustrate solving typical problems using Arrays, Strings and Lists.	**2**	**2**												
			2	Demonstrate applications of stacks & queues and solving typical problems using recursion.	**3**	**3**												
			3	Demonstrate use of sorting, Heaps and binary tree techniques in problem solving.	**3**	**3**												
			4	Examine AVL trees and Hashing techniques.				**2**										
			5	Apply the knowledge obtained by the course to solve real world problems.	**2**	**2**		**2**										
17 GN 1001	BASIC ENGINEERING MEASUREMENTS		1	Understand the Basic fundamentals of a measurement system.			**2**											
			2	Understand various Mechanical measuring parameters, and apply different measuring techniques on various mechanical parameters using simulation and experimentation tools.	**3**			**3**										
			3	Understand various Electrical measuring parameters, and apply different measuring techniques on various Electrical parameters using simulation and experimentation tools.	**3**			**3**										

			4	Understand various Electronic measuring parameters, and apply different measuring techniques on various Electronic parameters using simulation and experimentation tools.	**2**			**2**										
			5	Apply the theoretical concepts to measure different parameters.				**3**										
17 ME 1001	ENGINEERING MECHANICS		**1**	Understand the concept of forces and apply the static equilibrium equations.	**2**	**2**												
			2	Analyze co-planar and non co-planar system of forces.	**2**	**2**												
			3	Apply the concept of centroid & centre of gravity to determine moment of inertia.	**3**	**3**												
			4	Analyze the rigid bodies under translation and rotation with and without considering forces.		**2**												
			5	Understand and analyze the engineering systems with the help of mechanics concept to solve the engineering problems.				**3**										
17 ME 1002	ENGINEERING GRAPHICS		1	Understand the principles of drawing and use of drafting instruments	**2**									**2**		**2**		
			2	Draw engineering curves and scales.	**2**									**2**		**2**		
			3	Draw the projections of points, lines, planes and solids	**1**									**1**		**1**		

			4	Draw the surface sheath of solids by development of surfaces and the sections of Solids.	**1**									**1**		**1**			
			5	Prepare 2D & 3D drawings of solids and their transformations.	**2**									**2**		**2**			
17 ME 1003	WORKSHOP PRACTICE		1	prepare the different joints using carpentary trade by using wood as raw material					**2**										
			2	prepare the different fits using fitting trade with Ms plates as raw material					**3**										
			3	prepare the different components using Tinsmithy trade by using GI sheet as raw material					**3**										
			4	Apply basic electrical engineering knowledge for house wiring practice.					**2**										
17 EN 1101	BUILDING BLOCKS FOR COMMUNICATION SKILLS		1	Improve pronunciation skills and understand the method of identifying antonyms.										**2**					
			2	Apply writing strategies for office/ formal communication										**2**					
			3	Analyze types of reading techniques and improve reading speed.										**3**					
			4	Analyze different cultures and the importance of empathy in cross-cultural communication.										**3**					

17 EN 2102	INSTANT COMMUNICATION SKILLS		1	Analyse the concept of Group Discussion and speak effectively during the discussion.										**3**				
			2	Apply and analyze various concepts of writing strategies in professional communication skills like, reports, proposals and minutes of the meeting.										**2**				
			3	Analyse vocabulary and apply the types of reasoning in comprehending the information.										**4**				
			4	Apply the mechanics and application of presentation skills and apply people skills in various social organizational and corporate ambiences.										**2**				
17 EN 3203	CORPORATE COMMUNICATION SKILLS		1	Analyse the method of identifying synonyms and antonyms and analyze the meaning of a word from the context.										**3**				
			2	Analyze various strategies involved in writing an essay and apply various styles in writing.										**3**				
			3	Analyse the organization of the passage and also analyze the tone, attitude and style of the author.										**3**				
			4	Acquire knowledge on various employability skills & analyze a situation and develop adaptability.					**3**									

17 PH 1001	ENGINEERING MATERIALS		1	Understands structure of crystalline solids, kinds of crystal imperfections and appreciates structure-property relationship in crystals.	**2**														
			2	Understands magnetic properties of materials and identifies their role in classification soft & hard magnetic materials having specific engineering applications.	**2**														
			3	Understands thermal and mechanical properties of materials, heat treatment methods for changing the microstructure of materials and responses of materials subjected to load.	**2**														
			4	Understands the role of electronic energy band structures of solids in governing various electrical and optical properties of materials.	**2**														
			5	Apply the knowledge on structure and properties of materials while executing experiments and develop inter disciplinary projects.				**3**											
17 GN 1001	ECOLOGY AND ENVIRONMENT		1	Understand the importance of Environmental education and conservation of natural resources.						**1**									

			2	Understand the importance of ecosystems and biodiversity.												**1**		
			3	Apply the environmental science knowledge on solid waste management, disaster management and EIA process.						**2**								
17 GN 1002	HUMAN VALUES		1	Understand and identify the basic aspiration of human beings								**2**						
			2	Envisage the roadmap to fulfill the basic aspiration of human beings.								**3**						
			3	Analyze the profession and his role in this existence.								**3**						
17 EE 1101	INTRODUCTION TO ELECTICAL & ELECTRONICS ENGINEERING		1	Identify the evolution and application of Electrical Engineering						**1**							1	
			2	Understand the principles of Power Engineering	**2**												2	
			3	Recognize the necessity of electrical power conversion and control	**2**												2	
			4	Acquired knowledge about the basic Electronics	**2**												2	
17 EE 2102	FIELDS & NETWORKS		1	Understand the circuit elements, kirchhoff's law and theorems to solve the networks	**1**	**1**			**1**								1	
			2	Apply the procedure to determine form factor and peak factor to different symmetrical & unsymmetrical waves.	**2**	**2**			**2**								2	
			3	Apply vector algebra to field fundamentals to analyze electric and magnetic field distributions		**2**	**2**	**2**									2	

			4	Apply Maxwell's equations for static and time varying fields		**2**	**2**	**2**									2	
17 EE 2103	ELECTROMAGNETIC FIELD THEORY		1	Apply the vector algebra to analyse electrostatic field distributions		**2**	**2**	**2**									2	
			2	Understand the importance of magneto static field and analyse its spatial distributions		**1**	**1**	**1**									1	
			3	Analyse the Force generation due to static fields		**2**	**2**	**2**									2	
			4	Analyse the importance of Electromagnetic fields and its distributions		**2**	**2**	**2**									2	
17 ES2102	SIGNAL ANALYSIS		**1**	Understand the representation, manipulation and operations of Continuous-Time and Discrete Time signals and systems.		1											1	
			2	Explore the Continuous-Time signals in Fourier domain and illustration of sampling theorem.		1											1	
			3	Understand the Laplace Transforms and application to LTI systems.		1											1	
			4	Analyze Discrete Time signals in in Fourier and Z-Transform domain.		2											2	

			5	Apply and evaluate signals and systems concepts to various applications under transform domain.					**2**									2	
17 EE 2104	NETWORK THEORY		1	Understand the circuit elements, Kirchhoff's law and theorems to solve the networks	**1**	**1**			**1**									1	
			2	Analyze the steady state behaviour of AC networks	**2**	**2**			**2**									2	
			3	Analyze the physical circuits with Two port network	**2**	**2**			**2**									2	
			4	Understand the fundamentals of magnetic circuits and its analysis	**1**	**1**			**1**									1	
17 EC 2103	DIGITAL SYSTEM DESIGN		1	Understand numerical and character representations in digital logic, number system, data codes and the corresponding design of arithmetic circuitry.		**3**													3
			2	Understanding Logic gates, Logic theorems, Boolean algebra and SOP/POS expressions.		**1**												1	

			3	Combinational and sequential systems design using standard gates and filp-flops and minimization methods		**1**			**1**									1	
			4	Verilog HDL design for logic gates, combinational and sequential Logic Functions.		**1**			**1**										1
			5	Concepts of Programmable Logic devices.		**1**			**1**									1	
17 EM 2001	COMPUTER ORGANIZATION AND ARCHITECTURE		1	Understand the functionality and design the CPU functional units - control unit, registers, the arithmetic and logic unit, the instruction execution unit, and the interconnections among these components.			**3**		**3**										3
			2	Understand, analyze and design main, cache and virtual memory organizations.			**2**		**2**										2
			3	Understand, analyze and design different types of I/O transfer techniques.			**2**		**2**									2	

			4	Understand the design issues of RISC and CISC CPUs and the design issues of pipeline architectures.			**3**		**3**									3
			5	Able to Design combinational and sequential circuits using LOGISIM			**3**		**3**									3
17 EC 2104	ANALOG ELECTRONIC CIRCUIT DESIGN		1	Understand the industrial processes and organizations connected with the profession and relate classroom learning with real life situation by taking into the consideration of various design concepts			**2**											2
			2	Understanding the concepts of various diodes and their applications.			**2**										2	
			3	BJT concepts as operation, biasing and frequency response			**2**		**2**								2	
			4	FET concepts as operation, biasing and frequency response			**2**		**2**								2	
			5	Feedback concepts and their analysis			**2**		**2**								2	
			6	Concepts of various oscillators and applications.			**2**		**2**								2	

17 EM 2202	PROCESSORS AND CONTROLLERS		1	Able to understand and analyze the architectural features of CISC type of General purpose processor Intel 8086 Microprocessor.		**1**			**2**								2	
			2	Able to understand and analyze the architectural features of CISC type of microcontroller - Intel 8051 Microcontroller.		**1**			**2**								2	
			3	Able to understand and analyze the architectural features of RISC type of microcontroller – PIC Microcontroller.		**1**			**2**								2	
			4	Able to program 8086 microprocessor, 8051 and PIC microcontrollers in assembly language using TASM, KEIL, MPLAB and Proteus tools.		**1**			**2**								2	
			5	Able to Develop a real time application using 8051 & PIC Microcontrollers through project based labs.		**1**			**2**									2
17 EC 3101	DISCRETE TIME SIGNAL PROCESSING		1	Understanding the Discrete Time LTI Systems in both time domain and frequency domain.		**1**											**1**	

			2	Design and Realization of Digital Filters		**3**												**3**
			3	Analyzing the Discrete Fourier Transform and Wavelets.		**2**											**2**	
			4	Exploring Sampling rate conversion and applications of DSP.		**2**											**2**	
			5	Implementation of design aspects leading to project based labs in Matlab.					**3**									
17 EE 2207	ELECTRICAL CIRCUITS		1	Understand the concept of mutual inductance, series and parallel resonance, network topology to solve complex networks and 3- phase circuits voltage and current relations.	**1**				**1**								1	
			2	Analyze the magnetic circuits, transient response for AC and DC excitation and two port network parameters	**2**	**2**			**2**								**2**	
			3	Evaluate one port networks using Foster and cauer forms and design the prototype low and high pass filters.	**3**	**3**			**3**								**3**	
17 EE 2206	DC MACHINES & TRANSFORMERS		1	Apply the basic principles of electro mechanical energy conversion to electrical machines	**2**												**2**	
			2	Analyze operating characteristics of various types of DC generators.				**2**									**2**	
			3	Identify various speed control methods of DC motor and evaluate this performance				**2**	**2**								**2**	

			4	Evaluate the performance of a transformers and selecting it for particular application.				**2**	**2**								**2**	
			5	Test the DC machines and transformers to evaluate their performance	2			**2**									**2**	
17 EE 3103	AC MACHINES		1	Select from all commercially available 3-ϕ IM for given application				**2**	**2**								**2**	
			2	To understand the construction, operation and armature reaction of a 3-ϕ synchronous generator and identify the requirements for parallel operation.				**2**	**2**								**2**	
			3	Understand and analyze the performance of synchronous motor by varying excitation and varying load.				2	2								2	
			4	Evaluate the performance of a single phase motor and selecting it for particular application.				3	3								3	
			5	Test the induction machine and synchronous machine to evaluate their performance	2			2									2	
17 EE 3101	ELECTRICAL POWER GENERATION, TRANSMISSION & DISTRIBUTION		1	Understand various generating stations.	1		1										1	
			2	Analyze the performance of overhead transmission lines and underground cables.	2	2			2								2	
			3	Understand various types of substation layouts.	1		1										1	
			4	Understand the power system protection schemes.	1		1										1	

			1	Students are able to understand control system concepts such as open, closed loop systems, transfer function approach, mathematical modeling of physical systems and can understand analyze the similarities between synchros and ac generators	1			1									1	
			2	Students can be able to Analyze the time domain and frequency response of physical systems	2	2		2									2	
			3	Students can be able to understand and analyze stability of given transfer functions in time and Frequency domain and can be able to analyze the process of Converting state space equations into transfer function for the given model.	2			2						2			2	
17 EE 3104	CONTROL SYSTEMS		4	Students can be able to design and analyze controllers and lead, lag, lead-lag compensators	3	3		3	3								3	
			1	Apply the network matrices for solution of power flow problems	2	2											2	
			2	Apply the reactance diagrams for symmetrical short circuit faults in a power system	2	2											2	
			3	Apply symmetrical components for unsymmetrical fault analysis in a power system	2	2											2	
17 EE 3205	POWER SYSTEM ANALYSIS & STABILITY		4	Analyze rotor angle stability	2	2											2	

			5	Test and Analyze various short circuit faults, load flows, economic dispatch problems, rotor angle stability problems using MATLAB	2	2											2	
17 EE 3102	POWER ELECTRONICS		1	Select appropriate switch for a given power converter	2												2	
			2	Evaluate the steady state performance of Basic DC-DC converters			3	3									3	
			3	Evaluate the performance of Basic Switch-Mode PWM Inverter			3	3									3	
			4	Understand and analyze the operation of Basic Phase controlled converters	1					1							1	
17 EE 4101	POWER SYSTEM PROTECTION & CONTROL		1	Understand the principle of protective relays & circuit breakers		1											1	
			2	Analyze over current, distance and differential protection schemes	2	2			2								2	
			3	Analyze over voltage protection and economic operation of power system	2	2											2	
			4	Analyze automatic generation control and voltage regulators	2	2											2	
17 EE 3207	ELECTRIC DRIVES		1	Understand the concept of fundamental torque equations, Modes of operations, equivalent values of drive parameters, converters, DC motors and AC Motors.	1	1			1								1	

			2	Analyze the speed torque characteristics of DC Drives , Induction motor Drive and Synchronous motor Drive	2				2				2				2	
			3	Design a DC, AC drives and simulate those circuits with design parameters and observe the output waveforms.	3		3		3								3	
17 EE 3206	ELECTRICAL AND ELECTRONIC MEASUREMENTS		1	Understand the important aspects of torques generated in instruments	1			1									1	
			2	Analyse the measurement of Voltage, current & power	2			2									2	
			3	Analyse the measurement of physical parameters (RLC) & frequency and their instruments	2			2									2	
			4	Understand the basic concepts of transducers and analyze the working of Oscilloscopes	2			2									2	
17 EE 4151	DISTRIBUTION SYSTEM PLANNING AND AUTOMATION		1	Understand the methods to find load forecasting and various tariffs and meters	1			1									1	
			2	Understand the optimal locations of substation , capacitors and importance of protection and coordination of different protective devices			1	1									1	
			3	Understanding the SCADA and required components and its function	1			1									1	

			1	Students are able to understand the concept of deregulation market structure, market architecture and power system old Vs new		1						1					1	
			2	Students can be able to understand electricity sector structures different structure models , bilateral and pool markets and LMP based markets	1	1					1						1	
			3	Students can be able to understand and analyze transmission pricing methods, congestion management methods and effect of congestion on LMPs	2												2	
17 EE 4152	RESTRUCTURED POWER SYSTEMS		4	Students can be able to understand ancillary services system security in deregulation		1					1						1	
			1	Evaluating various HVDC transmission systems converter circuits and its control scheme	3												3	
			2	Analyzing FACTS devices for improving system stability				2									2	
17 EE 4153	HVDC & FACTS		3	Analyzing the knowledge for improving stability and understanding the concepts of harmonics and designing of filters				2									2	
			1	Understand various power quality issues.	1	1											1	
17 EE 4154	POWER QUALITY		2	Analyze various power quality issues and its causes.	2	2			2								2	

			3	Analyze the different mitigating techniques for voltage sag and swells.	2	2											2	
			4	Design and analyze voltage sag and swell using simulation tools.	3			3	3								3	
17 EE 4155	SMART GRID TECHNOLOGIES		1	To understand the functioning of various devices in Smart Grids	1												1	
			2	To understand communication channels in Smart Grid.	1	1											1	
			3	To apply knowledge in Smart Metering	2	2			2								2	
17 EE 4161	ADVANCED POWER ELECTRONICS		1	Understand various advanced inverter topologies and Analyze various PWM techniques to control them	2		2	2									2	
			2	Analyze the performance of various DC-DC converter s	2		2	2									2	
			3	Understand the working of various resonant converter topologies	1		1	1									1	
17 EE 4162	SWITCHED MODE POWER SUPPLIES		1	Design of non-isolated and isolated DC-DC converters			3										3	
			2	Analyze the operation of Resonant converters				2									2	
			3	Develop mathematical models for Non-isolated converters		3											3	
			4	Understand the necessity of closed loop controllers used for DC-DC converters	1												1	

			1	Understand the Modelling of 3-phase induction motor in various reference frames and control of induction motor	1	1											1	
			2	Understand the working and control of Brushless dc motor and Switched reluctance motor	1	1											1	
			3	Understand the working and control of PM synchronous machine and Stepper motor	1	1											1	
17 EE 4163	SPECIAL MACHINES & CONTROL		4	Understand the working and control of Stepper motor	1	1											1	
			1	Understanding the importance of probability theory in estimating system parameters		1											1	
			2	Understanding the importance of stochastic process in estimating system models		1											1	
			3	Analysis of the optimal prediction and smoothing for discrete linear systems		2											2	
17 EE 4171	STATE ESTIMATION & SYSTEM IDENTIFICATION		4	Analysis of the optimal estimation for continuous linear systems		2											2	
			1	Understand Z-transform and its properties.	1												1	
			2	Analyze systems in frequency domain using Z transform.				2									2	
17 EE 4172	DIGITAL CONTROL SYSTEMS		3	Design the basic compensators for discrete time systems using Root locus and Bilinear transformation		3											3	

			4	Design the state controllers for discrete-data control systems using state variable approach.		3											3	
17 EE 4173	PROGRAMMABLE LOGIC CONTROLLER		1	Understand the basics of Programmable Logic Controllers		1												1
			2	Understand and apply the basic ladder programming and learn diagrams for process control	2	2			2									2
			3	Understand about the PLC registers, their characteristics and understand various functions of PLC's.	1	1			1									1
			4	Understand about data handling functions of PLC	1	1			1									1
17 EE 4174	ARTIFICIAL NEURAL NETWORKS & FUZZY LOGIC		1	Comprehend the concepts of feed forward neural networks	1	1			1									1
			2	Analyze the various feedback networks	2	2			2									2
			3	Understand the concept of fuzziness involved in various systems and fuzzy set theory.	1	1			1									1
			4	Comprehend the fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm	3	3			3									3
17 EE 4175	OPTIMAL CONTROL SYSTEMS		1	Describe first order optimality condition for optimal control problem.		1											1	
			2	Describe first order optimality condition for calculus of variations for a optimal control problem	2												2	

			3	Understand the importance of optimal control for linear time invariant systems by solving the corresponding Riccati equations		1											1	
			4	Understand and estimate the operation of optimal control techniques		2											2	
17 EE 4181	ENERGY CONSERVATION & AUDIT		1	Understand the need for energy conservation and various tariffs	1			1										1
			2	Understand the auditing methods and their practice by case studies.			1	1										1
			3	Apply the energy conservation techniques to motors, transformers, lighting systems.			2	2										2
17 EE 4182	UTILIZATION OF ELECTRICAL ENERGY		1	Understand the motor ratings for different applications	1			1									1	
			2	Analyze the characteristics and intensity of lightning systems for different types of lamps.		2		2									2	
			3	Analyze the characteristics and control strategies of locomotives for track electrification.			2	2									2	
17 EE 4183	RENEWABLE ENERGY RESOURCES		1	Understand and analyze the solar thermal applications and solar photovoltaic cells.	1											1		1
			2	Analyze the performance of wind and tidal, wave and Ocean thermal energy conversion systems		2		2										2

			3	Understand and analyze the operation of geothermal, bio and micro hydro energy conversion.	1											1		1
17 EE 4184	HYBRID ELECTRIC VEHICLES		1	Understanding the kinematics and dynamics of Vehicles and different battery parameters, characteristics.	1	1	1			1								1
			2	Understand the operation and control of AC & DC drives	1	1	1			1								1
			3	Understand various types of internal combustion engines	1	1	1			1								1
			4	Understand various control strategies in Hybrid Electric vehicles	1	1	1			1								1
17 EE 4185	ENERGY STORAGE SYSTEMS		1	Understand different types of batteries and their modelling	1	1			1									1
			2	Understand the basics of fuel cell and their working principle, characteristics. It also introduces different types of fuel cell types	1	1			1									1
			3	Understand different concepts of Ultra Capacitors and their developments	1	1			1									1
			4	Understand the basic concept and operating principles of Fly Wheel energy storage systems and hybridization of energy storage	1	1			1									1
17 EE	FUNDAMENTALS OF IOT		1	Understand the basic concepts of IOTs & some related issues of IOTs							1							1

4191			2	Understand the Issues of Security, standards and Protocol Convergences with IOTs & Vision over M2M Vs. IOTs							1								1
			3	Understand the Architectural overview, Reference Models based Architecture of IOTs							1								1
			4	Analyze the IOT Smart Applications and Cloud support for IOT							2								2
			1	Understand Full-custom & Semi Custom design methodologies of for designing different PLD architectures.			1												1
			2	Study and design of combinational and sequential circuits using PLEs.			2		2										2
			3	Study and analysis of different CPLD and FPGA architectures			2												2
17 EE 4182	PLDs AND FPGAs		4	Study of New generation Architectures of Programmable Logic Devices			1												1
			1	To understand the VLSI fabrication process and to be able to interact with integrated circuit process engineers				1											1
			2	To analysis the theory and CV characteristics of MOS transistor				2											2
			3	To analysis MOS gate static and switching characteristics				2											2
17 EE 4193	VLSI Design		4	To design and layout MOS logic circuits					3										3

			5	Circuit Characterization and Performance Estimation and scaling					2										2
			6	Analyzing CMOS fault models and test principles				2	2										2
17 EE 4194	EMBEDDED SYSTEM DESIGN		1	Able to analyze embedded systems, its design cycle, modeling, layers of embedded systems			2		2										2
			2	Able to understand Processor and Memory Organization and I/O Devices and Networks			1		1										1
			3	Able to understand, evaluate and select appropriate software architecture and analyze the features real time operating systems.			3		3										3
			4	Understand various embedded system design methodologies and be able to develop and demonstrate a small embedded system for a real time application.			2		2										2
17 EE 4195	DSP Processors		1	Understand and analyze the basic concepts of Digital Signal Processing by MATLAB	2		2				2								2
			2	Understand various number systems	1	1													1
			3	Understand and analyze various architectures for programmable DSP devices	2		2				2								2

			4	Programming of TMS320F28335/F2812 Digital Signal Processor	2		2				2							2