



DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

**K L University**

(Koneru Lakshmaiah Education Foundation)

Deemed to be University Estd. u/s 3 of UGC Act. 1956

Accredited by NAAC as 'A' Grade University ♦ Approved by AICTE ♦ ISO 9001-2008 Certified

Green Fields, Vaddeswaram, Guntur District, Pincode : 522 502, Andhra Pradesh., INDIA

Phones: 0863-2399999 FAX: 0863-2388999

Date: 03.05.2015

**BOARD OF STUDIES INVITATION**

Electrical & Electronics Engineering Department Board of Studies meeting is scheduled on 04.05.2015 at 10.30 AM in E104. All the BOS Members are requested to make it convenient to attend the meeting.

Agenda of the Meeting:

1. To consider the proposed 2015-16 admitted batch B.Tech Curriculum and make recommendations to the Academic council KLU for approval the same.
2. To consider the proposed 2015-16 admitted batch M.Tech (PED & PS) Curriculum and make recommendations to the Academic council KLU for approval the same.

Following are the members present:

1. Dr. O. Chandra Sekhar, Professor & Head, EEE Department, K L University
2. Dr. P. Linga Reddy, Professor, EEE Department, K L University
3. Dr. G. Kesava Rao, Professor, EEE Department, K L University
4. Dr.M.K.S.Sastry, Visiting Professor, EEE Department, KL University
5. Dr. K. Subba Rao, Professor, EEE Department, K L University
6. Dr. S.V.N.L.Lalitha, Professor, EEE Department, K L University
7. Dr.Y.P.Obulesu, Professor, EEE Department, K L University
8. Dr.S.Lakshminarayana, Professor, ECE Department, K L University
9. Dr.K.Harinath Reddy, Professor, EEE Department, K L University
10. Dr. K.S.Srikanth, Professor, EEE Department, K L University
11. Dr. A. Pandian, Professor, EEE Department, K L University
12. Dr. P.S. Varma, Associate Professor, EEE Department, K L University
13. Dr. M. Kiran Kumar, Associate Professor, EEE Department, K L University
14. Dr.D.Sudha Rani, Assistant Professor, EEE Department, K L University
15. Mr. K. Narasimha Raju, Associate Professor, EEE Department, K L University
16. Mr. D. Narasimha Rao, Associate Professor, EEE Department ,K L University
17. Mr.A.Appa Rao, Associate Professor, EEE Department ,K L University
18. Mr. D. Seshi Reddy, Associate Professor, EEE Department ,K L University
19. Mr. J. Somlal, Associate Professor, EEE Department ,K L University
20. Mr. R.B.R. Prakash, Associate Professor, EEE Department ,K L University
21. Mrs. K Sarada, Associate Professor, EEE Department K L University



Date: 04.05.2015

**MINUTES OF BOARD OF STUDIES MEETING**

The following are the Minutes discussed in the “**Board of Studies**” meeting held on 04.05.2015 at 10.30 AM in HOD –EEE chamber.

**Agenda of the Meeting:**

1. To consider the proposed 2015-16 admitted batch B.Tech Curriculum and make recommendations to the Academic council KLU for approval the same.
2. To consider the proposed 2015-16 admitted batch M.Tech Curriculum and make recommendations to the Academic council KLU for approval the same.
3. Any other points with permission of the chair.

The following members are present:

1. Dr. O. Chandra Sekhar, Professor & Head, EEE Department, K L University
2. Dr. P. Linga Reddy, Professor, EEE Department, K L University
3. Dr. G. Kesava Rao, Professor, EEE Department, K L University
4. Dr.M.K.S.Sastry, Visiting Professor, EEE Department, KL University
5. Dr. K. Subba Rao, Professor, EEE Department, K L University
6. Dr. S.V.N.L.Lalitha, Professor, EEE Department, K L University
7. Dr.Y.P.Obulesu, Professor, EEE Department, K L University
8. Dr.S.Lakshminarayana, Professor, ECE Department, K L University
9. Dr.K.Harinath Reddy, Professor, EEE Department, K L University
10. Dr. K.S.Srikanth, Professor, EEE Department, K L University
11. Dr. A. Pandian, Professor, EEE Department, K L University
12. Dr. P.S. Varma, Associate Professor, EEE Department, K L University
13. Dr. M. Kiran Kumar, Associate Professor, EEE Department, K L University
14. Dr.D.Sudha Rani, Assistant Professor, EEE Department, K L University
15. Mr. K. Narasimha Raju, Associate Professor, EEE Department, K L University
16. Mr. D. Narasimha Rao, Associate Professor, EEE Department, K L University
17. Mr.A.Appa Rao, Associate Professor, EEE Department, K L University
18. Mr. D. Seshi Reddy, Associate Professor, EEE Department, K L University
19. Mr. J. Somlal, Associate Professor, EEE Department, K L University
20. Mr. R.B.R. Prakash, Associate Professor, EEE Department, K L University
21. Mrs. K Sarada, Associate Professor, EEE Department K L University



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The following External Members gave their valuable suggestions

1. Dr.D.V.S.Siva Sharma, Professor, EEE Department, NIT Warangal
2. Dr.C.Nagamani, Professor, EEE Department, NIT Tiruchy

Dr.O.Chandra Sekhar welcomed the BOS Members for the “Board of Studies Meeting”. The Chairman discussed about the previous BOS meeting resolutions and amendments made to the curriculum which are approved in Academic Council.

The Board of studies of the Department of Electrical & Electronics Engineering made the following resolutions:

1. Dr.O.Chandra Sekhar proposed PBL (Project Based Laboratory) concept to be implemented to all the courses of B.Tech students admitted in the 2015-16.
2. The amendment put forward by Dr.O.Chandra Sekhar approved by board unanimously.
3. Dr.A.Pandian, PED Research Group head put forward the modifications in the syllabus of Power Electronics & Drives specialisation courses offered for 2015-16 Batch.
4. Dr.P.S.Varma, PS Research Group head put forward the modifications in the syllabus of Power Systems specialisation courses offered for 2015-16 Batch.
5. Dr.Y.P.Obulesu, proposed Hybrid Electric Vehicles as a course to the B.Tech students.
6. The amendment put forward by Dr.Y.P.Obulesu, approved by board as a professional elective course.
7. Dr.C.Nagamani, proposed Utilisation of Electrical Energy as a course to the B.Tech students.
8. The amendment put forward by Dr.C.Nagamani, approved by board as a professional elective course.
9. As per the feedback from Alumni & Students, Dr.O.Chandra Sekhar approved Two communication skills courses (Verbal communication & Corporate communication skills) are added to the Curriculum for improving placement opportunities.



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10. The revised curriculum structure for 2015-16 Admitted B.Tech batch was approved by all members present in the meeting. The detailed structure of 2016-17 was shown in Annexure 1.
11. The revised curriculum structure for 2015-16 Admitted M.Tech batch was approved by all members present in the meeting. The detailed structure of 2016-17 was shown in Annexure 2.
12. All the recommendations of the DAC (Department Academic Council) minutes held on 10<sup>th</sup> September 2014 were approved.

  
BOS-CHAIRMAN

Professor & Head  
Dept of EEE  
K L University  
Green Fields, Vaddeswaram,  
Guntur Dt. A.P. Pin : 522 502



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**Board of Studies (BOS)**

The following members attended the meeting on 4<sup>th</sup> May 2015 at 10:30 AM:


S.No	Name of the member	Designation	Member	Signature
1	Dr. O. Chandra Sekhar	Professor, BOS Chairman	BOS Chairman	
2	Dr.D.V.S.Siva Sharma	Professor, NIT Warngal	External	
3	Dr.C.Nagamani	Professor, NIT Tirichy	External	
4	Dr. P. Linga Reddy	Professor	Internal	
5	Dr. G. Kesava Rao	Professor	Internal	
6	Dr.M.K.S.Sastry	Visiting Professor	Internal	
7	Dr. K. Subba Rao	Professor	Internal	
8	Dr. S.V.N.L.Lalitha	Professor	Internal	
9	Dr.Y.P.Obulesu	Professor	Internal	
10	Dr.S.Lakshminarayana	Professor, ECE Dept. KLU	External	
11	Dr.K.Harinath Reddy	Professor	Internal	
12	Dr. K.S.Srikanth	Professor	Internal	
13	Dr. A. Pandian	Associate Professor	Internal	
14	Dr. P.S. Varma	Associate Professor	Internal	
15	Dr. M. Kiran Kumar	Associate Professor	Internal	
16	Dr.D.Sudha Rani	Assistant Professor	Internal	
17	Mr. K. Narasimha Raju	Associate Professor	Internal	
18	Mr. D. Narasimha Rao	Associate Professor	Internal	
19	Mr.A.Appa Rao	Associate Professor	Internal	
20	Mr. D. Seshi Reddy	Associate Professor	Internal	
21	Mr. J. Somlal	Associate Professor	Internal	
22	Mr. R.B.R. Prakash	Associate Professor	Internal	
23	Mrs. K Sarada	Associate Professor	Internal	



Course Code	Course Title	CO NO	Description of the Course Outcome	a b c d e f g h i j k										L-T-P	Credits					
15 EN 3206	CORPORATE COMMUNICATION SKILLS	CO1	Understand and analyze the depth of a topic and use the advanced levels in creative speaking and debating.																	
		CO2	Understand and analyze various strategies involved in writing an essay and apply various styles in writing.																	
		CO3	Understand and analyze the given text critically and answer questions on critical reasoning based on the given information.																	
		CO4	Acquire knowledge on various employability skills & analyze a situation and develop adaptability.																	
		CO5	Apply the concepts of basic geometry and their importance while solving the problems.																	
15MT1001	SINGLE VARIABLE CALCULUS AND MATRIX ALGEBRA	CO1	Model physical laws and relations mathematically as a first order differential equations, solve by an appropriate method and interpret the solution.																	
		CO2	Model physical laws and relations mathematically as a second/higher order differential equations, solve by an appropriate method and interpret the solution.																	
		CO3	Obtain the Fourier series expansions of periodic functions and use the series to solve differential equations.																	
		CO4	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.																	
		CO5	Verify the solution of problems through MATLAB.																	
15ME1001	MECHANICS	CO1	Understand the concept of forces and apply the static equilibrium equations.																	
		CO2	Analyze co-planar and non co-planar system of forces.																	
		CO3	Apply the concept of centroid & centre of gravity to determine moment of inertia.																	
		CO4	Analyze the rigid bodies under translation and rotation with and without considering forces.																	
		CO5	Understand the engineering systems to prepare and demonstrate the models with the help of mechanics concept to solve the engineering problems.																	
15PH1001	ENGINEERING MATERIALS	CO1	Understands structure of crystalline solids, kinds of crystal imperfections and appreciates structure-property relationship in crystals.																	
		CO2	Understands the role of electronic energy band structures of solids in governing various electrical and optical properties of materials.																	
		CO3	Understands role of molecular vibrations in determining thermal properties of materials and deformation of materials in response to action of load, for identification of materials having specific engineering applications.																	
		CO4	Understands spin and orbital motion of electrons in determining magnetic properties of materials and identifies their role in classification soft & hard magnetic materials having specific engineering applications.																	
		CO5	Apply the knowledge on structure and properties of materials while executing related experiments and develop some inter disciplinary projects.																	


  
 CHAIRMAN  
 DEPT. OF EEE  
 GREENFIELD, VADAPATI  
 GOVT. ENGINEERING COLLEGE  
 VADAPATI, VADAPATI

Course Code	Course Title	CO NO	Description of the Course Outcome	a	b	c	d	e	f	g	h	i	j	k	Course Type	Rationale	L-T-P	Credits		
15CV1001	ENGINEERING CHEMISTRY	C01	Examine water quality and select appropriate purification technique for intended problem.	2	2										Course retained from earlier curriculum	To enhance the knowledge of chemical process in designing electrical components	2-2-2	4		
		C02	Predict potential complications from combining various chemicals or metals in an engineering setting	2	2															
		C03	Discuss fundamental aspects of electrochemistry and materials science relevant to corrosion phenomena	2	2															
		C04	Apply phase rule, polymers, conducting polymers and nano chemistry to engineering processes.	2	2															
		C05	An ability to analyze & generate experimental skills	2	2															
15BT1001	BIOLOGY FOR ENGINEERS	C01	Understand the basis of Life, Living organisms and human body systems												A New course introduced	This course introduced to get basic knowledge on biological aspects to acquire life skills	2-0-0	2		
		C02	Understand the importance of Diet and Nutrition																	
		C03	Acquire the knowledge of beneficial and harmful microorganisms and Biosensors																	
		C04	Understand the circuit elements, Kirchoff's law and theorems to solve the networks	1	1															
15 EE 1201	FIELDS & NETWORKS	C01	Apply the procedure to determine form factor and peak factor to different symmetrical & unsymmetrical waves	2											A New course introduced	This Course is added to Enhance the Analysis of Electrical Networks and Electronic systems	2-2-2	4		
		C02	Apply vector algebra to fields fundamental to analyze electric and magnetic field distributions	2																
		C03	Apply Maxwell's equations for static and time varying fields	2																
		C04	Illustrate how problems are solved using computers and programming.	2	2															
15CS1001	C PROGRAMMING AND DATA STRUCTURES	C01	Interpret & Illustrate user defined C functions and different operations on list of data.	2	2										A New course introduced	This course is modified for enhancing problem solving skills through C language & Data Structures	2-4-2	5		
		C02	Implement Linear Data Structures and compare them.	2																
		C03	Implement Binary Trees	2																
		C04	Apply the knowledge obtained by the course to solve real world problems.	2	2	2														
		C05	Draft Orthographic views, projections of planes and , solids manually and by using CAD software Tool (AutoCAD)	2	2															
15ME1002	ENGINEERING GRAPHICS	C01	Drafting Sectional views , Isometric views development of surfaces and perspectives views manually and by using AutoCAD												Course retained from earlier curriculum	This course is retained for enriching the software skills in design	0-0-6	3		
		C02	Project based workshop to prepare different models with the aid of workshop trades i.e., Carpentry, Tin smithy, House wiring and Fitting																	
		C03	Understand and apply the fundamentals of a measurement system, characteristics, transducers and metrology using simulation and experimentation tools.	2	2															
15GN1003	MEASUREMENTS	C01	Understand various electrical & computer parameters, and apply different measuring techniques on various electrical parameters using simulation and experimentation tools.	2	2										Course retained from earlier curriculum	To enhance the knowledge of measuring quantities with engineering equipments	0-0-4	2		
		C02	Understand electronic & electro-physiological parameters, and apply measuring techniques on electronic parameters using simulation and experimentation tools.	2	2															
		C03	Understand and apply different measuring techniques on civil and mechanical parameters using simulation and experimentation tools.	2	2															
		C04		2	2															

Professor & Head  
 Dept of EEE  
 K L University  
 Green Fields, Vaddeswaram  
 Guntur Dist. 515 102  
  
 CHAIRMAN




Course Code	Course Title	CO NO	Description of the Course Outcome	a	b	c	d	e	f	g	h	i	j	k	Course Type	Rationale	L-T-P	Credits		
15EN1004	INTRODUCTION TO ENGINEERING	CO1	Understand the basic principles of engineering design													This course is introduced to enrich the basics of all engineering concepts required for employability.	2-0-2	4		
		CO2	Understand and analyze the possible career options in Engineering and develop strategic plan, career targets and mechanism to achieve the same.																	
		CO3	Understand the aspects of critical thinking and problem solving in engineering																	
		CO4	Apply to knowledge of critical thinking to frame real-world problems and provide basic solution approach to such problems from engineering perspective																	
15 CS 2002	OBJECT ORIENTED PROGRAMMING	CO1	Understand basic concepts of OOP, introduction to classes and objects through java language and apply													This Course is retained to Enhance the coding skills with JAVA for Employability	2-2-2	4		
		CO2	Understand the concepts of constructors, overloading, parameter passing, access control, inheritance and apply																	
		CO3	Understand packages, interfaces and exception handling and apply																	
		CO4	Understand I/O streams & apply and understand basic concepts of multi threading																	
15EC101	DIGITAL SYSTEM DESIGN	CO1	Understand numerical and character representations in digital logic, number system, data codes and the corresponding design of arithmetic circuitry													This course is added to impart the designing aspects of digital systems for employability	2-2-2	4		
		CO2	Understanding logic gates, logic theorems, boolean algebra and SOP/POS expressions																	
		CO3	Combinational and sequential systems design using standard gates and flip flops and minimization methods																	
		CO4	Verilog HDL design for logic gates, combinational and sequential logic functions																	
		CO5	Concepts of programmable logic devices																	
		CO6	Understand the functionality and design the CPU functional units- control unit, registers, the arithmetic and logic unit, the instruction execution unit, and the interconnections using these components																	
15EM2001	COMPUTER ORGANIZATION AND ARCHITECTURE	CO1	Understand, analyze and design different types of I/O transfer techniques													This course is added to acquire the knowledge on computer architecture and organization	2-2-2	4		
		CO2	Understand, analyze and design different types of I/O transfer organizations																	
		CO3	Understand the design issues of RISC and CISC CPU's and the design issues of pipeline architectures.																	
		CO4	Understand, analyze and design different types of I/O transfer techniques																	
		CO5	Understand the design issues of RISC and CISC CPU's and the design issues of pipeline architectures.																	
		CO6	Understand the design issues of RISC and CISC CPU's and the design issues of pipeline architectures.																	
15 EE2103	ELECTRICAL CIRCUITS	CO1	Able to design combinational and sequential circuits using LOGISIM resonance, network topology to solve complex networks and 3- phase circuits' voltage and current relation													This Course is retained to acquire basic knowledge on electrical networks	2-2-2	4		
		CO2	Analyze the magnetic circuits, transient response for AC and DC excitation and two port network parameters																	
		CO3	Evaluate one port networks using Foster and Cauer forms																	
		CO4	Design the prototype low and high pass filters.																	
		CO5	Test and Evaluate the concepts learnt using any simulation tool or hardware																	
		CO6	Test and Evaluate the concepts learnt using any simulation tool or hardware																	

  
 Professor A Heed  
 Dept of EEE  
 K J Somaiya University  
 Green Fields, Vashi, Mumbai  
 Senior D.A.S.

Course Code	Course Title	CO NO	Description of the Course Outcome	a	b	c	d	e	f	g	h	i	j	k	Course Type	Rationale	L-T-P	Credits	
15EE2103	ANALOG ELECTRONIC CIRCUIT DESIGN	CO1	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.												A New course introduced	This Course is added to acquire basic knowledge of analysis of electronic components and its design.	2-2-2	4	
		CO2	Understand the concepts of various diodes and their applications.																
		CO3	BJT concepts as operation, biasing and frequency response.																
		CO4	FET concepts as operation, biasing and frequency response.																
		CO5	Feedback concepts and their analysis																
		CO6	Concepts of various oscillators and applications																
15 EE 2104	DC MACHINES & TRANSFORMERS	CO1	Apply the basic principles of electromechanical energy conversion to electrical machines																
		CO2	Analyze operating characteristics of various types of DC generators																
		CO3	Identify various speed control methods of DC motor and evaluate this performance																
		CO4	Evaluate the performance of a transformers and selecting it for particular application.																
		CO5	Test the DC machines and transformers to evaluate their performance																
		CO6	Able to understand and analyze the architectural features of CISC type of general purpose processor Intel 8086 microprocessor																
15EM2202	PROCESSORS AND CONTROLLERS	CO1	Able to understand and analyze the architectural features of CISC type of microcontroller-Intel 8051 microcontroller																
		CO2	Able to understand and analyze the architectural features of RISC type of microcontroller-PIC microcontroller																
		CO3	Able to program 8086 microprocessor, 8051 and PIC microcontrollers in assembly language using TASM, KEIL, MPLAB and proteus tools.																
		CO4	Able to develop a real time application using 8051, & PIC microcontrollers through project based labs																
		CO5	Select from all commercially available 3- $\phi$ IM for given application																
		CO6	To understand the construction, operation and armature reaction of a 3- $\phi$ synchronous generator and identify the																
15 EE 2205	AC MACHINES	CO1	Understand and analyze the performance of synchronous motor by varying excitation and varying load.																
		CO2	Test the induction machine and synchronous machine to evaluate their performance																
		CO3	Project based workshop to prepare different models with the aid of workshop trades i.e., Carpentry, Tin smithy, House wiring and Fitting																
		CO4	Understand various signals and model physical process using them.																
		CO5	Acquaint with various transformation methods and their potential for applicability in various signal analysis conditions.																
		CO6	Demonstrate sampling and its potential applications in communications, discrete signal acquisition etc., Evaluate discrete system behaviour and its response to facilitate system design.																
15EE2206	SIGNAL PROCESSING	CO1	Design a low pass discrete time system to meet noise elimination like applications																
		CO2	Analyze non stationary signals and analyze them in both time frequency domains																
		CO3																	
		CO4																	
		CO5																	
		CO6																	


  
 CHAIRMAN

Course Code	Course Title	CO NO.	Description of the Course Outcome	a b c d e f g h i j k										Course Type	Rel. e.	L-T-P	Credits	
				a	b	c	d	e	f	g	h	i	j					k
15 EE 2206	GENERATION, TRANSMISSION & DISTRIBUTION	CO1	Understand various generating stations.															
		CO2	Understand the concepts of transmission line parameters, Corona, Mechanical Sag and Insulators															
		CO3	Analyze the performance of overhead transmission lines and underground cables.															
		CO4	Analyze substation layouts and their design considerations															
		CO5	Test and apply knowledge obtained from Generation, transmission & distribution using any software tool or hardware															
15 EE 2207	CONTROL SYSTEMS	CO1	Students can be 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															
		CO2	Students can be able to Analyze the time domain and frequency response of physical systems															
		CO3	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.															
		CO4	Students can be able to design and analyze controllers															
		CO5	Test and apply the knowledge obtained in the subject by Matlab or hardware.															
15 EE 3108	POWER SYSTEM ANALYSIS	CO1	To analyze the short circuit faults in a power system															
		CO2	To apply numerical methods for the solution of load flow problem															
		CO3	To Select the best generators to have Economic Dispatch & to Evaluate the performance of Load Frequency Control															
		CO4	To Understand and analyze rotor angle stability															
		CO5	Test and Analyze various short circuit faults, load flows, economic dispatch problems, rotor angle stability problems using MATLAB															
15 EE 3109	POWER ELECTRONICS	CO1	Select appropriate switch for a given power converter															
		CO2	Evaluate the steady state performance of Basic DC-DC converters															
		CO3	Evaluate the performance of Basic Switch-Mode PWM Inverter															
		CO4	Understand and analyze the operation of Basic Phase controlled converters															
		CO5	Test and evaluate basic power electronic converters by using Matlab software or hardware.															
15 EE 3210	POWER SYSTEM PROTECTION	CO1	To apply per unit system and to draw the reactance diagrams															
		CO2	To analyze the short circuit faults in a power system															
		CO3	To Evaluate the performance of different protective relays & Circuit breakers															
		CO4	To understand the concepts of lightning arresters and the neutral grounding															
		CO5	Test and Analyze various power system protection concepts using MATLAB															

  
 R. S. Chakraborty  
 BOSE CHAIRMAN  
 K. L. DEPT OF ESE  
 Green Fields, Vaddeswari  
 Guntur District, A.P.



Course Code	Course Title	CO NO	Descriptor of the Course Outcome	a b c d e f g h i j k										L-T-P	Rationale	Credits			
15 EE 4161	POWER QUALITY	CO1	Understand various power quality issues.													This Course is retained to enrich the knowledge on enhancing quality of power	3-0-0	3	
		CO2	Analyze various power quality issues and its causes.																
		CO3	Analyze the different mitigating techniques for voltage sag and swells.																
		CO4	Design and analyze voltage sag and swell using simulation tools.																
15 EE 4162	HYBRID ELECTRIC VEHICLES	CO1	Understand the vehicle mechanics and working of internal combustion engines used for HEV													This course is added to acquire knowledge on New technologies of electric vehicles required for vehicle industry	3-0-0	3	
		CO2	Analyze the battery and Electric Drive performance for HEV																
		CO3	Understand the control strategies for HEV																
15 EE 3263	STATE ESTIMATION & ADAPTIVE CONTROL	CO1	Understanding the importance of probability in state estimation													s retained to establish the required skill on estimation & identification of systems for employability in Automation	3-0-0	3	
		CO2	Understanding and analyzing the adaptive control techniques																
		CO3	Evaluating the stability performance of adaptive controllers																
15 EE 4163	DIGITAL CONTROL SYSTEMS	CO1	Understanding the importance of Z-Transform in Discrete time systems													This Course is retained to establish the required skill on Digital systems for employability in Automation	3-0-0	3	
		CO2	Evaluating the stability performance and compensating techniques for Digital control systems																
		CO3	Designing of State feedback controllers and observers																
15 EE 4164	NON LINEAR CONTROL SYSTEMS	CO1	Understanding and analyzing the nonlinearities in the control system													This Course is retained to establish the required skill on Non-Linear systems for employability in Control & Automation sector	3-0-0	3	
		CO2	Evaluating the stability performance of Nonlinear systems																
		CO3	Understanding and evaluating the performance of fuzzy controllers for non linear control systems																
15 EE 4165	OPTIMAL CONTROL SYSTEMS	CO1	Formulate first order optimality condition for calculus of variation and optimal control problem													This Course is retained to establish the required skill on Optimal control strategies for employability in Control & Automation sector	3-0-0	3	
		CO2	Develop the optimal LTV system by solving Riccati equations																
		CO3	Understand and estimate the operation of optimal control techniques																
15 EE 4166	ADAPTIVE CONTROL SYSTEMS	CO1	Modelling and analysis of systems by identification approaches													This Course is retained to establish the required skill on Adaptive control strategies for employability in Control & Automation sector	3-0-0	3	
		CO2	Understand and analyze the operation of adaptive control techniques																
		CO3	Evaluate the stability performance of adaptive control system for mitigating the parameter variations.																
15 EE 3254	ENERGY CONSERVATION & AUDIT	CO1	Understand the need for energy conservation and various tariffs													This Course is retained to establish the knowledge on Energy Auditing for employability in Energy & Automation sector	3-0-0	3	
		CO2	Understand the auditing methods and their practice by case studies.																
		CO3	Apply the energy conservation techniques to motors, transformers, lighting systems.																
15 EE 4167	UTILIZATION OF ELECTRICAL ENERGY	CO1	Understand the motor ratings for different applications													This course is added to acquire the knowledge on utilization of electric power required for employability	3-0-0	3	
		CO2	Analyze the characteristics and intensity of lightning systems for different types of lamps.																
		CO3	Analyze the characteristics and control strategies of locomotives for track electrification.																

  
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 Gujarat 390 015, India

Course Code	Course Title	CO NO	Description of the Course Outcome	a	b	c	d	e	f	g	h	i	j	k	Course Type	Rationale	L-T-P	Credits	
15 EE 4168	SOLAR AND FUEL CELL ENERGY SYSTEMS	CO1	Understand and analyze basic concepts of the solar photovoltaic energy conversion system.	1											A New course introduced	This Course is retained to establish the knowledge on Solar energy for employability in Solar manufacturing	3-0-0	3	
		CO2	Analyze the different applications of solar thermal energy.		2														
		CO3	Understand and analyze the fuel cell characteristics, working principle and comparison of different types of fuel cells	2															
15 EE 4169	WIND AND BIOMASS ENERGY SYSTEMS	CO1	Understand and analyze basic concepts of the wind energy conversion system	1												This Course is retained to establish the knowledge on wind energy for employability in wind power plants	3-0-0	3	
		CO2	Analyze the different types of wind mills, control systems and design parameters	2	2														
		CO3	Apply the basic concepts of the bio energy conversion into different forms of energy	2															
15 EE 4170	NUCLEAR, GEOTHERMAL AND TIDAL ENERGY SYSTEMS	CO1	Understand the basic concepts of nuclear energy conversion system	1												This Course is retained to establish the knowledge on Nuclear energy for employability in Nuclear power plants	3-0-0	3	
		CO2	Analyze the geothermal energy conversion systems	2	2														
		CO3	Analyze the tidal characteristics and different types of tidal power generation systems	2															
		CO4	Understand the evolutionary steps of computer, complex instructions and microprogramming	2															
15 EE 2255	COMPUTER ARCHITECTURE	CO1	Understand, analyze and design main, cache and virtual memory organizations.	1												This Course is retained to establish the required skill on Computer architecture for employability in IT sector	3-0-0	3	
		CO2	Understand the design issues of complex pipeline architectures and also microprocessor evolution 4004 to 4	2															
		CO3	Understand synchronization and sequential consistency and VLIW/EPIC	2															
		CO4	Understand Full-custom & Semi Custom design methodologies of for designing different PLD architectures.	1															
15 EE 4171	PLDs AND FPGAs	CO1	Study and design of combinational and sequential circuits using PLDs.	1												This Course is retained to establish the required skill on FPGAs for employability in Embedded systems sector	3-0-0	3	
		CO2	Study and analysis of different CPLD and FPGA architectures	2															
		CO3	Study of New generation Architectures of Programmable Logic Devices	2															
		CO4	To understand the VLSI fabrication process and to be able to interact with integrated circuit process engineers	1															
15 EE 4172	VLSI DESIGN	CO1	To analyze the theory and CV characteristics of MOS transistor	1												This Course is retained to establish the required skill on VLSI DESIGN aspects for employability in Embedded systems sector	3-0-0	3	
		CO2	To analyze MOS gate static and switching characteristics	2															
		CO3	To design and layout MOS logic circuits	3															
		CO4	Circuit Characterization and Performance Estimation and scaling	1															
15 EE 4173	EMBEDDED SYSTEM DESIGN	CO1	Analyzing CMOS Inuit models and test principles	2												This Course is retained to establish the required skill on embedded for employability in Embedded systems sector	3-0-0	3	
		CO2	able to analyze embedded systems, its design cycle, modeling, layers of embedded systems	2															
		CO3	able to understand Processor and Memory Organization and I/O Devices and Networks	2															
		CO4	able to understand, evaluate and select appropriate software architecture and analyze the features real time operating systems	2															
15 EE 4174	DSP PROCESSORS	CO1	Understand various embedded system design methodologies and be able to develop and demonstrate a small embedded system for a real time application.	2												This Course is retained to establish the required skill on DSP for employability in Embedded systems sector	3-0-0	3	
		CO2	Understand and analyze the basic concepts of Digital Signal Processing by MATLAB and number systems	2															
		CO3	Understand and analyze various architectures for programmable DSP devices	2															
			Programming of TMS320F28335/F2812 Digital Signal Processor	2															

  
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Course Code	Course Title	CONO	Description of the Course Outcome	a	b	c	d	e	f	g	h	i	j	k	Course Type	Rationale	L-T-P	Credits
15 IE 3250	Term Paper														Course retained from earlier curriculum	with this course student acquire employability in industry	0-0-4	2
15 IE 4049	Minor Project																0-0-4	2
15 IE 4050	Major Project OR Industrial Practice School																0-0-16	8
15 IE 4048	Industrial Training (Summer Break in II/IV year)																0-0-16	8
																		2

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**KL University**  
**Department of Electrical and Electronics Engineering**  
**2015-17 Batch Course Outcomes From I - I SEM to II-II SEM**  
**Course Articulation Matrix**  
**M.Tech in POWER ELECTRONICS SPECIALIZATION**

Course Code	Course Title	CO.NO	Description of the Course Outcome	a	b	c	d	e	f	Course Type	Rationale	I-T-P	Credits
15EE502	DESIGN OF POWER CONVERTERS	CO1	Select and design power electronic converter topologies for a broad range of energy conversion applications.	✓	✓	✓			✓	Course modified from earlier curriculum	This Course is modified to enrich the students knowledge in analysing converters for power electronic industry.	3-0-2	4
		CO2	Analyze and simulate the performance of power electronic conversion systems.	✓	✓								
		CO3	Ability to model and design controllers for the closed loop operation of power converters.	✓	✓	✓							
		CO4	Apply the basic concepts of power electronics to design the circuits in the fields of AC and DC drives, power generation and transmission and energy conversion, industrial applications, extraction of energy from renewable sources.			✓	✓						
15EE501	POWER ELECTRONIC CONTROL OF DRIVES	CO1	Design and simulate the modeling concepts of 3-phase synchronous machine and 3-phase induction machine, Kron's primitive machine equations.	✓						A New course introduced	This Course is added to enrich the students knowledge in designing aspects of machines for electronic machine industry.	3-0-2	4
		CO2	Analyze the mathematical model of separately excited D.C Motor, D.C Series & shunt motor and its steady state, transient state analysis.	✓	✓								
		CO3	Transform from 3 phase to 2 phase park's transformation of induction machine speed, low level of the induction machine.	✓	✓								
		CO4	Design the modeling of 1-phase and poly phase induction machine, cross field theory, modeling of synchronous machine.	✓	✓								
15EE503	OPTIMIZATION TECHNIQUES	CO1	To study 1-φ & 3-φ controlled bridge rectifier with motor load on continuous and discontinuous modes of operation and effect of freewheeling diode on converter performance.	✓	✓					Course modified from earlier curriculum	This Course is modified to enrich the skills required to operate and control of Drives with converters for Employment.	3-0-2	4
		CO2	To understand the operation of three phase naturally commutated bridge as a rectifier and inverter.	✓	✓								
		CO3	To study the steady state analysis three phase converter controlled and chopper controlled DC Motor drives and design speed current controller.	✓	✓								
		CO4	To know the closed loop operation and dynamic simulation of DC motor drive system with current Controller.	✓	✓								
15EE514	Modern Control Theory	CO1	This course introduces Z-Transforms and analysis of discrete data systems using Z-Transforms	✓					✓	Course modified from earlier curriculum	This Course is modified to enrich the skills required to control electrical equipment with modern techniques for Employability.	3-0-2	4
		CO2	In case of multiple input and multiple output systems, this course helps to deal with digital control systems.	✓	✓								
		CO3	The Non-Linear systems which will come across in most of practical systems, this course deals about Non-Linear systems.	✓	✓								
		CO4	since stability is most important for every systems to give it satisfaction, performance, this topic also helps understand the back ground processes related to the numerical solution used in generic simulators.	✓	✓								
15EE532	ADVANCED POWER CONVERTERS	CO1	Choose the universal solver to be used for a given type of analysis simulation and to avoid them.	✓	✓				✓	Course modified from earlier curriculum	This Course is modified to enrich the Matlab skills required to model the power electronic converters for Employability.	3-0-2	4
		CO2	Understand the reason for convergence problems occurring during simulation and to avoid them.		✓	✓							
		CO3	Simulate the behavior of Power Converters, DC and AC drives techniques in evolutionary computation.		✓	✓	✓						
		CO4	Understand the concepts, advantages and disadvantages of the techniques in evolutionary computation.		✓	✓	✓						
15EE534	MICRO CONTROLLERS AND EMBEDDED SYSTEMS	CO1	Design suitable neural networks, fuzzy systems, genetic representations	✓	✓				✓	Course modified from earlier curriculum	This Course is modified to enrich the computational techniques with Matlab skills required to analyse power electronic systems.	3-0-2	4
		CO2	with appropriate fitness functions for simple problems		✓								
		CO3	Know the key issues in using these techniques in Matlab for search of different sample cases.		✓	✓							
		CO4	Awareness of the different approaches and different applications in the field.		✓	✓							


M.Tech in POWER ELECTRONICS SPECIALIZATION  
**KL UNIVERSITY**  
 DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING



Course Code	Course Title	CO/NO	Description of the Course Outcome	a	b	c	d	e	f	Course Type	Rationale	L-T-P	Credits	
15EE506	MODELLING AND SIMULATION OF POWER ELECTRONIC SYSTEMS	CO1	Three Phase AC Voltage regulators-Analysis of 3-phase regulators with star and delta connected R and RL loads - Load voltage harmonics-Analysis of transformer problems	✓	✓				✓	Course modified from earlier curriculum	This Course is modified to enrich the students knowledge in analysing advanced power converters for power electronic industry	3-0-2	4	
		CO2	Three Phase ac-dc Converters- Half controlled and fully controlled Converters with RL load and load voltage and current harmonic analysis, three phase diode converters-PWM control of 3-phase controlled rectifier		✓									
		CO3	Analysis Single-phase single stage boost power factor corrected rectifier, three phase boost PFC converter, sinusoidal PWM - modified PWM		✓									
		CO4	Analysis of output voltage for continuous (CC) and discontinuous conduction mode (DCM)		✓									
15EE506	INDUSTRIAL APPLICATIONS OF ELECTRONICS	CO1	Understand the vector control principle of AC motor drives	✓					✓	A New course introduced	This Course is modified to enrich the students knowledge in analysing advanced electric drives for power electronic industry	3-0-2	4	
		CO2	Evaluate speed control performance of 3-Phase induction motor drive using vector control methods		✓									
		CO3	Analyze the dynamic behaviour of SRM motor drives under various control methods		✓									
		CO4	Investigate the performance of BLDC Motor drive using various control techniques		✓									
15EE517	Smart Grids	CO1	Understand basic concepts of smart grid in power network.	✓					✓	Course modified from earlier curriculum	This course is intended to acquire knowledge on Smart grid technologies for power sector applications	3-0-0	3	
		CO2	Analyzing smart generation and smart area operation		✓									
		CO3	Understand synchronous machine modeling		✓									
		CO4	Understand excitation systems and power system stabilizers		✓									
15EE508	FPGA Controllers and Applications	CO1	Introduce digital design techniques using various Programmable logic devices	✓					✓	A New course introduced	This Course is added to establish the required skills on FPGAs for employability in Embedded systems sector	3-0-0	3	
		CO2	To introduce FPGA architecture, digital design flow using FPGAs, and other technologies associated with field programmable gate arrays		✓									
		CO3	To learn about various applications of FPGAs		✓									
		CO4	To get to know about the logic and physical designing of an ASIC.		✓									
15EE535	Electric Vehicles	CO1	Understand the vehicle mechanics and working of Internal combustion engines used for HEV	✓					✓	A New course introduced	This course is added to acquire knowledge on New technologies of electric vehicles required for vehicle industry	3-0-0	3	
		CO2	Analyze the battery and Electric Drive performance for HEV		✓									
		CO3	Understand the control strategies for HEV		✓									
		CO4	Working and Matlab model of HEV		✓									
15EE530	EHVAC and HVDC Transmission	CO1	To understand the basic concepts of EHV AC and HVDC transmission	✓					✓	Course modified from earlier curriculum	This Course is modified to establish the required knowledge on EHVAC & HVDC Power Transfer and improving quality of power	3-0-0	3	
		CO2	To identify the electrical requirements for HVDC lines and identify the components used in AC to DC conversion		✓									
		CO3	To understand the operation of HVDC conversion technology		✓									
		CO4	To understand the fundamental requirements of HVDC transmission line design and To identify factors affecting AC-DC transmission		✓									
15 EE 51A1	Instrumentation & Control	CO1	Discussion of load cells, torque meter and various velocity pick-ups	✓	✓				✓	Course modified from earlier curriculum	This Course is modified to establish the required knowledge on Instrumentation & controlling techniques necessary for an industry	3-0-0	3	
		CO2	Exposure to various accelerometer pick-ups, vibrometers, density and viscous pick-ups.		✓									
		CO3	To have a sound knowledge about thermocouples and pyrometry techniques.		✓									
		CO4	To have an adequate knowledge about pressure transducers		✓									
15 EE 51A2	Special Machines	CO1	To understand the operation of different special machines	✓					✓	Course modified from earlier curriculum	This Course is modified to establish the required knowledge on Special machines utilized in industry	3-0-0	3	
		CO2	To select different special machines as part of control system components		✓									
		CO3	To use special machines as transducers for converting physical signals into electrical signals		✓									
		CO4	To design digital controllers for different machines		✓									
15 EE 51A3	Electric and Hybrid Vehicles	CO1	Understanding the kinematics and dynamics of Vehicles and different battery parameters, characteristics.	✓	✓				✓	Course modified from earlier curriculum	This Course is modified to establish the required knowledge on Electrical vehicles and hybridized models utilized in transportation sector	3-0-0	3	
		CO2	Understand the operation and control of AC & DC drives		✓									
		CO3	Understand various types of internal combustion engines		✓									
		CO4	Understand various control strategies in Hybrid Electric Vehicles		✓									

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Course Code	Course Title	CO NO	Description of the Course Outcome	a	b	c	d	e	f	Course Type	Rationale	L-T-P	Credits
15 EE 51A4	Microcontroller applications	CO1	Ability to apply knowledge of mathematics, engineering to understand concepts in microcontroller based system.	✓					✓	Course modified from earlier curriculum	This Course is modified to establish the required skill set for automation industry in using micro controllers	3-4-0	3
		CO2	Ability to analyze a problem and formulate appropriate computing solution for microcontroller based applications	✓	✓				✓				
		CO3	An ability to design experiments in microcontrollers, analyze computer based process to meet desired needs	✓	✓				✓				
		CO4	Ability to work, document and present as an individual and as a team-member to design, formulate and implement experiments using modern tools.	✓					✓				
15 EE 51A6	Sensors and Transducers	CO1	It deals with various types of Sensors & Transducers and their working principle	✓						Course modified from earlier curriculum	This Course is modified to establish the required skill set for utilizing sensors & transducers in automation industry.	3-4-0	3
		CO2	It deals with Resistive, Capacitive and Inductive transducers	✓		✓							
		CO3	It deals with some of the miscellaneous transducers also	✓	✓	✓			✓				
		CO4	Application of sensors and transducers in industrial sector	✓		✓			✓				
15 EE 51B1	Digital Signal Processor and applications	CO1	Understand types of digital signals and Transforms	✓						Course modified from earlier curriculum	This Course is modified to establish the required skill set for automation industry in using DSP processors	3-4-0	3
		CO2	application of digital signals to signals and systems	✓	✓				✓				
		CO3	Design FIR & IIR filters	✓	✓				✓				
		CO4	Estimate power spectrum using various methods	✓	✓	✓			✓				
15 EE 51B2	Non Conventional Energy Resources	CO1	Create awareness among students about Non-Conventional sources of energy technologies		✓	✓			✓	Course modified from earlier curriculum	This Course is modified to enhance the required skill set for utilizing and integrating non conventional energy sources in power sector.	3-4-0	3
		CO2	Enable students to understand various renewable energy technologies and systems.	✓	✓				✓				
		CO3	To impart the knowledge of Storage technologies form the autonomous renewable energy sources	✓	✓	✓			✓				
		CO4	Equip the students with knowledge and understanding of various possible renewable energy sources.	✓	✓	✓			✓				
15 EE 51B3	AI Techniques in Power Electronics & Drives	CO1	Comprehend the concepts of feed forward neural networks	✓	✓	✓				Course modified from earlier curriculum	This Course is modified to enhance the required skill set for utilizing AI techniques in power electronic industry	3-4-0	3
		CO2	Analyze the various feedback networks	✓	✓	✓							
		CO3	Understand the concept of fuzziness involved in various systems and fuzzy set theory.	✓	✓				✓				
		CO4	Comprehend the fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm	✓	✓	✓							
15 EE 52C1	FACTS	CO1	Learners will be able to refresh on basics of power transmission networks and need for FACTS controllers			✓			✓	Course modified from earlier curriculum	This Course is modified to enhance the knowledge on FACTS devices in improving power quality	3-4-0	3
		CO2	Learners will be able to explain about static var compensator in detail and series compensation devices	✓									
		CO3	Learners will understand the significance about different voltage source converter based facts controllers.	✓	✓								
		CO4	Learners will be able to analyze on FACTS controller interaction and control coordination	✓	✓	✓							
15 EE 52C2	Power Quality	CO1	Understand various power quality issues.	✓	✓	✓				Course modified from earlier curriculum	This Course is modified to enhance the knowledge on enhancement of power quality techniques in industry	3-4-0	3
		CO2	Analyze various power quality issues and its causes.	✓	✓	✓							
		CO3	Analyze the different mitigation techniques for voltage sag and swells.	✓	✓	✓							
		CO4	Design and analyze voltage sag and swell using simulation tools.	✓	✓	✓							
15 EE 52C3	Embedded Control of Electric Drives	CO1	Comprehend state of the art technology of dc and ac advanced drives	✓	✓					Course modified from earlier curriculum	This Course is modified to enhance the skill set on embedded systems to control electric machines	3-4-0	3
		CO2	Solve problems analyze performance of dc and ac drives.	✓	✓				✓				
		CO3	Select suitable drives according to the application	✓	✓	✓			✓				
		CO4	Understanding the importance of probability theory in estimating system parameters	✓	✓	✓			✓				
15 EE 52D2	State Estimation & Adaptive Control	CO1	Understanding the importance of probability theory in estimating system parameters	✓						Course modified from earlier curriculum	This Course is modified to enhance the estimation techniques and adaptive controlling strategies in power electronic industry	3-4-0	3
		CO2	Understanding the importance of stochastic process in estimating system models	✓									
		CO3	Analysis of the optimal prediction and smoothing for discrete linear systems	✓	✓				✓				
		CO4	Design the advanced drive and compare the performance with the existing one.	✓	✓				✓				

  
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Course Code	Course Title	CO NO	Description of the Course Outcome	L-T-P							Credits
				a	b	c	d	e	f	Rationale	
15 EE 32D3	Advance PWM Techniques	CO1	Design the advanced drive and compare the performance with the existing one.								3
		CO2	Ability to dynamic analysis of power Converters							This Course is modified to enhance the knowledge on PWM techniques to improve the power transfer capability	
		CO3	Competency in operation of resonant converter								
		CO4	Know-how of multilevel converter								
15 EE 32D4	Power electronics for renewable energy systems	CO1	account for a range of power electronics applications for developing power conditioning devices for integration of renewable and distributed electrical energy systems								3
		CO2	describe and analyze basic topologies of both DC-DC converters							This Course is modified to enhance the required skill set for utilizing and integrating renewable energy sources in power electronics industry sector	
		CO3	understand disturbances from power conditioning devices on the power grid (i.e. power quality).								
		CO4	understand and analyze electric and hybrid vehicle drive train systems								


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**KL University**  
**Department of Electrical and Electronics Engineering**  
**2015-17 Batch Course Outcomes From I - I SEM to II-II SEM**  
**Course Articulation Matrix**  
**M.Tech in POWER SYSTEMS SPECIALIZATION**

Course Code	Course Title	CO NO	Description of the Course Outcome	Assessment						Course Type	Rationale	L-T-P	Credits
				a	b	c	d	e	f				
15EE512	Advanced Power System Analysis	CO1	Understand power system stability and power angle equations	√	√	√				Course modified from earlier curriculum	This Course is modified to enrich the students knowledge in analysing advanced analysis techniques for power systems	3-0-2	4
		CO2	Analyzing swing equation and equal area criterion	√	√								
		CO3	Understand synchronous machine modeling	√	√	√							
		CO4	Understand excitation systems and power system stabilizers	√	√			√					
15EE511	Power System Dynamics & Stability	CO1	Comprehend basic concepts and principles in power system analysis and Formulate and solve power flow problems, economic and environmental dispatch problems	√	√	√				Course modified from earlier curriculum	This Course is modified to enrich the students knowledge in analysing power system dynamics & stability aspects required for power system sector industry	3-0-2	4
		CO2	Demonstrate understanding in the theory of power system security analysis, voltage stability analysis, optimal power flow and state estimation	√	√			√					
		CO3	Develop algorithms as well as to use software tools to solve power system analysis and stability problems	√	√	√		√					
		CO4	To make sound recommendations and implement as required based on these solutions,analyse for practical power system problems	√	√								
15EE513	Deregulated Operation Of Power Systems	CO1	Describe various types of regulations in power systems and Identify the need of regulation and deregulation	√						A New course introduced	This Course is intended to enrich the students knowledge in deregulation aspects of power system required for power system sector industry	3-0-2	4
		CO2	Define and describe the Technical and Non-technical issues in Deregulated Power Industry	√					√				
		CO3	Identify and give examples of existing electricity markets	√	√				√				
		CO4	Classify different market mechanisms and to summarize the role of various entities in the market	√	√	√		√					
15EE514	Modern Control Theory	CO1	this course introduces Z Transform and analysis of discrete data systems using Z Transforms	√						Course modified from earlier curriculum	This Course is modified to enrich the students knowledge to control electrical equipment with modern techniques for Employability	3-0-2	4
		CO2	in case of multiple input and multiple output systems, this course helps to deal with digital control systems	√	√				√				
		CO3	the Non – Linear systems which will come across in most of practical systems, this course deals about Non – Linearity s	√	√				√				
		CO4	since stability is most important for every systems to give it satisfactory performance, this topic also helps	√					√				
15EE541	Power System Reliability	CO1	Understand basic concepts of smart grid in power network;	√						Course modified from earlier curriculum	This Course is modified to enrich the skills required to assess the reliability of power system for Employability	3-0-2	4
		CO2	Analyzing swing equation and equal area criterion	√	√								
		CO3	Understand synchronous machine modeling	√	√								
		CO4	Understand excitation systems and power system stabilizers	√	√			√					
15EE546	Optimization Techniques	CO1	Apply numerical or iterative techniques in power systems for optimal power flow solutions	√						Course modified from earlier curriculum	This Course is modified to enrich the computational techniques with Matlab skills required to analyse power systems	3-0-2	4
		CO2	Optimize the parameters in control systems for desired steady state or transient response	√									
		CO3	Optimize the cost function in deciding economic factors of power systems	√	√								
		CO4	Design of electrical systems optimally using suitable techniques like univariate method, steepest descent method etc	√	√	√		√					
15EE515	Real Time Control of Power System	CO1	Learn various activities of operator	√						Course modified from earlier curriculum	This Course is modified to enrich the skills required for real time control of power systems for power system sector	3-0-2	4
		CO2	Understand about Supervisory control and data acquisition	√									
		CO3	Real time software and state estimation	√					√				
		CO4	Understand Security management	√	√								
15EE516	AI Techniques in Power Systems	CO1	Differentiate between Algorithmic based methods and Knowledge based methods	√						Course modified from earlier curriculum	This Course is modified to enrich the computational techniques with Matlab skills required to analyse power systems	3-0-2	4
		CO2	Use the soft computing techniques for power system problems	√	√								
		CO3	Use appropriate AI framework for solving power system problems	√	√	√		√					
		CO4	Apply GA to power system optimization problems	√	√	√		√					
15EE517	Smart Grids	CO1	Understand basic concepts of smart grid in power network.	√						A New course introduced	This course is intended to acquire knowledge on Smart grid technologies for power sector applications	3-0-2	4
		CO2	Analyzing swing equation and equal area criterion	√	√								
		CO3	Understand synchronous machine modeling	√	√				√				
		CO4	Understand excitation systems and power system stabilizers	√	√			√					
15EE518	Power System Digital Protection	CO1	Understand salient features of protective relaying electromagnetic relays and distance protection schemes	√						Course modified from earlier curriculum	This course is intended to acquire knowledge on Digital Protection of power systems for power sector applications	3-0-2	4
		CO2	Apply the Over current protective schemes and differential protection of alternator and transformer	√	√								
		CO3	Analyse wire pilot and carrier current protection for transmission lines and neutral grounding	√	√								
		CO4	Understand the principle of operation of static relays and realization of various static relays and Understand current practices in microprocessor based numerical relays and the over voltage protection	√	√				√				
15EE547	FACTS Devices	CO1	Learners will be able to refresh on basics of power transmission networks and need for FACTS controllers	√						A New course introduced	This course is intended to acquire knowledge on FACTS Devices for improving power quality for power sector applications	3-0-2	4
		CO2	Learners will be able to explain about static var compensator in detail and series compensation devices	√	√								
		CO3	Learners will understand the significance about different voltage source converter based facts controllers	√	√								
		CO4	Learners will be able to analyze on FACTS controller interaction and control coordination	√	√								
15EE550	EHVAC and HVDC Transmission	CO1	To understand the basic concepts of EHV AC and HVDC transmission	√						Course modified from earlier curriculum	This Course is retained to establish the required knowledge on EHVAC & HVDC Power Transfer and improving quality of power	3-0-2	4
		CO2	To identify the electrical requirements for HVDC lines and identify the components used in AC to DC conversion	√	√								
		CO3	To understand the operation of HVDC conversion technology	√	√								
		CO4	To understand the fundamental requirements of HVDC transmission line design and To identify factors affecting AC-DC transmission	√	√								

Course Code	Course Title	CO NO	Description of the Course Outcome	n	b	e	d	e	f	Course Type	Rationale	L-T-P	Credits
15 EE 51E1	Reactive Power Compensation & Management	CO1	Understand the need of load compensation	✓						Course modified from earlier curriculum	This Course is retained to enrich the knowledge on restructured power systems	3-0-0	3
		CO2	Analyze various reactive power compensation techniques	✓	✓								
		CO3, CO4	Understand reactive power coordination and demand side management Understand reactive power control requirements in domestic, traction and arc furnace systems	✓	✓	✓		✓					
15 EE 51E2	Distribution System Planning & Automation	CO1	Acquire in depth Knowledge on Load modeling and their characteristics	✓	✓					Course modified from earlier curriculum	This Course is retained to enrich the knowledge on planning & automation of power systems	3-0-0	3
		CO2	Acquire in depth Knowledge on Distribution feeders and transformers	✓	✓	✓							
		CO3	Faults and protection schemes	✓	✓	✓							
		CO4	Acquire knowledge on Distribution Automation	✓	✓	✓							
15 EE 51F1	Power System Restructuring, Deregulation & Power Markets	CO1	intended to provide a comprehensive treatment towards understanding of the new dimensions associated with the power systems	✓	✓					Course modified from earlier curriculum	This Course is retained to enrich the knowledge on restructuring & deregulation of power systems	3-0-0	3
		CO2	the differences between the conventional power system operation and the restructured one, the course will prepare a background with fundamentals of microeconomics	✓	✓								
		CO3	the design of power markets and market architecture of aspects, the changes in operational aspects with new operational challenges like congestion management and ancillary service management will be elaborated	✓	✓								
		CO4	efficient pricing of transmission network usage operation and Genero bidding strategies and market power with mitigation techniques	✓	✓								
15 EE 51B2	Non Conventional Energy Resources	CO1	Create awareness among students about Non-Conventional sources of energy	✓	✓					Course modified from earlier curriculum	This Course is modified to enhance the required skill set for utilising and integrating non conventional energy sources in power sector	3-0-0	3
		CO2	Enable students to understand various renewable energy technologies and systems.	✓	✓								
		CO3	To impart the knowledge of Storage technologies from the autonomous renewable energy sources	✓	✓								
		CO4	Equip the students with knowledge and understanding of various possible mechanisms about renewable energy impacts.	✓	✓			✓					
15 EE 51B1	Digital Signal Processor and applications	CO1	Understand and analyze the basic concepts of Digital Signal Processing by MATLAB and number systems	✓						Course modified from earlier curriculum	This Course is modified to establish the required skill set for automation industry in using DSP processors	3-0-0	3
		CO2	Understand and analyze various architectures for programmable DSP devices	✓	✓								
		CO3	Programming of TMS320F28335/F2812 Digital Signal Processor	✓	✓								
		CO4	Application side of TMS320F28335/F2812 Digital Signal Processor	✓	✓								
15 EE 51F2	Alternative sources of electrical energy	CO1	Create awareness among students about Non-Conventional sources of energy	✓	✓					Course modified from earlier curriculum	This Course is modified to enhance the required skill set for utilising and integrating renewable energy sources in power sector	3-0-0	3
		CO2	Understand and analyze the solar thermal applications and solar photovoltaic cells.	✓	✓								
		CO3	Analyze the performance of wind and tidal, wave and Ocean thermal energy conversion systems	✓	✓								
		CO4	Understand and analyze the operation of geothermal, bio and micro hydro energy conversion.	✓	✓								
15 EE 52G1	Energy Conservation & Audit	CO1	Understand the need for energy conservation and various tariffs	✓						Course modified from earlier curriculum	This Course is retained to establish the knowledge on Energy Auditing for employability in Energy & Automation sector	3-0-0	3
		CO2	Understand the auditing methods and their practice by case studies.	✓	✓								
		CO3	Apply the energy conservation techniques to motors, transformers, lighting systems.	✓	✓								
15 EE 52G1	Adaptive control systems	CO1	Modelling and analysis of systems by identification approaches	✓	✓			✓		Course modified from earlier curriculum	This Course is modified to enhance the adaptive controlling strategies in power sector industry	3-0-0	3
		CO2	Understand and analyze the operation of adaptive control techniques	✓	✓								
		CO3	Evaluate the stability performance of adaptive control system for mitigating the parameter variations.	✓	✓								
15 EE 52D1	Smart Grids	CO1	To understand the functioning of various devices in Smart Grids	✓	✓					Course modified from earlier curriculum	This course is intended to acquire knowledge on Smart grid technologies for power sector applications	3-0-0	3
		CO2	To understand communication channels in Smart Grid.	✓	✓								
		CO3	To apply knowledge in Smart Metering	✓	✓								
15 EE 52D2	State Estimation & Adaptive Control	CO1	Understanding the importance of probability in state estimation	✓	✓					Course modified from earlier curriculum	This Course is modified to enhance the estimation techniques and adaptive controlling strategies in power electron industry	3-0-0	3
		CO2	Understanding and analyzing the adaptive control techniques	✓	✓								
		CO3	Evaluating the stability performance of adaptive controllers	✓	✓								
15 EE 52C2	Power Quality	CO1	Understand various power quality issues.	✓	✓					Course modified from earlier curriculum	This Course is modified to enhance the knowledge on enhancement of power quality techniques in industry	3-0-0	3
		CO2	Analyze various power quality issues and its causes.	✓	✓			✓					
		CO3	Analyze the different mitigating techniques for voltage sag and swells.	✓	✓								
		CO4	Design and analyze voltage sag and swell using simulation tools.	✓	✓								
15EE52H2	Embedded Systems	CO1	Able to analyze embedded systems, its design cycle, modeling, layers of embedded systems	✓	✓					Course modified from earlier curriculum	This Course is modified to enhance the skill set on embedded systems to control the power flow	3-0-0	3
		CO2	Able to understand Processor and Memory Organization and I/O Devices and Networks	✓	✓								
		CO3	Able to understand, evaluate and select appropriate software architecture and analyze the features real time operating systems	✓	✓								
		CO4	Understand various embedded system design methodologies and be able to develop and demonstrate a small embedded system for a real time application	✓	✓								

  
 BOS CHAIRMAN  
 Professor  
 Dept of EEE  
 K L University  
 Green Fields, Maddurwaram,  
 Guntur D.T.A.P. Pin : 522 502

**K L UNIVERSITY**  
**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**  
**MINUTES OF DEPARTMENT ACADEMIC COMMITTEE MEETING**

The Department Academic Committee meeting was conducted in E.E.E HOD, chamber on 10<sup>th</sup> September 2014 at 12.30 PM

**Agenda:**

1. To discuss the feedbacks received from stake holders on curriculum
2. To propose the curriculum for B.Tech 2015-16 admitting batch
3. To propose the curriculum for M.Tech (PED & PS) 2015-16 admitting batch
4. Any other points with the permission of the DAC chairman

The following members were present:

1. Dr.M.Venu Gopal Rao, HoD & Head of DAC committee
2. Dr.O.Chandra Sekhar, PED Research Group Head
3. Mrs.S.V.N.L.Lalitha, PS Research Group Head
4. Dr.P.Linga Reddy, Professor, Department of EEE
5. Dr.G.Kesava Rao, Professor, Department of EEE
6. Dr.G.R.K.Murthy, Professor, Department of EEE
7. Prof.K.Subba Rao, Professor, Department of EEE

The following points were discussed, resolved and forwarded to Board of studies for considerations:

1. Up on feedback from Alumni, DAC members discussed about framing the syllabus in line with GATE syllabus.
2. Under Power Electronics & Drives specialization, the syllabus of the core courses was presented.
  - a. It is also resolved to include the following courses under the Power Electronics & Drives specialization (Annexure 2).
    - i. Modelling And Simulation Of Power Electronic Systems
    - ii. Industrial Applications Of Electronics
    - iii. Digital Signal Processing
    - iv. Power Quality
    - v. Advance PWM Techniques
3. Under Power Systems specialization, the syllabus of the core courses was presented.
  - a. It is also resolved to include the following courses under the Power System specialization (Annexure 2).
    - i. Advanced Power System Analysis
    - ii. Reactive Power Compensation & Management
    - iii. Power System Restructuring, Deregulation & Power Markets
    - iv. Energy Conservation & Audit

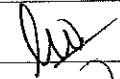


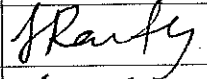

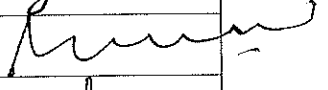

- v. AI Techniques in Power Systems
4. Up on feedback from students & Industrial Peers, HoD has recommended Employability oriented courses to be included to enrich the placements.
    - a. It is also resolved to include the following changes in the courses of employability & communication skills (Annexure 1).
      - i. Rudiments of Communication Skills
      - ii. Interpersonal Communication Skills
      - iii. Professional Communication Skills
      - iv. Employability Skills
  5. Up on feedback from External Faculty, DAC members recommended the following changes in the Basic science courses are
    - a) Form factor & Peak Factor Calculations for Aperiodic signals also in Fields & Networks Course (Annexure 1).
    - b) Cayley Hamilton theorem as a topic in single variable calculus & Matrix Algebra Course (Annexure 1).
    - c) Electrical Engineering measuring devices like Ammeter, Voltmeters & Bridges are to be included in Measurements course (Annexure 1).
    - d) Bridge Course of Introduction to Engineering is to be included as a noncredit course in curriculum to impart the importance of Engineering (Annexure 1).
  6. Up on feedback from Course Coordinator, DAC members recommended the following changes in the Network theory course are
    - a. Two Port Networks, Transients & Graph Theory (Annexure 1).
  7. Dr.Y.P.Obulesu, tabled the syllabus of Hybrid Electric Vehicles in the power electronic engineering stream, DAC members recommended to incorporate this course in to the curriculum.
  8. Upon considering above mentioned feedbacks, it is resolved to propose enclosed Program development documents and curriculum for B.Tech-Electrical Engineering Program for 2015-16 for BOS approval (Annexure 1).
  9. Upon considering above mentioned feedbacks, it is resolved to propose enclosed Program development documents and curriculum for M.Tech-Electrical & Electronics Engineering Program for 2015-16 for BOS approval (Annexure 2).

  
Dr.M.Venkatesh Gopal Rao  
(Head of the Department)

Professor & Head  
Dept of EEE  
K L University  
Green Fields, Vaddeswaram.  
Guntur Dt. A.P. Pin : 522 502

**K L University**  
**Department of ELECTRICAL & ELECTRONICS Engineering**  
**Department Academic Committee (DAC)**

The following members attended the meeting on 10<sup>th</sup> September 2014 at 1:00 pm:

S.No	Name of the member	Designation	Signature
1	Dr.M.Venu Gopal Rao	Professor, HOD	
2	Dr.O.Chandra Sekhar	Professor	
3	Dr.P.Lingareddy	Professor	
4	Dr.G.R.K.Murthy	Professor	
5	Dr.G.Kesava Rao	Professor	
6	Prof.K.Subbarao	Professor	
7	Mrs.S.V.N.L.Lalitha	Associate Professor	



K L E F					
Department of Electrical & Electronics Engineering					
Department Academic Committee Meeting (10/10/2014)					
Annexure I: Proposed B.Tech 2015-16 Course Structure					
S.No	Course Name	L-T-P	Cr	Pre-Req.	Remarks
<b>I HUMANITIES &amp; SOCIAL SCIENCES</b>					
1	Ecology and Environment	2-0-0	2	NIL	Nil
2	Human Values	2-0-0	2	NIL	Nil
3	Rudiments of Communication Skills	2-0-0	2	NIL	Topic Modified: Imparting Rudiments of Communication skills
4	Interpersonal Communication Skills	2-0-0	2	NIL	Topic Modified: Incorporate topics to enhance interpersonal Communication skills
5	Professional Communication Skills	0-0-4	2	NIL	Topic Modified: Incorporate topics to enhance Professional Communication skills
6	Employability Skills	0-0-4	2	NIL	Topic Modified: Imparting Employability acquiring skills and opportunities
7	Verbal and Quantitative Reasoning	0-0-4	2	NIL	New Course
8	Corporate Communication Skills	0-0-4	2	NIL	New Course
<b>II BASIC SCIENCES</b>					
1	Single Variable calculus and Matrix Algebra	2-2--2	4	NIL	Topic Added: Matrix Algebra- Cayley Hamilton Theorem
2	Mechanics	2-2--2	4	NIL	Topic Modified: Project Based lab Implementation to Enhance the Programming Skills
3	Engineering Materials	2-2--2	4	NIL	Topic Modified: Project Based lab Implementation to Enhance the Programming Skills
4	Engineering Chemistry	2-2--2	4	NIL	Topic Modified: Project Based lab Implementation to Enhance the Programming Skills
5	Biology for Engineers	2-0-0	2	NIL	Topic Modified: Project Based lab Implementation to Enhance the Programming Skills
6	Fields & Networks	2-2--2	4	NIL	Topic Added: Form Factor & Peak Factor for Aperiodic Signals
<b>III ENGINEERING SCIENCES</b>					
1	C Programming & Data Structures	2-4--2	5	NIL	New Course
2	Engineering Graphics	0-0-6	3	NIL	Nil
3	Measurements	0-0-4	2	NIL	Topic Modified: Electrical Engineering Measurements Like Ammeter, Voltmeters & Bridges
4	Introduction to Engineering	2-0-2	3	NIL	New Course
5	Object Oriented Programming	2-2--2	4	NIL	Topic Modified: Project Based lab Implementation
6	Signal Analysis	2-2--2	4	NIL	Topic Modified: Project Based lab Implementation
7	Discrete Mathematics	2-2--2	4	NIL	Topic Modified: Project Based lab Implementation

S.No	Course Name	L-T-P	Cr	Pre-Req.	Remarks
IV	<b>PROFESSIONAL CORE COURSES</b>				
1	Digital System Design	2-2-2	4	NIL	Topic Modified: Project Based lab Implementation
2	Computer Organization and Architecture	2-2-2	4	NIL	Topic Modified: Project Based lab Implementation
3	Electrical Circuits	2-2-2	4	Fields & Networks	Topic Modified: Project Based lab Implementation Topics Added: Two Port Networks, Graph Theory & Transients
4	Analog Electronic Circuit Design	2-2-2	4	NIL	Topic Modified: Project Based lab Implementation
5	DC Machines and Transformers	2-2-2	4	Electrical Circuits	Topic Modified: Project Based lab Implementation
6	Processors and Controllers	2-2-2	4	NIL	Topic Modified: Project Based lab Implementation
7	AC Machines	2-2-2	4	DC Machines and Transformers	Topic Modified: Project Based lab Implementation
8	Signal Processing	2-2-2	4	Signal Analysis	Topic Modified: Project Based lab Implementation
9	Generation, Transmission & Distribution	2-2-2	4	NIL	Topic Modified: Project Based lab Implementation
10	Control Systems	2-2-2	4	NIL	Topic Modified: Project Based lab Implementation
11	Power System Analysis	2-2-2	4	Generation, Transmission & Distribution	Topic Modified: Project Based lab Implementation
12	Power Electronics	2-2-2	4	Electrical Circuits	Topic Modified: Project Based lab Implementation
13	Power System Protection	2-2-2	4	Generation, Transmission & Distribution	Topic Modified: Project Based lab Implementation
14	Electrical Drives	2-2-2	4	Power Electronics	Topic Modified: Project Based lab Implementation
IV	<b>PROFESSIONAL ELECTIVES</b>				
<b>Power Electronics Specialization</b>					
1	Advanced Power Electronics	3-0-0	3	Power Electronics	Nil
2	Advanced Electrical Drives	3-0-0	3	Electrical Drives	Nil
3	HVDC & FACTS	3-0-0	3	NIL	Nil
4	Power Quality	3-0-0	3	NIL	Nil
5	Hybrid Electrical Vehicles	3-0-0	3	Electrical Drives	New Course
<b>Power Systems Specialization</b>					
1	Distribution System Planning & Automation	3-0-0	3	NIL	Nil
2	Restructured Power Systems	3-0-0	3	NIL	Nil
3	HVDC & FACTS	3-0-0	3	NIL	Nil
4	Power Quality	3-0-0	3	NIL	Nil
5	Smart Grid Technologies	3-0-0	3	NIL	Nil

S.No	Course Name	L-T-P	Cr	Pre-Req.	Remarks
<b>Control Systems Specialization</b>					
1	State Estimation & System Identification	3-0-0	3	Control Systems	Nil
2	Digital Control Systems	3-0-0	3	Control Systems	Nil
3	Non Linear Control Systems	3-0-0	3	Control Systems	Nil
4	Optimal Control Systems	3-0-0	3	Control Systems	Nil
5	Adaptive Control Systems	3-0-0	3	Control Systems	Nil
<b>Energy Systems Specialization</b>					
1	Energy Conservation & Audit	3-0-0	3	NIL	Nil
2	Utilization of Electrical Energy	3-0-0	3	NIL	New Course
3	Solar & Fuel cell Energy Systems	3-0-0	3	NIL	Nil
4	Wind & Biomass Energy Systems	3-0-0	3	NIL	Nil
5	Nuclear, Geothermal & Tidal Energy Systems	3-0-0	3	NIL	Nil
<b>Digital System Specialization</b>					
1	Computer Architecture	3-0-0	3	NIL	Nil
2	PLD's & FPGAs	3-0-0	3	NIL	Nil
3	VLSI Design	3-0-0	3	NIL	Nil
4	Embedded System Design	3-0-0	3	NIL	Nil
5	DSP Processors	3-0-0	3	NIL	Nil
<b>V OPEN ELECTIVES</b>					
1	Renewable Energy Sources	3-0-0	3	NIL	Nil
<b>VI PROJECT</b>					
1	Term Paper	0-0-4	2	NIL	Nil
2	Minor Project	0-0-4	2	NIL	Topic Modified: Technical Paper (IEEE) Literature Review & Partial Results
3	Major Project	0-0-16	8	NIL	Nil
4	Industrial Practice School	0-0-16		NIL	Nil
5	Industrial Training (Summer Break in II/IV year)		2	NIL	Nil

No. of New Courses Added :	6
No. of Courses Modified :	38
No. of Courses Offered :	61
Percentage of Syllabus Revision:	72%

K L E F					
Department of Electrical & Electronics Engineering					
Department Academic Committee Meeting (10/10/2014)					
Annexure 2: Proposed M.Tech- PED- 2015-16 Course Structure					
S.No	Course Name	L-T-P	Cr	Pre-Req.	Remarks
Professional Core Courses					
1	DESIGN OF POWER CONVERTERS	3-0-2	4	NIL	NIL
2	POWER ELECTRONIC CONTROL OF DRIVES	3-2-2	4	NIL	NIL
3	OPTIMIZATION TECHNIQUES	3-0-2	4	NIL	NIL
4	MODERN CONTROL THEORY	3-2-0	4	NIL	NIL
5	ADVANCED POWER CONVERTERS	3-2-2	4	NIL	NIL
6	MICRO CONTROLLER'S AND EMBEDDED SYSTEMS	3-2-0	4	NIL	New Course
7	MODELLING AND SIMULATION OF POWER ELECTRONIC SYSTEMS	3-2-0	4	NIL	New Course
8	INDUSTRIAL APPLICATIONS OF ELECTRONICS	3-2-0	4	NIL	
Professional Elective Courses					
1	INSTRUMENTATION & CONTROL	3-0-0	3	NIL	NIL
2	SPECIAL MACHINES	3-0-0	3	NIL	NIL
3	ELECTRIC AND HYBRID VEHICLES	3-0-0	3	NIL	New Course
4	DIGITAL SIGNAL PROCESSING	3-0-0	3	NIL	NIL
5	NON-CONVENTIONAL ENERGY RESOURCES	3-0-0	3	NIL	NIL
6	FACTS	3-0-0	3	NIL	New Course
7	POWER QUALITY	3-0-0	3	NIL	NIL
8	SMART GRIDS	3-0-0	3	NIL	NIL
9	STATE ESTIMATION & ADAPTIVE CONTROL	3-0-0	3	NIL	New Course
10	ADVANCE PWM TECHNIQUES	3-0-0	3	NIL	NIL
11	AI TECHNIQUES IN POWER ELECTRONICS & DRIVES	3-0-0	3	NIL	NIL
12	EMBEDDED CONTROL OF ELECTRIC DRIVES	3-0-0	3	NIL	NIL
Projects					
1	Seminar	0-0-4	2	NIL	NIL
2	Term Paper	0-0-4	2	NIL	NIL
3	Dissertation	0-0-72	36	NIL	NIL

K L E F					
Department of Electrical & Electronics Engineering					
Department Academic Committee Meeting (10/10/2014)					
Annexure 2: Proposed M.Tech 2015-16 Course Structure					
S.No	Course Name	L-T-P	Cr	Pre-Req.	Remarks
Professional Core Courses					
1	Power System Dynamics & stability	3-0-2	4	NIL	NIL
2	Advanced Power System Analysis	3-2-2	4	NIL	New Course
3	Optimization Techniques	3-0-2	4	NIL	NIL
4	Modern Control theory	3-2-0	4	NIL	NIL
5	Real Time Control of Power System	3-2-2	4	NIL	NIL
6	Micro Controllers & Embedded Systems	3-2-0	4	NIL	NIL
7	EHVAC & HVDC Transmission	3-2-0	4	NIL	NIL
8	Power Systems Digital Protection	3-2-0	4	NIL	NIL
Professional Elective Courses					
1	Reactive Power Compensation & Management	3-0-0	3	NIL	New Course
2	Distribution System Planning & Automation	3-0-0	3	NIL	NIL
3	Power System Reliability	3-0-0	3	NIL	NIL
4	Power System Restructuring, Deregulation & Power Markets	3-0-0	3	NIL	New Course
5	Energy Conservation & Audit	3-0-0	3	NIL	New Course
6	AI Techniques in Power Systems	3-0-0	3	NIL	NIL
7	DIGITAL SIGNAL PROCESSING	3-0-0	3	NIL	NIL
8	NON-CONVENTIONAL ENERGY RESOURCES	3-0-0	3	NIL	NIL
9	FACTS	3-0-0	3	NIL	NIL
10	POWER QUALITY	3-0-0	3	NIL	NIL
11	SMART GRIDS	3-0-0	3	NIL	NIL
12	STATE ESTIMATION & ADAPTIVE CONTROL	3-0-0	3	NIL	NIL
Projects					
1	Seminar	0-0-4	2	NIL	NIL
2	Term Paper	0-0-4	2	NIL	NIL
3	Dissertation	0-0-72	36	NIL	NIL