DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION OF THE DEPARTMENT

- ✓ To become a Pioneer Department Imparting High Quality Education through Technological Advancements in the Field of Electrical and Electronics Engineering.

MISSION OF THE DEPARTMENT

- ✓ To provide state–of–the art resources, high quality technical education and training for EEE students to become competent in industry or research to serve the society.
- ✓ To enable EEE students to develop life-long learning skills and ethical values suitable for accomplishing a successful career in higher education or entrepreneur in India or Abroad.

M.Tech – Power System Automation and Control

M.Tech – Power System Automation and Control - Program Educational Objectives (PEOs):

PEO 1: Students should acquire knowledge regarding the operations of Power sector to become proficient and understand the issues pertaining to it.

PEO 2: Students should have strong theoretical and complex network simulations of power systems, control and automation to engage in research and pre-doctoral studies.

PEO 3: Students should volunteer themselves as a source of innovative solutions to complex problems by adopting good communication, professional and ethical standards.

PEO 4: : Students should keep them updated with respect to upcoming research tools and technologies pertaining to their stream and prompt enough to undertake interdisciplinary collaborative works.

M.Tech – Power System Automation and Control - Program Specific Outcomes (PSOs):

PSO 1: Students will be able to assimilate in depth knowledge in power industry to obtain optimal solutions to complex problems.

PSO 2: Students are imbibed with ethical and social responsibilities in their professional endeavours.

PSO 3: Students will have exposure to multidisciplinary collaborative research works to emphasis their skills to attain key positions in research centres and industry or to emerge as entrepreneur.

M.Tech – Power System Automation and Control - Program Outcomes (POs):

PO1: An ability to independently carry out research /investigation and development work to solve practical problems

PO2: ability to write and present a substantial technical report/document

PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program

PO4: Students should keep them updated with respect to upcoming research tools and technologies pertaining to their stream.

PO5: Ability to initiate small start-ups which will pave a path for doing industry oriented projects.

Course outcomes for M.Tech – Power System Automation and Control (45) for the year 2015-16

Course Outcome	**Year/Semester I/I Sem**	**Subject Name (Subject Code)** Advanced Power System Analysis (A953101)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Identify the methods and assumptions in modeling of machines.		
2	Recognize the different frames for modeling of AC machines.		
3	Illustrate the voltage and torque equations in state space form for different machines		
4	Develop the mathematical models of various machines like, induction motor and Synchronous machines using modeling equations.		
5	Analyze the developed models in various reference frames		
6	Assess the machine dynamics in various operating conditions		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Advanced Power System Protection (A953102)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Understand the basic function of a circuit breaker, all kinds of circuit breakers and relays		
2	Differentiate fuse and circuit breakers under fault condition		
3	Learn constructional details of static relays and importance of duality of comparators in them.		
4	Study the operation of static relay applied for over current protection		
5	Able to apply static relay for transformer and transmission line protection		
6	Basic principle of operation and application of microprocessor based relaying.		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Modern Control Theory (A953103)	**L: 4 T: 0 P: 0 C: 4**
After the completion of this course, the students should be able to			
1	Various terms of basic and modern control system for the real time analysis and design of control systems.		
2	To perform state variables analysis for any real time system.		
3	Apply the concept of optimal control to any system.		
4	Able to examine a system for its stability, controllability and observability.		
5	Implement basic principles and techniques in designing linear control systems.		
6	Formulate and solve deterministic optimal control problems in terms of performance indices.		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** EHV AC Transmission (A953104)	**L: 4 T: 0 P: 0 C: 4**
After the completion of this course, the students should be able to			
1	Identify the different aspects of Extra High Voltage A.C and D.C Transmission		
2	Demonstrate EHV AC transmission system components, protection and insulation level for over voltages		
3	Estimate the Statistical procedures for line designs, scientific and engineering		

	Principles in power systems.		
4	Power Frequency Voltage control and over-voltages in EHV lines		
5	Study the concept of Corona in E.H.V. lines and impact of RI in EHV lines		
6	Design the EHV cables and study their charcteristics		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** High Voltage Engineering (A953105)	**L: 3 T: 0 P: 0 C:3**
After the completion of this course, the students should be able to			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Advanced Digital Signal Processing (A953106)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Comprehensive understanding of using advanced controllers in measurement and control instrumentation.		
2	Illustrate about data acquisition - process of collecting information from field instruments.		
3	Analyze Programmable Logic Controller (PLC), IO Modules and internal features.		
4	Comprehend Programming in Ladder Logic, addressing of I/O.		
5	Apply PID and its Tuning.		
6	Development of ladder logic programming for simple process		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Power Quality (A953107)	**L: 4 T: 0 P: 0 C: 4**
After the completion of this course, the students should be able to			
1	To relate the basic architecture and addressing modes of a microcontroller.		
2	Distinguish types of computers & microcontrollers and explain the principles of top down design to microcontroller software development		
3	demonstrate assembly language programs for the 8-bit, 16-bit and 32-bit Microcontroller , assembly language code for high-level language structures such as IF-THENELSE and DO-WHILE		
4	analyze a typical I/O interface and to discuss timing issues		
5	Develop Real time Applications of Microcontrollers & Demonstrate RTOS for Microcontrollers.		
6	Translate Hardware applications using Microcontrollers.		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Microcontrollers and applications (A953108)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	To relate the basic architecture and addressing modes of a microcontroller.		
2	Distinguish types of computers & microcontrollers and explain the principles of top down design to microcontroller software development		
3	demonstrate assembly language programs for the 8-bit, 16-bit and 32-bit Microcontroller , assembly language code for high-level language structures such as IF-THENELSE and DO-WHILE		
4	analyze a typical I/O interface and to discuss timing issues		
5	Develop Real time Applications of Microcontrollers & Demonstrate RTOS for Microcontrollers.		
6	Translate Hardware applications using Microcontrollers.		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Distribution Automation (A953109)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			

1	Learn the need of structure of power system automation and its evolution.		
2	Classify various power system automation schemes		
3	Learn to implement power system automation and protection using SCADA.		
4	Learn the importance of EMS in power system operation.		
5	Learn the architecture of PLC and its application in power system automation		
6	Know the control schemes of distribution automation and substation automation		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Optimization Techniques (A953110)	**L: 4 T: 0 P: 0 C: 4**
After the completion of this course, the students should be able to			
1	Study the need of optimisation in electrical engineering problems		
2	Learn the conventional or classical optimisation techniques		
3	Learn to formulate the problem with constrained and unconstrained cases		
4	Explore various modern intelligent optimisation techniques		
5	Apply these techniques to real world problems such as transportation problem, travelling salesman problem		
6	Study various limitations in these techniques		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Digital control systems (A953111)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Deduce the control system to block diagram for various analysis		
2	Acquire a strong foundation in sampling and reconstruction Z-transforms.		
3	Apply knowledge of mathematics, Z-plane analysis to discrete time control systems.		
4	Know sampling and reconstruction, Z -transforms.		
5	Replace the conventional control system with Digital control system.		
6	Evaluate to Apply Z-plane analysis of discrete time control systems		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Renewable energy systems (A953112)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Explore various renewable energy sources to produce electrical energy		
2	Study the characteristics of PV cell- photo voltaic modules and its applications		
3	Learn the basics of wind energy conversion systems and bio-mass energy generation		
4	Explore various Wave energy conversion machines - Ocean Thermal Energy conversion schemes		
5	Know the need of hybrid energy systems such as geothermal and fuel cells		
6	Study the impact of various renewable energy sources on environment.		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** HVDC Transmission (A953113)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Study the basic power handling capabilities of HVDC lines		
2	Explore various configurations and conversion principles of static power converters		
3	Learn the rectifier and inverter operations, commutation process at converter stations.		
4	Apply AC/DC filters for harmonic elimination in HVDC link		
5	Explore various controls adapted in HVDC converters		
6	Identify various instability problems in HV AC and DC system		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Analysis of power Electronic converters (A953114)	**L: 3 T: 0 P: 0 C: 3**

After the completion of this course, the students should be able to			
1	Understand the characteristics and principle of operation of modern power semiconductor devices.		
2	Comprehend the concepts of different power converters and their applications		
3	Analyze and design switched mode regulators for various industrial applications		
4	Knowledge on various converter topologies		
5	Choose appropriate device for a particular converter topology.		
6	Use power electronic simulation packages for analyzing and designing power converters.		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Embedded Systems (A953115)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Understand the basics of an embedded system		
2	Learn the method of designing an embedded system for any type of applications		
3	Understand the operating systems concepts, types and choosing RTOS		
4	Design, implement and test an embedded system		
5	Understand types of memory and interacting to external world		
6	Learn embedded firmware design approaches		
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Power Systems Lab-I (A953116)	**L: 0 T: 0 P: 4 C: 2**
After the completion of this course, the students should be able to			
1	Able to demonstrate the symmetrical and unsymmetrical fault in the generator.		
2	Realise the Ferranti effect in the transmission line and implement feeder protection under over current operation by constructing the circuits		
3	Study the operation various static relays for over current and over voltage condition		
4	Visualise the differential protection of transformer for external and internal faults		
Course Outcome	**Year/Semester I/II Sem**	**Subject Name (Subject Code)** Power System Dynamics (A953201)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Learn the basics of system dynamics and able to analyse steady state stability and transient stability		
2	Able to model synchronous machine to analyse steady state operation analyse its dynamics of operation.		
3	Model the excitation system analyse the dynamics of the synchronous machine connected to infinite bus.		
4	Examine the small signal stability of the system using Routh's Hurwitz criterion		
5	Know the need of PSS in control signals		
6	Dynamic compensator analysis of single machine infinite bus system with and without PSS.		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Flexible AC Transmission Systems (FACTS) (A953202)	**L: 4 T: 0 P: 0 C: 4**
After the completion of this course, the students should be able to			
1	Know the concepts and types of FACTS controllers		
2	Learn various converters employed for FACTS controllers		
3	Study the impact of FACTS devices in the power flow in the AC system		
4	Learn various shunt compensation using SVC and STATCOM		
5	Learn various series compensators such as TCSC, TSSC		

6	Explore the concept of UPFC and its application.		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Power System Operation and Deregulation (A953203)	**L: 4 T: 0 P: 0 C: 4**
After the completion of this course, the students should be able to			
1	Acquire basic knowledge on restructuring of power industry and market models.		
2	Impart knowledge on fundamental concepts of congestion management		
3	Knowledge on various ancillary service providers		
4	Illustrate various international Transmission pricing paradigms		
5	Idea on framework of Indian power sector and its initiatives		
6	The reforms in Indian power sector		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Gas Insulated Systems(GIS) (A953204)	**L: 4 T: 0 P: 0 C: 4**
After the completion of this course, the students should be able to			
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Programmable Logic Controllers and their Applications (A953205)	**L: 4 T: 0 P: 0 C:4**
After the completion of this course, the students should be able to			
1	Gain Comprehensive knowledge of using advanced controllers in measurement and control instrumentation.		
2	Illustrate about data acquisition - process of collecting information from field instruments.		
3	Analyze Programmable Logic Controller (PLC), IO Modules and internal features.		
4	Comprehend Programming in Ladder Logic, addressing of I/O.		
5	Apply PID and its Tuning.		
6	Develop ladder logic programming for simple process		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** High frequency magnetic components (A953206)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Learn the fundamentals of magnetic devices		
2	Explore the properties of magnetic core materials		
3	Study the various effects that exists the round conductor carrying AC currents		
4	Evaluate the energy stored in coupled inductors of transformers		
5	Design of transformers for fly-back converters in CCM		
6	Design the integrated inductors and self capacitance for high frequency applications		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Reactive Power Compensation and Management (A953207)	**L: 4 T: 0 P: 0 C: 4**
After the completion of this course, the students should be able to			
1	Identify the necessity of reactive power compensation		
2	Describe load compensation		
3	Select various types of reactive power compensation in transmission systems		
4	Characterize distribution side and utility side reactive power.		
5	Understand issues related to power system stability and control.		
6	Detect reactive power compensation techniques & their practical importance		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Power System Reliability (A953208)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			

1	To identify the generation system model and recursive relation for capacitive model building		
2	calculate the equivalent transitional rates, cumulative probability and cumulative frequency		
3	Evaluate cumulative probability and cumulative frequency of non-identical generating units and merging generation and load		
4	Distinguish various approaches to evaluate operating reserves and bulk power generation reserve		
5	Analyse the reliability indices on radial and weakly meshed distribution networks		
6	Study the effect of short circuits in substation and switching stations.		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Voltage Stability (A953209)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Identify the necessity of reactive power compensation		
2	Describe load compensation		
3	Select various types of reactive power compensation in transmission systems		
4	Characterize distribution side and utility side reactive power.		
5	Understand issues related to power system stability and control.		
6	Detect reactive power compensation techniques & their practical importance		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Instrumentation & Control (A953210)	**L: 4 T: 0 P: 0 C: 4**
After the completion of this course, the students should be able to			
1	Survey various methods of power generation		
2	Understand the importance of instrumentation in power generation		
3	Explore various measuring and supervising systems involved in thermal power plant processes such as boiler and turbine units		
4	Understand various controls employed in boiler		
5	Explore the temperature and pressure controls in turbine		
6	Study the nuclear power plant instrumentation		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Intelligent Control (A953211)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Learn the architecture of Intelligent control		
2	Learn the basic artificial neural network and its mathematical model		
3	Train and test the neural network with various configurations.		
4	Apply genetic algorithm for various optimisation problems		
5	Model and control different system with fuzzy logic controller		
6	Explore various power system problem and apply GA, NN and Fuzzy controller		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Smart grid technologies (A953212)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Recite the structure of an electricity market in either regulated or deregulated market conditions.		
2	Understand the advantages of DC distribution and developing technologies in distribution		
3	Discriminate the trade-off between economics and reliability of an electric power system.		

4	Differentiate various investment options (e.g. generation capacities, transmission, renewable, demand-side resources, etc) in electricity markets.		
5	Analyze the development of smart and intelligent domestic systems.		
6	Recite the structure of an electricity market in either regulated or deregulated market conditions.		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** AI Techniques in Electrical Engineering (A953213)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Gain knowledge on soft computing techniques such as artificial neural networks, Fuzzy logic and genetic Algorithms.		
2	Learn the concepts of feed forward neural networks and feedback neural networks.		
3	Get the concept of fuzziness involved in various systems and comprehensive knowledge of fuzzy logic control and to design the fuzzy rules		
4	Acquire complete knowledge on genetic algorithm including three genetic operators		
5	Explore various power system problems which can utilize these AI techniques		
6	Assess system stability using AI techniques		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Reliability Engineering (A953214)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	To identify the generation system model and recursive relation for capacitive model building		
2	calculate the equivalent transitional rates, cumulative probability and cumulative frequency		
3	Evaluate cumulative probability and cumulative frequency of non-identical generating units and merging generation and load		
4	Distinguish various approaches to evaluate operating reserves and bulk power generation reserve		
5	Analyse the reliability indices on radial and weakly meshed distribution networks		
6	Study the effect of short circuits in substation and switching stations.		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Energy Auditing, Conservation & Management (A953215)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Know the necessity of conservation of energy		
2	Generalize the methods of energy management		
3	Illustrate the factors to increase the efficiency of electrical equipment		
4	Detect the benefits of carrying out energy audits.		
5	Analyze the power factor and to design a good illumination system		
6	Determine pay back periods for energy saving equipment.		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Power Systems Lab-II (A953216)	**L: 0 T: 0 P: 4 C: 2**
After the completion of this course, the students should be able to			
1	Study the characteristics of microprocessor-based relays		
2	Able to protect the feeder from faulty condition using over current relay operation		
3	Study the Characteristics of IDMT Electromagnetic Over Current Relay		
4	Study the phase failure and phase reversal protection with static negative sequence relay		

VAAGDEVI COLLEGE OF ENGINEERING

Autonomous

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