VAAGDEVI COLLEGE OF ENGINEERING

Autonomous

Bollikunta, Khila Warangal (Mandal), Warangal Urban-506 005 (T.S), www.vaagdevi.edu.in

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 Electronics - Program Educational Objectives (PEOs):

PEO 1: Students should establish themselves as efficient professionals in the field of power electronics.

PEO 2: Students should have strong theoretical and experimental knowledge of power electronics 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 be able to acquire knowledge for realizing it into gainful employment or entrepreneurship being useful to the societal needs.

M.Tech – Power Electronics 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 and prompt enough to undertake interdisciplinary collaborative works.

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

M.Tech – Power Electronics - Program Specific Outcomes (PSOs):

PSO 1: Students will be proficient in designing, developing and analyzing the power converters and their applications.

PSO 2: Students will be expertise in state-of-art simulation tools and real-time control platforms.

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.

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PSO 4: Course Outcomes for M.Tech – Power Electronics (43) for the year 2015-16

PSO 5:

Course Outcome	**Year/Semester I/I Sem**	**Subject Name (Subject Code)** Machine Modelling and Analysis(A943101)	**L: 4 T: 0 P: 0 Total: 4**	**Credits: 4**
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 DC machines and derive the transfer function of the DC motor.			
5	Study various transformations adopted in 3 phase machines and explore its starting methods			
6	Analyze the developed models in various reference frames through simulation study			
7	Assess the machine dynamics in various operating conditions			
8	Perform short circuits analysis with d-q model of machines.			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Modern Control Theory (A943102)	**L: 4 T: 0 P: 0 Total: 4**	**Credits: 4**
After the completion of this course, the students should be able to				
1	Learn various terms of basic and modern control system for the real time analysis and design of control systems.			
2	Learn the basic mathematical preliminaries for modeling a control system			
3	Perform state variables analysis for any real time system			
4	Linearize the non-linear system model using various techniques			
5	Apply the concept of optimal control to any system.			
6	Examine a system for its stability, controllability and observability.			
7	Implement basic principles and techniques in designing linear control systems.			
8	Formulate and solve deterministic optimal control problems in terms of performance indices.			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Power Electronic Devices and Circuits (A943103)	**L: 4 T: 0 P: 0 Total: 4**	**Credits: 4**
After the completion of this course, the students should be able to				
1	Understand the characteristics and principle of operation of modern power electronics devices.			
2	Compare the features of various power electronic devices			
3	Comprehend the concepts of different power converters and their application			
4	Explore various driver circuits and its heat management system			
5	Study the effect of source and load inductance on the controller operation			
6	Analyse and design the switched mode regulator for various industrial application			
7	Explore various power factor improvement controllers			
8	Use power electronic simulation packages for analysing and designing power converters			

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Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Special Machines (A943104)	**L: 4 T: 0 P: 0 Total: 4**	**Credits: 4**
After the completion of this course, the students should be able to				
1	Learn the constructional features, principle of operation and methods of control of stepper motor.			
2	Realize the need for stepper motors and the various applications in industries.			
	Explore various hybrid stepping motor			
3	Get a clear picture of the operational characteristics and the applications of Switched Reluctance Motor.			
4	Know the various types of PMBLDC motors, rotor position sensors, methods of control and their applications			
5	Get a clear idea of the features, control and the applications of PMSM			
6	Explore the concept of linear induction motor and develop a double sided LIM from rotory induction motor			
7	Study the constructional details of permanent magnet axial flux machines (PMAF)			
8	Explore the applications of various special machines in day to day applications			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** HVDC Transmission (A943105)	**L: 4 T: 0 P: 0 Total: 4**	**Credits: 4**
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			
7	Study various over voltage problems in multi-terminal DC system			
8	Comprehend various converter faults and protection circuits .			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Programmable Logic Controllers and their Applications (A943106)	**L: 4 T: 0 P: 0 Total: 4**	**Credits: 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			
7	Execute , debug and test programs developed for digital and analog operations			
8	Reproduce block diagram representation on industrial applications using PLC			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Microcontrollers and Applications (A943107)	**L: 4 T: 0 P: 0 Total: 4**	**Credits: 4**
After the completion of this course, the students should be able to				
1	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.			
7	Gain working knowledge of ports and interrupts			
8	Introduce the need and use of interrupt structure, timers in respective applications			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Embedded Systems (A943108)	**L: 4 T: 0 P: 0 Total: 4**	**Credits: 4**
After the completion of this course, the students should be able to				
1	Understand the basics of an embedded system			
2	Explore various issues in embedded software development and applications			
3	Learn the method of designing an embedded system for any type of applications			
4	Understand the operating systems concepts, types and choosing RTOS			
5	Design, implement and test an embedded system			
6	Understand types of memory and interacting to external world			
7	Learn embedded firmware design approaches			
8	Use ICE and software tools to address the issues in embedded systems			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Digital Control Systems (A943109)	**L: 4 T: 0 P: 0 Total: 4**	**Credits: 4**
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			
7	Apply state feedback controllers and observers			
8	Analyse the system stability using root locus , bode and Nyquist plots			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Optimization Techniques (A943110)	**L: 4 T: 0 P: 0 Total: 4**	**Credits: 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			

7	Apply methods of sensitivity analysis and validate post processing results			
8	Explore various real time optimization problems.			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Digital control systems (A943111)	**L: 4 T: 0 P: 0 Total: 4**	**Credits: 4**
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			
7	Apply state feedback controllers and observers			
8	Analyse the system stability using root locus , bode and Nyquist plots			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Renewable energy systems (A943112)	**L: 4 T: 0 P: 0 Total: 4**	**Credits: 4**
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.			
7	Arrange storage energy and to avoid the environmental pollution			
8	Detect the environmental effects of energy conversion			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** HVDC Transmission (A943113)	**L: 4 T: 0 P: 0 Total: 4**	**Credits: 4**
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			
7	Study various over voltage problems in multi-terminal DC system			
8	Comprehend various converter faults and protection circuits .			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Analysis of Power Electronic Converters (A943114)	**L: 4 T: 0 P: 0 Total: 4**	**Credits: 4**
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	Describe the importance of AC voltage controllers and cyclo-converters for various industrial applications			
4	Analyze and design switched mode power electronic converters for various industrial applications			
5	Analyze pulse width modulated inverters which are used in variable speed drives			
6	Choose appropriate device for a particular converter topology.			
7	Use power electronic simulation packages for analyzing and designing power converters.			
8	Choose appropriate power converter topologies and design the power stage and feedback controllers for various applications			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Embedded Systems (A943115)	**L: 4 T: 0 P: 0 Total: 4**	**Credits: 4**
After the completion of this course, the students should be able to				
1	Understand the basics of an embedded system			
2	Explore various issues in embedded software development and applications			
3	Learn the method of designing an embedded system for any type of applications			
4	Understand the operating systems concepts, types and choosing RTOS			
5	Design, implement and test an embedded system			
6	Understand types of memory and interacting to external world			
7	Learn embedded firmware design approaches			
8	Use ICE and software tools to address the issues in embedded systems			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Power Converters Simulation Lab (A943116)	**L: 0 T: 0 P: 4 Total:4**	**Credits:4**
After the completion of this course, the students should be able to				
1	Able to simulate full converter circuits for various types of loading			
2	Acquire programming knowledge to study the systems dynamics in state space model			
3	Able to assess the frequency response of the system			
4	Analyse the system stability and PID controller application for steady state system operation.			
Course Outcome	**Year / semester I/I Sem**	**Subject Name (Subject Code)** Seminar-I (A943117)	**L: 0 T: 0 P: 4 Total:4**	**Credits:4**
Course Outcome	**Year/Semester I/II Sem**	**Subject Name (Subject Code)** Power Electronic Converters (A943201)	**L: 4 T: 0 P: 0 C: 4**	
After the completion of this course, the students should be able to				
1	Understand various advanced power electronics devices.			
2	Explore various advanced modulation techniques and its applications			
3	Describe the operation of multi-level inverters with switching strategies for high power applications.			
4	Comprehend the design of resonant converters and switched mode power supplies.			
5	Gain knowledge on various topologies converter circuits			
6	Develop and analyze various converter topologies.			
7	Design AC or DC switched mode power supplies.			
8	Explore various power conditioning devices			

Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Power Electronic Control of DC Drives (A943202)	**L: 4 T: 0 P: 0 C: 4**
After the completion of this course, the students should be able to			
1	Learn basic preliminary requirements for operating DC drives		
2	Explore various rectifier fed DC drives		
3	Study the continuous and discontinuous modes of operation of single phase semi and full converter for DC drives		
4	Study the continuous and discontinuous modes of operation of three phase semi and full converter for DC drives		
5	Perform steady state analysis of three phase converter controlled DC motor drive		
6	Explore various current and speed controllers		
7	Perform steady state analysis of chopper controlled DC motor drive		
8	Simulate the dynamics of speed controlled DC motor drives		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Power Electronic Control of AC Drives (A943203)	**L: 4 T: 0 P: 0 C: 4**
After the completion of this course, the students should be able to			
1	Learn the speed torque characteristics variable voltage and variable frequency operation		
2	Study the operation of induction motor in constant torque and field weakening regions		
3	Understand the stator side controls employed for induction drives		
4	Employ speed and flux control in current fed inverter drive		
5	Evaluate the efficiency of the drive by applying optimization control		
6	Study the principles of vector control methods in rotor of induction drives		
7	Implement various speed control schemes in synchronous motor drives		
8	Study the characteristics and control of variable reluctance motor drive		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Power Quality (A943204)	**L: 4 T: 0 P: 0 C: 4**
After the completion of this course, the students should be able to			
1	Know the different terms and concepts of electric power quality in power systems.		
2	Learn about the applications of non-linear load.		
3	Identify and study the difference between system failures, outage and interruptions		
4	Predict various short and long interruptions		
5	Characterize and calculate the magnitude the single and three phases Voltage sag in the system		
6	Learn how to mitigate the power quality problems		
7	Learn about the application of FACTS device on DG side.		
8	Know the different characteristics of electric power quality in power systems.		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Advanced Digital Signal Processing (A943205)	**L: 3 T: 0 P: 0 C:3**
After the completion of this course, the students should be able to			
1	Provide fundamental knowledge of analysing and processing of digital systems		
2	Study the relationship between continuous time and discrete time signals and		

	systems		
3	Study the fundamentals of time , frequency and Z-Plane analysis and their interrelationships.		
4	Study and design digital filters form analysis to synthesis		
5	Explore few real world signal processing applications		
6	Get acquainted with FFT algorithms, multi-rate signal processing techniques.		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Switched Mode Power Supplies (SMPS) (A943206)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Apply the basic concepts of power electronics for designing converters.		
2	Explore various design considerations.		
3	Explore various control circuits.		
4	Design and implement practical circuits for UPS, SMPS.		
5	Understand the effect of Electromagnetic interference (EMI).		
6	Understand the various protection aspects for the converters.		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Flexible AC Transmission Systems (A943207)	**L: 3 T: 0 P: 0 C: 3**
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)** High-Frequency Magnetic Components (A943208)	**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)** Dynamics of Electrical Machines (A943209)	**L: 3 T: 0 P: 0 C: 3**
After the completion of this course, the students should be able to			
1	Basics of machine theory of all types of machines		
2	Learn generalized modeling of all electrical machines		
3	Apply of Lagrange's equation solution of Electro dynamical equations.		
4	Understand the basic mathematical analysis of electrical machines and its characteristics.		
5	Understand behavior of electrical machines under steady state and transient state.		
6	Understand dynamic modeling of electrical machines		

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Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Instrumentation & Control (A943210)	**L: 3 T: 0 P: 0 C: 3**
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 (A943211)	**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 (A943212)	**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 (A943213)	**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 (A943214)	**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 (A943215)	**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 Converters and Drives Lab (A943216)	**L: 0 T: 0 P: 4 C: 2**
After the completion of this course, the students should be able to			
1	Learn basic speed measurement and implement closed loop control in PMDC motor		
2	Experience the improved control of thyristor drive for PMDC motor over conventional control		
3	Learn to generate PWM signals using DSP		
4	Explore the inverter controls for solar PV systems		
Course Outcome	**Year / semester I/II Sem**	**Subject Name (Subject Code)** Seminar-II (A943217)	**L: 0 T: 0 P: 4 C:2**
Course Outcome	**Year / semester II/I Sem**	**Subject Name (Subject Code)** Comprehensive Viva-Voce (A943301)	**L: 0 T: 0 P: 0 C:4**