JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

Kakinada-533003, Andhra Pradesh, India

M.Tech in POWER ELECTRONICS AND DRIVES

Vision

To be in the forefront in advanced research in emerging areas of Electrical & Electronics Engineering, be proactive with industry in technology development and mould the department into a centre of academic excellence.

Mission

- To produce high quality Electrical and Electronics Engineering graduates with the requisite theoretical and practical knowledge.
- To undertake research & development and extension activities in the field of Electrical and Electronics Engineering in the area of relevance for immediate application as well as for establishing and strengthening the fundamental knowledge.
- To create social awareness and ethical values in the graduates so as to contribute in the progress of the society.

PROGRAM EDUCATIONAL OBJECTIVES

PEO1	Design and develop innovative products and services in the field of Power Electronic and Drives.
PEO2	Communicate effectively to propagate ideas and promote teamwork and keep abreas with the latest technology and toolset.
PEO3	Attain intellectual leadership skills to cater to the changing needs of power indust academia, society and environment.
PEO4	To become socially and ethically responsible and pursue life-long learning.

PROGRAM OUTCOMES: At the end of the program the student will be able to:

PO1	The graduate will be able to acquire in depth knowledge in the area of Power electronics and Drives.
PO2	The graduate will attain the lateral thinking and problem solving capabilities in the area of Power Electronics and Drives.
PO3	The graduate will obtain the capabilities of critical thinking, analyzing real world problems and handling the complexities to arrive feasible and optimal solutions considering societal and environmental factors.
PO4	The graduate will be able to extract information through literature survey and apply appropriate research methodologies, techniques and tools to solve Power Electronics and Drives problems.
PO5	The graduate will be able to use the state-of-the-art tools for modelling, simulation and analysis of problems related to Power Electronics and Drives.

PO6

The graduate will be trained to assess social, health, safety, legal, cultural issues and She/he will also be trained on the consequent responsibilities relevant to the professional engineering
practices.

PO7

To sensitize the graduate about the impact of professional engineering solutions in social and environmental contents and demonstrates the knowledge of, and need for sustainable developments.

PO8

The graduate will become socially responsible and follow ethical practices to contribute to the community for sustainable development of society.

PO9

The graduate will be able to independently observe and examine critically the outcomes of his actions and reflect on to make corrective measures subsequently and move forward positively by learning through mistakes.

PO10

The graduate will be able to communicate confidently, make effective presentations and write good reports to engineering community and society.

PO11

The graduate will demonstrate knowledge and understanding of high voltage engineering with emphasis on power system and management principles and apply the same for efficiently carrying out projects with due consideration to economical and financial factors.

PO12

The graduate will recognize the need for life-long learning and have the ability to do it independently.

PROGRAMME SPECIFIC OUTCOMES (PSOS):

PSO1 Able to apply the knowledge during the course of the program from basic computing and social science in general and all electrical courses in particular to identify, formulate and solve real life problems faced in industries and/or during research work..

PSO2 Development of environment-conscious, new technologies to enhance the quality of human life.

Course Code	**Electrical Machine Modeling and Analysis**
R19PC1101	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Analyze the characteristics of different types of DC motors to design suitable controllers for different applications.

CO2 Apply the knowledge of reference frame theory for AC machines to model the induction and Synchronous machines.

CO3 Evaluate the steady state and transient behavior of induction and synchronous machines to Propose the suitability of drives for different industrial applications

CO4 Analyze the behavior of induction machines using voltage and torque equations.

Course Code	**Analysis of Power Electronic Converters**
R19PC1102	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Describe and analyze the operation of AC-DC, DC-AC and AC-AC power converters.

CO2 Analyze the operation of power factor correction converters.

CO3 Analyze the operation of three phase inverters with PWM control.

CO4 Study the principles of operation of multi level inverters and their applications.

Course Code	**Modern Control Theory (Elective-I)**
R19PE1103A	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Formulate and solve the state equations of dynamic systems, analyze controllability and observability.

CO2 Design a state feedback controller; design an observer.

CO3 Linearize a nonlinear system model; analyze non linear systems through describing functions.

CO4 Determine the stability of a given system; generate a Lyapunov function.

CO5 Minimize a given functional, design an optimal feedback gain matrix.

CO6 Understand the various schemes of HVDC transmission.

Course Code	**Power Quality and Custom Power Devices (Elective-I)**
R19PE1103B	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Identify the issues related to power quality in power systems.
CO2 Address the problems of transient and long duration voltage variations in power systems.
CO3 Analyze the effects of harmonics and study of different mitigation techniques.
CO4 Identify the importance of custom power devices and their applications.
CO5 Acquire knowledge on different compensation techniques to minimize power quality disturbance

Course Code	**Programmable Logic Controllers & Applications (Elective-I)**
R19PE1103C	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Understand the PLCs and their I/O modules.
CO2 Develop control algorithms to PLC using ladder logic etc.
CO3 Manage PLC registers for effective utilization in different applications.
CO4 Handle data functions and control of two axis and their axis robots with PLC.
CO5 Design PID controller with PLC.

Course Code	**Artificial Intelligence Techniques (Elective-II)**
R19PE1104A	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Differentiate between Algorithmic based methods and knowledge based methods.
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.

Course Code	**Renewable Energy Technologies (Elective-II)**
R19PE1104B	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Understand various general aspects of renewable energy systems.
CO2 Analyze and design induction generator for power generation from wind.
CO3 Design MPPT controller for solar power utilization.
CO4 Utilize fuel cell systems for power generation.

Course Code	**HVDC Transmission and Flexible AC Transmission Systems (Elective-II)**
R19PE1104C	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Compare HVDC and EHVAC transmission systems
CO2 Analyze converter configurations used in HVDC and evaluate the performance metrics.
CO3 Understand controllers for controlling the power flow through a dc link and compute filter Parameters.
CO4 Apply impedance, phase angle and voltage control for real and reactive power flow in ac transmission systems with FACTS controller.
CO5 Analyze and select a suitable FACTS controller for a given power flow condition.

Course Code	**Power Electronics Simulation Laboratory**
R191106	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Analyze the characteristics of power semiconductor devices in simulation.
CO2 Analyze the operation of various power electronic converters in simulation.
CO3 Analyze and implementing the speed controlling techniques for AC machines in simulation.
CO4 Analyze and implementing PWM techniques in simulation.

Course Code	**Switched Mode Power Conversion**
N3303	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Analyze operation and control of non-isolated and isolated switch mode converters.
CO2 Design non-isolated and isolated switch mode converters.
CO3 Analyze operation and control of resonant converters.
CO4 Feedback design of switch mode converters based on linearized models.

Course Code	**Power Electronic Control of Electrical Drives**
N3304	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Study the concepts of scalar and vector control methods for drive systems.
CO2 Analyze and design controllers and converters for induction motor and PMSM, BLDC drives.
CO3 Select and implement proper control techniques for induction motor and PMSM for specific applications.
CO4 Analyze and design control techniques and converters for SRM drives.

Course Code	**Energy Auditing, Conservation and Management (Elective-III)**
N3305	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Understand the principle of energy audit and their economic aspects.
CO2 Recommend energy efficient motors and design good lighting system.
CO3 Understand advantages to improve the power factor.
CO4 Evaluate the depreciation of equipment.

Course Code	**Hybrid Electric Vehicles (Elective-III)**
N3306	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Know the concept of electric vehicles and hybrid electric vehicles.
CO2 Familiar with different motors used for hybrid electric vehicles.
CO3 Understand the power converters used in hybrid electric vehicles
CO4 Know different batteries and other energy storage systems.

Course Code	**Advanced Digital Control Systems (Elective-III)**
N3307	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Analyze digital control systems using Z-transforms and Inverse Z-Transforms.
CO2 Evaluate the state transition matrix and solve state equation for discrete model for continuous time systems, investigate the controllability and observability.
CO3 Determine the stability; design state feedback controller.
CO4 Design an observer.
CO5 Solve a given optimal control problem.

Course Code	**Advanced Digital Signal Processing (Elective-IV)**
N3308	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Describe structure of digital filters.
CO2 Design digital filters with different techniques.
CO3 Understand the implementation aspects of signal processing algorithms.
CO4 Know the effect of finite word length in signal processing.
CO5 Analyze different power spectrum estimation techniques.

Course Code	**Evolutionary Algorithms and Applications (Elective-IV)**
N3309	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.

CO2 Apply classical optimization techniques to minimize or maximize a multi- variable objective function, without or with constraints, and arrive at an optimal solution.

CO3 Formulate a mathematical model and apply linear programming technique by using Simplex method. Also extend the concept of dual Simplex method for optimal solutions.

CO4 Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions.

CO5 Apply Genetic algorithms for simple electrical problems and able to solve practical problems using PSO.

Course Code	**Microcontrollers (Elective-IV)**
N3310	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Design the interfacing circuits for input and output to PIC micro controllers and DSP processors.

CO2 Write ALP for DSP processors.

CO3 Design PWM controller for power electronic circuits using FPGA.

Course Code	**Power Systems Laboratory**
P3303	

COURSEOUTCOMES

After completion of course, students would be able to:

CO1 Distinguish between sequence impedances of alternator and transformer.

CO2 Understand the Ferranti effect.

CO3 Analyze performance and importance of transmission line parameters.

CO4 Understand the operation of various protection relays.