DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

PROGRAMME: M.E. POWER SYSTEMS ENGIEERING

VISION

- ❖ To produce globally competent and socially responsible Electrical and Electronics Engineers to meet the Industry needs.

MISSION

- ❖ To establish quality learning facilities.
- ❖ To produce Quality Electrical Engineers to compete globally.
- ❖ To nurture innovative research on cutting edge technologies.
- ❖ To inculcate the positive attitude and spirit of ethical practices.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- ❖ To prepare the students for successful career in electrical power industry, research and teaching institutions.
- ❖ To provide strong foundation in Power Engineering, necessary for day-to-day operation and planning of Power System.
- ❖ To develop the ability to design various controllers to enhance the stability and power transfer capability of the Power System.
- ❖ To provide knowledge in Renewable Energy Systems, Electric Vehicles and Grid Integrations using Power Converters.
- ❖ To develop a detailed understanding of various tools applied to the operation, design and investigation of modern electric power systems.

PROGRAM OUTCOMES (POs)

- ❖ Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- ❖ Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences,

and engineering sciences.

❖ Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

❖ Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

❖ Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

❖ The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

❖ Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

❖ Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

❖ Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

❖ Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

❖ Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

❖ Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

❖ Ability to apply knowledge of electrical power system principles and techniques for power system applications.

❖ Ability to develop steady-state and dynamic models of various power system components to perform system studies for generation and transmission system expansion planning.

❖ Ability to design and develop various indigenous controllers for efficient and economic operation of power system.

❖ Ability to design and develop principles, practices and state-of-art techniques to protect the power system.

❖ Ability to analyze various electricity market models with distributed energy resources and demand response management.

❖ Ability to incorporate interdisciplinary knowledge to address the recent problems in the electrical power industry.

COURSE OUTCOMES (COs)

Regulation	2017
Semester	01
Course Code	MA5155
Course Name	Applied Mathematics for Electrical Engineers
Course Outcome	❖ After completing this course, students should demonstrate competency in the following skills: ❖ Apply various methods in matrix theory to solve system of linear equations. ❖ Maximizing and minimizing the functional that occur in electrical engineering discipline. ❖ Computation of probability and moments, standard distributions of discrete and continuous random variables and functions of a random variable ❖ Could develop a fundamental understanding of linear programming models, able to develop a linear programming model from problem description, apply the simplex method for solving linear programming problems. ❖ Fourier series analysis and its uses in representing the power signals.

Regulation	2017
Semester	01

Course Code	PS5101
Course Name	Advanced Power System Analysis
Course Outcome	❖ Ability to apply the concepts of sparse matrix for large scale power system analysis ❖ Ability to analyze power system studies that needed for the transmission system planning.

Regulation	2017
Semester	01
Course Code	PS5102
Course Name	Power System Operation and Control
Course Outcome	❖ Learners will be able to understand system load variations and get an overview of power system operations. ❖ Learners will be exposed to power system state estimation. ❖ Learners will attain knowledge about hydrothermal scheduling. ❖ Learners will understand the significance of unit commitment and different solution methods. ❖ Learners will understand the need for state estimation in real time operation

Regulation	2017
Semester	01
Course Code	PS5103
Course Name	Analysis and Computation of Electromagnetic Transients in Power Systems
Course Outcome	❖ Learners will be able to model over head lines, cables and transformers. ❖ Learners will be able to analyze power system transients.

Regulation	2017
Semester	01
Course Code	IN5152
Course Name	System Theory

Course Outcome	❖ Ability to represent the time-invariant systems in state space form as well as analyze, whether the system is stabilizable, controllable, observable and detectable.
	❖ Ability to design state feedback controller and state observers
	Ability to classify singular points and construct phase trajectory using delta and isocline methods.
	❖ Use the techniques such as describing function, Lyapunov Stability, Popov's Stability
	❖ Criterion and Circle Criterion to assess the stability of certain class of non-linear system.
	❖ Ability to describe non-linear behaviors such as Limit cycles, input multiplicity and output multiplicity, Bifurcation and Chaos.

Regulation	2017
Semester	01
Course Code	PX5152
Course Name	Analysis And Design Of Power Converters	Professional Elective I
Course Outcome	❖ At the end of the course the student will be able to:
	❖ Analyze various single phase and three phase power converters
	Select and design dc-dc converter topologies for a broad range of power conversion applications.
	❖ Develop improved power converters for any stringent application requirements.
	❖ Design ac-ac converters for variable frequency applications.

Regulation	2017
Semester	01
Course Code	PS5111
Course Name	Power System Simulation Lab
Course Outcome	❖ Analyze the power flow using Newton-Raphson method and Fast decoupled method.

	❖ Perform contingency analysis & economic dispatch
	❖ Set Digital Over Current Relay and Coordinate Relay

Regulation	2017
Semester	02
Course Code	PS5201
Course Name	Power System Dynamics
Course Outcome	❖ Learners will be able to understand on dynamic modelling of synchronous machine. ❖ Learners will be able to understand the modeling of excitation and speed governing system for stability analysis. ❖ Learners will attain knowledge about stability of dynamic systems. ❖ Learners will understand the significance about small signal stability analysis with controllers. ❖ Learners will understand the enhancement of small signal stability

Regulation	2017
Semester	02
Course Code	PS5202
Course Name	HVDC and FACTS
Course Outcome	❖ Learners will be able to refresh on basics of power transmission networks and need for FACTS controllers ❖ Learners will understand the significance about different voltage source converter based FACTS controllers ❖ Learners will understand the significance of HVDC converters and HVDC system control ❖ Learners will attain knowledge on AC/DC power flow analysis

Regulation	2017
Semester	02

Course Code	PS5203
Course Name	Advanced Power System Protection
Course Outcome	❖ Learners will be able to understand the various schemes available in Transformer protection ❖ Learners will have knowledge on Overcurrent protection. ❖ Learners will attain knowledge about Distance and Carrier protection in transmission lines. ❖ Learners will understand the concepts of Generator protection. ❖ Learners will attain basic knowledge on substation automation.

Regulation	2017
Semester	02
Course Code	PS5204
Course Name	Restructured Power System
Course Outcome	❖ Learners will have knowledge on restructuring of power industry ❖ Learners will understand basics of congestion management ❖ Learners will attain knowledge about locational margin prices and financial transmission rights ❖ Learners will understand the significance ancillary services and pricing of transmission network ❖ Learners will have knowledge on the various power sectors in India

Regulation	2017	
Semester	02	
Course Code	PS5092	
Course Name	Solar and Energy Storage Systems	Professional Elective II
Course Outcome	❖ Students will develop more understanding on solar energy storage systems ❖ Students will develop basic knowledge on standalone PV system ❖ Students will understand the issues in grid connected PV systems	

	❖ Students will study about the modeling of different energy storage systems and their performances ❖ Students will attain more on different applications of solar energy

Regulation	2017
Semester	02
Course Code	PS5071
Course Name	Distributed Generation and Microgrid Professional Elective III
Course Outcome	❖ Learners will attain knowledge on the various schemes of conventional and nonconventional power generation. ❖ Learners will have knowledge on the topologies and energy sources of distributed generation. ❖ Learners will learn about the requirements for grid interconnection and its impact with NCE sources ❖ Learners will understand the fundamental concept of Microgrid.

Regulation	2017
Semester	02
Course Code	PS5211
Course Name	Advanced Power System Simulation Laboratory
Course Outcome	❖ Gain hands on experience on various power system dynamic studies using own program and validation of results using software packages.

Regulation	2017
Semester	03
Course Code	PS5072 Professional Elective IV
Course Name	Energy Management and Auditing
Course Outcome	❖ Students will develop the ability to learn about the need for energy management and auditing process ❖ Learners will learn about basic concepts of economic analysis and load

	management.
	❖ Students will understand the energy management on various electrical equipments.
	❖ Students will have knowledge on the concepts of metering and factors influencing cost function
	❖ Students will be able to learn about the concept of lighting systems, light sources and various forms of cogeneration

Regulation	2017	
Semester	03	
Course Code	PX5071	
Course Name	Wind Energy Conversion Systems	Professional Elective V
Course Outcome	❖ Acquire knowledge on the basic concepts of Wind energy conversion system. ❖ Understand the mathematical modeling and control of the Wind turbine ❖ Develop more understanding on the design of Fixed speed system ❖ Study about the need of Variable speed system and its modeling. ❖ Able to learn about Grid integration issues and current practices of wind interconnections with power system.	

Regulation	2017	
Semester	03	
Course Code	PS5073	
Course Name	Electric Vehicles and Power Management	Professional Elective VI
Course Outcome	❖ Learners will understand the operation of Electric vehicles and various energy storage technologies for electrical vehicles	

Regulation	2017
Semester	03
Course Code	PS5311
Course Name	Project Work Phase I

Course Outcome	❖ At the end of the course the students will have a clear idea of their area of work and they will be in a position to carry out the remaining phase II work in a systematic way.

Regulation	2017
Semester	04
Course Code	PS5411
Course Name	Project Work Phase II
Course Outcome	❖ On completion of the project work students will be in a position to take up any challenging practical problem in the field of engineering design and find better solutions to it.