

Department Name: Electrical Engineering

PG Program Name: M.Tech Electrical Power Systems

Vision

Develop professionally competent electrical engineers to serve future needs and challenges of the society in global environment.

Mission:-

To impart technical education and research skills in close interaction with industry and society for the development of young minds, sensitive to ethical and environmental issues.

Sr. No.	Program Outcomes
1.	PO1: independently carry out research /investigation and development work to solve practical problems
2.	PO2: write and present a substantial technical report/document
3.	PO3: 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.
4.	PO4: analyze electrical power systems to identify performance parameters to be improved by designing suitable control system.
5.	PO5: Use modern scientific and engineering tools to assess the performance of power systems
6.	PO6: Evaluate financial aspects in power system infrastructure development considering environmental issues for sustainable growth

Sr. No.	Program Specific Outcomes
1.	PSO: Able to interpret data and work on power system research projects with well-defined goals to provide practical solutions.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1.	I	SH515	Numerical Computational Technique	CO1-Estimate the error. CO2- Apply the relevant numerical method for interpolating the polynomial CO3- Develop the equation to be fitted and fit the curve for given data CO4- Estimate numerically the solution of given algebraic equation. CO5- Use the relevant method for solving the simultaneous linear equations and compute the Eigen values. CO6-Construct the fuzzy set for given linguistic variable and apply fuzzy logic.
2.		EPS1013	Advanced Power Systems Analysis	CO1-Develop proper mathematical models for analysis of selected problem like power flows analysis and fault analysis. CO2-Apply computational techniques to analyse power system under steady state conditions. CO3-Explain the need of economic load dispatch and optimal power flow studies. CO4-Apply numerical and heuristic techniques to solve economic load dispatch and optimal power flow problems CO5-Estimate various parameters using least square algorithms.
3.	I	EPS1023	Power System Dynamics	CO1-Describe power system operating states and control CO2-Analyze synchronous machine model CO3-Model excitation and prime mover system CO4-Describe the power system stability CO5-Analyze transient and voltage Stability
4.	I	EPS1033	Smart Grids	CO1: Discuss features of Smart Grid in the context of Indian Grid CO2: Design of architectures and tools for smart grids CO3: Recommend suitable generation technologies for Smart Grid

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO4: Address power quality issues in smart grid CO5: Implement control strategies for smart grid
5.	I	EPS1043	HVDC Transmission	CO1. Justify the need of HVDC Transmission system for power transmission CO2. Analyse different working modes of converters used for HVDC transmission CO3. Compare different control schemes employed for controlling HVDC system CO4. Compute the filter parameters for elimination of voltage and current harmonics in HVDC system CO5. Draw and compare different configuration multi-terminal HVDC system
6.	I	EPS1053	Electrical Power Distribution System	CO1. Plan and forecast distribution systems CO2. Design distribution system and associated equipment and devices. CO3. Identify the importance of capacitors in distribution system. CO4. Describe importance of distributed generation CO5. Explain the importance of automation and SCADA
7.	I	EPS1063	Wind and Solar Systems	CO1. Explain the performance and characteristics of wind energy CO2. Analysis of voltage control and power quality issues for wind energy system. CO3. Design dynamic modelling of wind turbines: CO4. Discuss about working of PV cells and PV technologies. CO5. Describe the different types of power converters and storage system.
8.	I	SHP 551	Technical Communication	CO1. Acquire skills required for good oral and written communication CO2. Demonstrate improved writing and reading skills

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO3. Ensure the good quality of oral and written communication
9.	I	EPS1073	Power System Steady State Analysis Lab	CO1. Develop script to analyze symmetrical components using power system software. CO2. Analyze load flow and fault studies of given power system network using power system software. CO3. Develop MATLAB programme for power system optimization problem CO4. Develop estimation algorithm using least square methods. CO5. Use various power system software packages to analyze power system networks
10.	I	EPS1083	Renewable Energy Lab	CO1. Prepare report on wind resource assessment CO2. Operate and maintain squirrel cage and DFIG based systems. CO3. Compute reactive power requirement for standalone wind turbine system CO4. Demonstrate the effects of shadowing on PV modules CO5. List the installation materials for off grid PV systems
11.	II	EPS2013	Digital Protection of power system	CO1. Discuss the importance of Digital Relays CO2. Apply mathematical approach towards protection CO3. Develop algorithms for numerical protection
12.	II	EPS2023	Application of Power Electronics to Power System	CO1. Explain the dynamic function of power system CO2. Illustrate the operation and characteristics of reactive power compensators. CO3. Develop models of reactive power compensator CO4. Analyze power quality issues. CO5. Design different devices to mitigate power quality issues.
13.	II	EPS2033	Restructured Power System	CO1. Describe the new dimensions associated with the power systems.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO2. Determine transmission congestion management CO3. Discuss pricing of transmission network CO4. Explain ancillary service management in electrical market CO5. Justify the role and functions of PX, IEX and various organization in Indian restructured power market
14.	II	EPS2043	Energy Storage System	CO1: Apply energy storage systems for generation of electrical power CO2: Analyze pumped hydroelectric and compressed energy storage CO3: Apply battery energy storage systems for various power system applications CO4: Calculate economics of solar-thermal energy storage CO5: Analyze role of gas storage in transmission and distribution systems
15.	II	EPS2053	Electric and Hybrid Vehicles	CO1. Describe the performance of hybrid vehicle CO2. Explain the hybrid electric and electric drive mechanism. CO3. Identify the different electric components used in hybrid and electric vehicles CO4. Describe the energy storage systems in electric and hybrid vehicles.
16.	II	EPS2063	SCADA system and its Applications	CO1. Develop RLL diagrams for the given applications. CO2. Describe the basic tasks of Supervisory Control Systems (SCADA) as well as their typical applications CO3. Explain SCADA architecture, various advantages and disadvantages of each system and single unified standard architecture IEC 61850 CO4. To learn about SCADA system components: remote terminal units, PLCs, intelligent electronic devices, HMI systems, SCADA server. CO5. Discuss applications of SCADA systems in various sectors.

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17.	II	EPS2073	Research Methodology & IPR	CO1. Formulate a research problem. CO2. Analyze research related information CO3. Prepare and present research proposal/paper by following research ethics CO4. Make effective use of computers and computing tools to search information, analyze information and prepare report. CO5. Describe nature and processes involved in development of intellectual property rights
18.	II	EPS2083	Power System Protection Lab	CO1: Observe different switches, cbs. relays CO2: Analyze characteristics of solid state relays CO3: Analyze characteristics of digital relays CO4: Demonstrate protection panels CO5: Simulate protection models
19.	II	EPS2093	Power System Optimization Lab	CO1. Identify different types of optimization problems. CO2. Formulate power system optimization problem. CO3. Solve optimization problems by numerical methods. CO4. Explain heuristic techniques and their need. CO5. Apply heuristic methods to optimization problems.
20.	II	EPS2103	Industry Internship / Professional Certification	CO1. Apply engineering knowledge learned during the program. CO2. Apply his/her technical skills to solve industrial problem. CO3. Work in multi-disciplinary environment.
21.	II	EPS2113	Mini Project	CO1. Formulate a real world problem. CO2. Design solution for a set of requirements. CO3. Use software packages available to analyze the proposed theory. CO4. Explain technical ideas, strategies and methodologies in written form and oral presentations

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22.	III	EPS3013	MOOC	CO1: Develop program using C++ language project work CO2: Use the core concepts to implement in the project work CO3: formulate the research problem
23.	III	EPS3023	Dissertation Phase - I	CO1. Identify research opportunities in his/her domain or multidisciplinary domains CO2. Formulate the problem statement and its objectives correctly CO3. Apply the principles of project management during development of the project CO4. Present synopsis in logical order CO5. Write synopsis of the proposed system
24.	III	EPS3033	Dissertation Phase - II	CO1. Identify research opportunities in his/her domain or multidisciplinary domains. CO2. Formulate the problem statement and its objectives correctly CO3. Develop, simulate and implement the system by complying with desired technical specifications CO4. Analyze and synthesize obtained results in theoretical and practical context CO5. Present report in logical order CO6. Write report of the system implementation
25.	IV	EPS4013	Dissertation Phase - III	CO1. Formulate the problem statement and its objectives correctly CO2. Develop, simulate and implement the system by complying with desired technical specifications CO3. Analyze and synthesize obtained results in theoretical and practical context

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO4. Present report in logical order CO5. Write report of the system implementation CO6. Apply the principles of project management during development of the project
26.	IV	EPS4023	Dissertation Phase - IV	CO1. Formulate the problem statement and its objectives correctly CO2. Develop, simulate and implement the system by complying with desired technical specifications CO3. Analyze and synthesize obtained results in theoretical and practical context CO4. Present report in logical order CO5. Write report of the system implementation CO6. Apply the principles of project management during development of the project