Yeshwantrao Chavan College of Engineering, Nagpur

PO/PSO and CO's of all courses of the PG Programme

Session 2020-2021

Name of the Department: Electrical Engineering

Name of the PG Programme: M.Tech. in Intergrated Power System

Programme Outcomes (PO)

A. To demonstrate in-depth knowledge of power system and allied fields.
B. To carry out research work with independent and introspective learning
C. To apply appropriate modern engineering and software tools to power system.
D. To think critically to indentify, conceive, analyse and solve complex engineering problems in power and energy sector.
E. To communicate effectively and acquire professional, ethical and responsible attitude towards sustainable development of the society.
F. To accept and adapt to the technological changes for lifelong learning with enthusiasm and commitment to improve knowledge and competence continuously.
G. To demonstrate capacity for self-management, project & finance management and decision making to achieve common goals.

Programme Specific Outcomes (PSO)

PSO1: -

PSO2:-

Course Outcomes (CO):

First Year: Semester I:

Course Name: Advanced Power Electronics (T/P)	**Course Code: EL3901/EL3902**
CO1	Apply knowledge of the power semiconductor devices, to select them for a range of applications.
CO2	Demonstrate and analyze techniques to design and assess the performance of thyristor-based converters, as well as, switch-mode DC/DC power electronic converters, resonant and DC/AC inverters.
CO3	Assess power quality specially, power factor and harmonic issues of various power electronic converters/inverters.
CO4	Analyze different modulation techniques for bridge as well as multilevel inverters.5.Design,simulate, and test various converter/inverter circuits in the laboratory.(Lab component)

Course Name: Analog & Digital Protection (T/P)	**Course Code: EL3903/EL3904**
CO1	Explain & design protection scheme for Relay Coordination
CO2	Develop, Compare & Solve the problems of over current and distance protection
CO3	Explain and define the basics terms of Digital Protection
CO4	Compare and solve the different methods and techniques of digital

	protection
CO5	Explain and justify the recent advances in digital protection

Course Name: Digital Control System (T)	**Course Code: EL3905**
CO1	Recall and explain the basics of discrete time signals.
CO2	Apply and solve Z transforms method for discrete systems and analyse the stability of digital control system.
CO3	Understand the preliminary concept of state variable analysis of discrete time control systems, pole placement and design through state feedback.
CO4	Select the PID parameters through tuning and make use of optimal control for design.

Course Name: HVDC Power Transmission (T)	**Course Code: EL3906**
CO1	Recall the principles, advantages and applications of a HVDC link.
CO2	Explain the operation of converters in a classical HVDC link and modern VSCHVDC technology.
CO3	Model valve and converter for simulation.
CO4	List various methods of control and protection, various faults, stability aspects relevant to HVDC system.

Course Name: Power System Modelling (T)	**Course Code: EL3907**
CO1	Understand the general construction and relationship between the various fluxes of various electrical machines and its impact on induced emf during the small and transient disturbances.
CO2	Analyze the electrical machines in stationary and rotary frame of reference in per unit for stability analysis.
CO3	Evaluate the electrical machine parameters for various power system components under static and dynamic load conditions.
CO4	Create mathematical models for stationary and rotating machines under steady state and transient conditions.

Course Name: PE I: Electrical Drives and Controls (T/P)	**Course Code: EL3908/EL3909**
CO1	Explain the working of DC motor, Induction motor, synchronous motor, brushless DC motor and Switched reluctance motors
CO2	Analyse operation of DC motor, Induction motor, synchronous motor, brushless DC motor and Switched reluctance motors.
CO3	Choose suitable converters for DC motor, Induction motor, synchronous motor, brushless DC motor and Switched reluctance motors.
CO4	Solve numericals on DC motor, Induction motor, synchronous motor.

Course Name: PE I: Renewable Energy System (T/P)	**Course Code: EL3910/EL3911**
CO1	Apply knowledge of renewable energy sources to various solar, wind and other systems
CO2	Demonstrate and analyze techniques to design and assess the

	performance of solar PV panels and solar based energy converters
CO3	Assess the output of renewable energy systems under different environmental conditions
CO4	Analyze the performance of different renewable energy sources like solar, wind, geothermal and hybrid sources

First Year: Semester II:

Course Name: Power System Planning (T)	**Course Code: EL3915**
CO1	Illustrate various regulations by state and central government for energy generation and supply and apply them for planning integrated power system.
CO2	Develop and examine the role of investors in a power plant portfolio for sustainable development
CO3	Interpret the load forecasting and recommend the generation, transmission, and distribution capacities for integrated power system considering economical, reliable and optimal usage for sustainable development.
CO4	Predict the behavior of integrated power system for secure and reliable operation.

Course Name: Application of Power Electronics to Power System (T)	**Course Code: EL3916**
CO1	Demonstrate the knowledge of AC transmission constraints and decide the power electronics-based solutions.
CO2	Design and assess the performance of shunt and series thyristor-based controllers.
CO3	Interpret and compare the performance of various converter –based controllers
CO4	Analyze different control techniques for shunt/series/shunt-series and series-series controllers.

Course Name: Power Quality (T)	**Course Code: EL3917**
CO1	Define, discuss and analyse the various power quality problem, their causes and effects in distribution system
CO2	Identify, discuss and analyse the different non-linear loads.
CO3	Define, explain, apply various measurements and transforms to analyse the power quality problems.
CO4	Describe, analyse and calculate the powers, harmonics indices and sequence components.
CO5	Explain, apply the various indices and develop load balancing algorithms.
CO6	Discuss, analyse, apply the various custom power devices, their reference generation algorithms and their applications.

Course Name: PE II: EHV Power Transmission (T)	Course Code: EL3919
CO1	List various aspects of EHVAC Transmission.
CO2	Develop knowledge to calculate various parameters related to EHV Transmission line.
CO3	Explain voltage gradient concept pertaining to conductors of the EHV Transmission line.
CO4	Discuss various effects of EHVAC Transmission related to human life.

Course Name: PE II: Restructuring of Power System (T)	Course Code: EL3920
CO1	Discuss deregulation of electricity market.
CO2	Classify, illustrate different processes and operations in deregulation.
CO3	Explain, apply solution techniques for optimal power flow.
CO4	Discuss automation in energy management and communication technologies in power system.

Course Name: PE IV: Power Electronics for Renewable Energy Systems (T)	Course Code: EL3926
CO1	Describe the impact and significances of different renewable energy sources.
CO2	Explain solar thermal and solar photovoltaic applications
CO3	Describe and analyse the various solar photovoltaic inverters topologies and configurations, and characteristics.
CO4	Discuss and categorize wind energy conversion systems based on the generators, controls and operation.
CO5	Examine and apply various power converters for Wind energy systems and its controls.
CO6	Define and explain the need of hybrid systems, discuss its various configurations and various power quality issues in grid integrations.

Course Name: PE IV: Control System Design (T)	Course Code: EL3927
CO1	Recall and explain the basics of conventional design method in time and frequency domain.
CO2	Apply and solve problems for design of discrete systems and analyse the stability of digital control system.
CO3	Understand the preliminary concept of discrete time state variable analysis pole placement and design through state feedback.
CO4	Explain the concepts of optimal control formulation of optimal control.

Course Name: Power System Simulation (P)	Course Code: EL3928
CO1	Solve and design the power system problems.
CO2	Explain, compare various pulse width modulations and apply to

	different converter topologies
CO3	Use and evaluate the load balancing for compensation.
CO4	Design and analyse the renewable energy sources.
CO5	Design the various controls and its application in power system.
CO6	Apply and infer the performance of compensators in power system.

Course Name: Power System Design (P)	**Course Code: EL3929**
CO1	Identify and explain the various aspects AC and DC power transmission systems.
CO2	Design and assess the performance of AC transmission system
CO3	Develop optimized and robust HVDC transmission systems and evaluate the significance of the various parameters.

Second Year: Semester III:

Course Name: Project Phase -I	**Course Code: EL3939**
CO1	Identify research topic
CO2	Carryout literature survey
CO3	Analyze and solve the research problem
CO4	Learn and use the suitable software tool
	To communicate effectively with proper presentation methods

Second Year: Semester IV:

Course Name: Project Phase -II	**Course Code: EL3940**
CO1	Analyze the system and achieve desired results using software/hardware tools
CO2	Write and present the research paper based on project work
CO3	Acquire in-depth knowledge of the subject for the benefit of the society