K.L.N. College of Engineering
Department of Electrical and Electronics Engineering
M.E. Power Systems Engineering-Course Outcomes-R-2017

Course Name: C101- Applied Mathematics for Electrical Engineers   **Course Code: MA5155**

C101.1	To determine the Eigen values using QR factorization and solve system of equations by least
C101.2	Squares method involving pseudo inverse.
C101.3	To determine the extremals of functionals depending on single and several independent variables using the concept of variation and its properties.
C101.4	To identify some discrete and continuous probability distributions and apply the concepts in Electrical engineering problems.
C101.5	To mathematically formulate Electrical Engineering and industry related problems and solve them using simplex method and some standard resource management techniques.

Course Name: C102– Advanced Power System Analysis   **Course Code: PS5101**

C102.1	To discuss different techniques dealing with sparse matrix for large scale power systems.
C102.2	To explain different methods of power flow solutions.
C102.3	To solve optimal power flow problem.
C102.4	To analyze various types of short circuit faults
C102.5	To demonstrate different numeric al integration methods and factors influencing transient stability

Course Name: C103– Power System Operation and Control   **Course Code: PS5102**

C103.1	Outline the voltage, frequency regulation and load forecasting methods
C103.2	Analyze the real – power frequency control for single area and two area power system
C103.3	Analyze Hydro – Thermal coordination for maintain the power balance between generation and demand
C103.4	Predict the unit to be committed and evaluate the generation scheduling by analyzing cost equation of the units.
C103.5	Analyze the state estimation of power system using different techniques to maintain the security of the systems

**Course Name: C104– Analysis and Computation of Electromagnetic Transients in Power Systems
Course Code: PS5103**

C104.1	Develop travelling wave equation and to analyze travelling wave
C104.2	Analyze the sources and effects of lightning, switching and temporary over voltages.
C104.3	Analyze parameters and modeling of overhead lines
C104.4	Analyze parameters and modeling of underground cables
C104.5	Develop the modeling of power system for transient over voltages using Electromagnetic Transient Program (EMTP).

Course Name: C105– System Theory   **Course Code: IN5152**

C105.1	To develop the state model for linear time invariant and time variant system
C105.2	To solve the state equation for linear time invariant and time variant system
C105.3	To analyze the controllability, observability and stability of linear systems
C105.4	To design the state feedback controllers and state estimator
C105.5	To analyze the stability of linear and non-linear systems using Lyapunov, Kravoski and Variable gradient method

Course Name: C106– Analysis and Design of Power Converters   **Course Code: PX5152**

C106.1	Analyze the operation and performance of various single phase & three phase converters
C106.2	Analyze the various types of dc-dc converters operation
C106.3	Design of transformer ,inductor, input filter and output filter capacitor for power converter
C106.4	Analyze and Illustrate the operation of various types of resonant dc-dc converters
C106.5	Analyze the operation and performance of various types of ac voltage controller and Cycloconverter for variable frequency applications

Course Name: C107– Power System Simulation Lab   **Course Code: PS5111**

C107.1	Develop the coding to Analyse the load flow problems using Newton Raphson and Fast Decoupled methods and state estimation for the power system and interpret the results.
C107.2	Design the simulation model to Analyse the transient stability of the power system and contingency analysis using generation shift factors and line outage distribution factors
C107.3	Develop the coding to Analyse the economic dispatch and unit commitment for a given power system and interpret the results
C107.4	Design the simulation model to Analyse the occurrence of electromagnetic transients in power system and interpret the results
C107.5	Design the simulation model of VSI and analyse the relay coordination for digital over current relay and distance relays for radial distribution systems

Course Name: C108– Power System Dynamics   **Course Code: PS5201**

C108.1	Explain the dynamic modeling of synchronous machine, steady state analysis and equation of motion.
C108.2	Apply and analyze the modeling of excitation and speed governing system.
C108.3	Analyze the significance about small signal stability analysis without controllers
C108.4	Analyze the significance about small signal stability analysis with controllers
C108.5	Apply and explain the methods of enhancement of small signal stability

Course Name: C109– HVDC and FACTS   **Course Code: PS5202**

C109.1	Analyze the basics of power transmission networks and need for FACTS controllers
C109.2	Illustrate the significance about SVC & STATCOM converter based FACTS controllers
C109.3	Illustrate the significance about TCSC and SSSC converter based FACTS controllers
C109.4	Demonstrate the significance of HVDC converters and HVDC system control.
C109.5	Develop knowledge on AC/DC power flow analysis.

Course Name: C110– Advanced Power System Protection   **Course Code: PS5203**

C110.1	Demonstrate the construction and principle of operation of over current relay and apply over current protection for feeders
C110.2	Analyze the various faults occur in transformers and to select appropriate protective scheme for transformers and discuss the differential scheme for bus bar protection
C110.3	Apply the distance and carrier current protection schemes for transmission lines
C110.4	Analyze the various faults occur in generators and to select appropriate protective scheme for generators
C110.5	Illustrate the concept of numerical protection and to apply for transformer and distance protection

Course Name: C111– Restructured Power System   **Course Code: PS5204**

C111.1	Demonstrate the Fundamentals And Architecture of Power markets.
C111.2	Analyze the technical Challenges of Restructured Power Systems
C111.3	Analyze the Transmission Networks And System Security Services
C111.4	Analyze the effect of Market Pricing
C111.5	Apply the effect of Restructured Power Market Model to Indian Power Market

Course Name: C112PE2– Solar and Energy Storage Systems   **Course Code: PS5092**

C112PE2.1	Apply the basics of semiconductor theory sunlight and solar cell.
C112PE2.2	Analyze solar PV system with power conditioning unit and Design stand alone PV system and sizing
C112PE2.3	Analyze issues in gird connected PV system.
C112PE2.4	Apply he engineering knowledge on various energy storage systems
C112PE2.5	Identify the various applications of solar energy systems.

Course Name: C113PE3– Soft Computing Techniques   **Course Code: IN5091**

C113PE3.1	Outline the basic ANN architectures, algorithms and their limitations and will be able to know the different operations on the fuzzy sets.
C113PE3.2	Develop the ANN based models and control schemes for non-linear system
C113PE3.3	Develop the fuzzy logic rules for modeling and control of non-linear systems
C113PE3.4	Analyze the Genetic Algorithms for power system optimization problems
C113PE3.5	Analyze the hybrid control schemes and P.S.O and support vector Regressive for classification and identification of power system problems

Course Name: C114– Advanced Power System Simulation Laboratory   **Course Code: PS5211**

C114.1	Develop the coding and modelling of small signal stability analysis of single machine infinite bus and multi machine.
C114.2	Design the simulation model to starting Analyse of motor using EMTP tolls
C114.3	Design the simulation model of Load flow analysis and Transient analysis of two-bus system with STATCOM
C114.4	Develop the coding to calculate the ATC using an existing load flow program and study the outline of variable speed wind energy conversion system using DFIG and PMSG
C114.5	Design the simulation of Computation of harmonic indices generated by a rectifier feeding a R-L load and design the model to active filter for mitigating harmonics

Course Name: C115– Technical Seminar   **Course Code: PS5212**

C115.1	Analyze and develop a thought process for presentation.
C115.2	Develop our language and communication skills.
C115.3	Analyze the other points of view thereby encouraging the team work
C115.4	Create the current developments in the power systems.
C115.5	Apply the principles of Ethics and Respect in interaction with others.

Course Name: C201PE4– Electrical Distribution System   **Course Code: PS5003**

C201PE4.1	Explain the basic concepts of electrical distribution system
C201PE4.2	Apply the concepts of planning of distribution system for utility systems
C201PE4.3	Explain the Line Model of Distribution system
C201PE4.4	Evaluate voltage drop and line loss calculations for designing the capacitors and voltage regulating equipments
C201PE4.5	Analyze the power flow in balanced and unbalanced Three-Phase Distribution Feeder

Course Name: C202PE5– Energy Management and Auditing   **Course Code: PS5072**

C202PE5.1	Analyze the need for energy management and auditing process
C202PE5.2	Analyze the concepts of economic load management.
C202PE5.3	Analyze the energy management on various electrical equipments
C202PE5.4	Analyze the concepts of metering and factors influencing cost function
C202PE5.5	Analyze the concept of lighting systems, light sources and various forms of cogeneration

Course Name: C203PE6A– Wind Energy Conversion Systems   **Course Code: PX5071**

C203PE6A.1	To apply the basic concepts of wind energy system.
C203PE6A.2	To analyze the design and control of various types of wind turbine and their components.
C203PE6A.3	To analyze the design of constant speed wind Generators and modelling of wind turbine rotor.
C203PE6A.4	To apply knowledge of variable speed wind Generators and modelling of variable speed wind systems
C203PE6A.5	To identify Grid integration issues and current practices of wind interconnections with power system.

Course Name: C203PE6B– Principles of Electric Power Transmission   **Course Code: PS5004**

C203PE6B.1	Explain the types of power transmission and configurations
C203PE6B.2	Apply engineering knowledge to calculate line parameters
C203PE6B.3	Analyze voltage gradients of transmission line conductors
C203PE6B.4	Analyze the effect of Electrostatic field and analyze the design requirements of EHV lines
C203PE6B.5	Analyze the design requirements of HVDC lines

Course Name: C204– Project Work Phase I   **Course Code: PS5311**

C204.1	Identify the area and narrow dine the problems by using the existing journal references
C204.2	Identify and apply the real world and societal importance problems in the power systems and its allied area.
C204.3	Identify, analyze, design, implement projects with a complete and organized solution methodologies
C204.4	Apply modern engineering tools for solution
C204.5	Contribute as an individual of technical projects

Course Name: C205– Project Work Phase II   **Course Code: PS5411**

C205.1	To design and develop the projects and creativity and choose the most appropriate option for the current project
C205.2	Effectively as a member of a project work
C205.3	To effectively communicate technical project information in writing or in personal presentation and conversation
C205.4	Engaged in continuously learning the new practices, principles, and techniques of the electrical power industry
C205.5	Contribute as an individual of technical projects and attend the conferences and apply projects in journals