

K.L.N.College of Engineering
Department of Electrical and Electronics Engineering
M.E. Power Systems Engineering

Course Outcomes (Regulation 2013)

At the end of the course, the students will be able:

C101 - APPLIED MATHEMATICS FOR ELECTRICAL ENGINEERS

C101.1 To apply the concepts of Matrix theory

C101.2 To solve linear programming problems

C101.2 To apply the basic concepts of one dimensional random variables in electrical engineering problems.

C101.3 To explain calculus of variations

C101.4 To solve problems using Fourier transforms.

C102 ADVANCED POWER SYSTEM ANALYSIS

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 numerical integration methods and factors influencing transient stability

C103 POWER SYSTEM OPERATION AND CONTROL

C103.1 To explain the terms related with power system operation and to explain various methods of load forecasting

C103.2 To model and analyze the single area and two area thermal power system

C103.3 To discuss the hydro-thermal scheduling problem

C103.4 To solve unit commitment and economic dispatch problems

C103.5 To explain the function of SCADA and EMS

C104 ELECTRICAL TRANSIENTS IN POWER SYSTEMS

C104.1 To explain the sources and effects of lightning, switching and temporary over voltages.

C104.2 To model and estimate the over voltages in power system

C104.3 To develop travelling wave equation and to analyze travelling wave.

C104.4 To analyze the insulation coordination of power system and protective devices.

C104.5 To develop the modeling of power system for transient over voltages using Electromagnetic Transient Program (EMTP).

C105 SYSTEM THEORY

C105.1 To develop state model for linear time invariant and time variant system and non-linear system

C105.2 To solve the state equation

C105.3 To analyze controllability and observability of the system using state model

C105.4 To analyze the stability of the linear time invariant, time variant and nonlinear systems using Lyapunov, Krasovskii and Variable-Gradient Methods.

C105.5 To design state and output feedback controllers and estimators

C107 POWER SYSTEM SIMULATION LABORATORY

C107.1 To develop coding to solve power flow problem using NR and GS methods

C107.2 To develop coding to calculate generation shift factor and line outage factor

C107.3 To develop coding to solve UC and ED problems

C107.4 To analyze transient stability of SMIB system using MATLAB and to analyze the switching surges using EMTP

C107.5 To simulate and analyze voltage source inverters

C107.6 To analyze the functions of protective relays using simulation

C108 POWER SYSTEM DYNAMICS

C108.1 To develop dynamic modeling of a synchronous machine.

C108.2 To describe the modeling of excitation and speed governing system.

C108.3 To analyze the small signal stability without controllers

C108.4 To analyze the small signal stability with controllers

C108.5 To explain the methods to enhance the small signal stability of the power system.

C109 FLEXIBLE AC TRANSMISSION SYSTEMS

C109.1 To explain the necessity and various types of FACTS controllers

C109.2 To develop model of SVC and describe the applications SVC

C109.3 To analyze TCSC and GCSC

C109.4 To develop the modeling and analyze the voltage source converter based FACTS controllers

C109.5 To describe the coordination between the various FACTS controllers

C110 ADVANCED POWER SYSTEM PROTECTION

C110.1 To explain the construction and principle of operation of over current relay and apply over current protection for feeders

C110.2 To list various faults occur in transformers and generators and to select appropriate protective scheme for transformers and generators

C110.3 To apply distance and carrier current protection schemes for transmission lines

C110.4 To discuss the differential scheme for bus bar protection

C110.5 To explain the concept of numerical protection and to apply for transformer and distance protection

C111 RESTRUCTURED POWER SYSTEM

C111.1: To explain the importance of restructuring of Power Systems, different market models and the function of ISO role in power market.

C111.2: To discuss the Concepts of Transmission Congestion and to calculate ATC

C111.3: To Calculate Locational marginal pricing and explain the significance of Financial Transmission rights.

C111.4: To define Ancillary services management and analyze transmission pricing issues.

C111.5: To outline the reform initiatives taken by Indian Government, Electricity act 2003 and open access issues.

C114 ADVANCED POWER SYSTEM SIMULATION LABORATORY

C114.1 To develop simulation model of SMIB system and multi machine system for small signal stability analysis

C114.2 To develop simulation model for two bus system with STATCOM and to analyze load flow and transient stability using the simulated model

C114.3 To develop simulation model for wind energy conversion system and to analyze its response.

C114.4 To develop simulation induction motor model and to analyze its starting response

C114.5 To develop coding to calculate ATC.

C204 PROJECT WORK (PHASE I)

C204.1 To independently carry out research /investigation to identify and solve practical problems

C204.2 To write and present a report

C205 PROJECT WORK (PHASE II)

C205.1 To identify the problem in the existing power system and to develop software / hardware solution by doing research.

C205.2 To write and present a substantial technical report

C106E3 ANALYSIS AND DESIGN OF INVERTERS

C106E3.1 To describe the operation of different single phase inverters

C106E3.2 To apply three phase voltage source inverters to various drive systems

C106E3.3 To explain the operation of various current source inverters and to design PWM techniques for current source inverters

C106E3.4 To develop various multi level inverters and impedance source inverters and PWM techniques for MLI

C106E3.5 To describe the operation of various resonant inverters.

C112E1 POWER QUALITY

C112E1.1 To describe various power quality issues

C112E1.2 To explain the concept of power and power factor in single phase and three phase systems supplying non linear loads

C112E1.3 To discuss the conventional compensation techniques used for power factor correction and load voltage regulation.

C112E1.4 To explain the active compensation techniques used for power factor correction.

C112E1.5 To analyze the active compensation techniques used for load voltage regulation.

C113E3 SOFT COMPUTING TECHNIQUES

C113E3.1 To explain the concept of artificial neural network and to develop ANN structure and back propagation algorithm

C113E3.2 To develop Hopfield neural network model and explain adaptive resonant theory

C113E3.3 To describe fuzzy concept and to develop fuzzy logic systems

C113E3.4 To explain Genetic Algorithm, Tabu Search and Ant Colony Optimization algorithms

C113E3.5 To apply ANN, fuzzy logic and optimization algorithms to solve the problems

C201E2 HIGH VOLTAGE DIRECT CURRENT TRANSMISSION

C201E2.1 To compare AC and DC transmission and explain modern DC transmission system

C201E2.2 To analyze HVDC converters and HVDC system control

C201E2.3 To list the applications of multi terminal DC systems

C201E2.4 To solve DC power flow problem

C201E2.5 To develop simulation model for HVDC system

C202E7 POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS

C202E7.1 To discuss and analyze the various types of renewable energy sources.

C202E7.2 To analyze the performance of IG, PMSG, SCIG and DFIG.

C202E7.3 To design different power converters namely AC to DC, DC to DC and Ac to AC converters for renewable energy sources.

C202E7.4 To analyze various operating modes of wind electrical generators and solar energy systems.

C202E7.5 To develop maximum power point tracking algorithms.

C203E9 POWER SYSTEM PLANNING AND RELIABILITY

C203E9.1 To list the objectives of load forecasting and to apply the AI technique for load forecasting

C203E9.2 To determine the reliability of ISO and interconnected generation systems.

C203E9.3 To analyze the transmission system reliability

C203E9.4 To explain the expansion planning and capacitor placement problem in transmission system and radial distributions system.

C203E9.5 To design the primary and secondary distribution system and to explain distribution system protective scheme and its coordination.