

Course Structure

Course Code : SM7205

Course Title : Power Station System Design

Credit Hours : 3

Course Description

This module will examine the system design requirements of generating system for responding to the needs of the integrated grid. Electric power has always been one of the driving forces for progress in human life. This has popularized electric energy as the most utilized form of energy. However, dispersed location of energy resources and continuously increasing demand of electricity have led to a large electric power transmission network across the landscape. To operate the power station system effectively, a large number of components, such as protection systems, monitoring systems, operation procedures, etc. are required to work in a synchronized and efficient manner; otherwise, contingencies may arise in the system.

Course Objectives

To operate the power station system effectively, a large number of components, such as protection systems, monitoring systems, operation procedures, etc. are required to work in a synchronized and efficient manner; otherwise, contingencies may arise in the system.

Course Topics

- Introduction to the course motivation, old and new problems. Intro to energy sources
- Industrial organization, management economics and finance
- Generation with limited supply
- Transmission system effect: introduction, existing power flow techniques, Newton Raphson method and mathematical foundation
- Transmission system effects: AC system control, local voltage control, and power flow
- Power system security
- Power system security
- Review of material and midterm exam
- Optimal power flow: introduction and calculations
- Optimal power flow: algorithms and case studies
- Introduction to state estimation in power systems
- Control of generation introduction
- Automation issues in control short term demand forecasting analytic models
- Review and final exam

References

- Allen J. Wood, Bruce F Wollenberg, Gerard B Sheble, Power Generation Operation and Control, Wiley press, 2014