

Course	Name	: Power Quality
	Code	: EE184916
	Credits	: 3
	Semester	: Elective

Description of Course

The course discusses the phenomena and simulations of the phenomenon of the quality of electric power in electric power distribution systems, with discussion covering: Definition of Quality of Electric Power, Standards, Capacitors Bank for Correction of Power Factors, Reactive Power Flow and Power Losses, Voltage Quality, Imbalances, and Harmonics.

Learning Outcomes

Knowledge

(P02) Mastering the concepts and principles of engineering, and implementing them in the form of procedures for analysis and design in power systems, control systems, multimedia telecommunications, or electronics.

Specific Skill

(KK01) Able to formulate engineering problems in power systems, control systems, multimedia telecommunications, or electronics.

General Skill

(KU12) Able to implement information and communication technology (ICT) in the context of implementation of his/her work.

Attitude

(S09) Demonstrating attitude of responsibility on work in his/her field of expertise independently.

(S12) Working together to be able to make the most of his/her potential.

Course Learning Outcomes

Knowledge

Mastering the concept of the phenomenon of electric power quality in the 3 phase ac power distribution system in a steady state / transient and symmetrical / non-symmetrical state.

Specific Skill

Able to simulate the phenomenon of electric power quality in the 3 phase ac power distribution system in a steady state / transient and symmetry / non-symmetry using simulation software.

General Skill

Able to use simulation software to simulate power quality phenomena in electric power distribution systems

Attitude

Demonstrating attitude of responsibility on work in his/her field of expertise independently.

Working together to be able to make the most of his/her potential.

Main Subjects

1. Definition of PHENOMENA electric power quality, problems due to decreased power quality
2. POWER QUALITY DEFINITION & STANDARD: Transients, Short Duration Variations, Long Duration Variations, Voltage Imbalance, Waveform Distortions, Voltage Fluctuations, Power

Frequency Variations

3. CAPACITOR BANKS FOR CORRECTION OF POWER FACTORS: Understanding Power Factors, Reactive Energy Sources, Technical and Economic Benefits, Calculation of Bank Capacitor Power, Examples of Benefits of Power Factor Repair
4. REACTIVE POWER AND POWER LOSS: Reactive Power Flow, Equipment / Load Absorbing Reactive Power, Rug-Loss Due to Reactive Power Flow, Reactive Power Compensation, Capacitor Location, Side Effects of Reactive Power Compensation.
5. VOLTAGE QUALITY: Definition of Voltage Interference, Transients, Short Duration Variations, Long Duration Variations, Voltage Fluctuation (Flicker).
6. BALANCE: Understanding Imbalance, Causes of Imbalance, Symmetry Components, Imbalance Indicators, Imbalance Impacts on Electrical Equipment, Practical Recommendations for Limiting Imbalances, Improving Supply Network Balance.
7. HARMONISA: Understanding Harmonics, Problems Due to Harmonics, How to Reduce Harmonics, How to Detect Harmonics, Harmonics of Voltage and Flow in Supply Systems, Voltage and Current Harmonic Distortion Factors, Harmonics Flow Sources, System Characteristic Responses, Harmonics, Capacitors and Harmonics, Harmonics Flow Reduction, Standard Harmonics.

Reference(s)

- [1] W. Mielcczarski, G.J. Anders, M.F. Conlon, W.B. Lawrence, H. Khalsa, G. Michalik, "Quality of Electricity Supply & Management of Network Losses", Puma Press, 1997
- [2] Roger C. Dugan, Mark F. McGranagan, H. Wayne Beaty, "Electrical Power Systems Quality", McGraw Hill, 1996
- [3] Wilson E. Kazibwe, Musoke H. Sendaula, "Electric Power Quality Control Techniques", Van Nostrand Reinhold, 1993

Prerequisite(s)

EE184511 Power System Analysis
