EE 423: Power Quality (3-0-0:3)

Introduction

Power quality-voltage quality-overview of power quality phenomena-classification of power quality issues-power quality measures and standards-THD-TIF-DIN-message weights-flicker factor-transient phenomena-occurrence of power quality problems-power acceptability curves-IEEE guides, EMC standards and recommended practices.

Power Assessment under Waveform Distortion

Introduction, single phase definitions, three phase definitions, illustrative examples.

Waveform Processing Techniques

Fundamental frequency characterization, Fourier analysis, Fast Fourier Transform, window functions, efficiency of FFT algorithms, alternative transforms, wavelet transform, Hartley transform, automation of disturbance recognition.

Power Quality Monitoring

Introduction, transducers, CT, PT, power quality instrumentation, Harmonic monitoring, event recording, flicker monitoring, assessment of voltage and current unbalance, examples of application

Evaluation of Power System Harmonic Distortion

Introduction, direct harmonic analysis, incorporation of harmonic voltage sources, derivation of network harmonic impedances, solution by direct injection, representation of individual power system components, implementation of harmonic analysis, post processing and display of results.

Harmonic Mitigation

Passive filtering, harmonic resonance, impedance scan analysis-active power factor corrected single phase front end, introduction to three phase APFC and control techniques,

Grounding

Grounding and wiring–introduction-NEC grounding requirements-reasons for grounding-typical grounding and wiring problems-solutions to grounding and wiring problems.

Text Books:

1. G T Heydt, “Electric Power Quality”, Stars in circle
2. Math H Bollen, “Understanding Power Quality Problems”, CRC press
3. J. Arrillaga, “Power System Quality Assessment”, John Willey

References:

1. J Arrillaga, A R Wood & et al, “Power System Harmonic Analysis”, John Wiley
2. Surya Santoso & et al, “Electrical Power System Quality”, McGraw Hills