POWER QUALITY IMPROVEMENT TECHNIQUE

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PRE-REQUISITES : Power Electronics

INTENDED AUDIENCE : Final year B.Tech, M.Tech students of Power Electronics and power system, Power electronics Engineer / Experts from industry

INDUSTRIES APPLICABLE TO : ABB, GE, Statcon Energeia, CESC, NTPC, NHPC all state electric supply board, AAI

COURSE OUTLINE :
The power quality of modern power distribution system is vulgarized due to the increased use of distributed sources, adjustable speed drive, nonlinear load and unbalanced load. The main challenge in the distribution system is the mitigation of power quality problems produced by load disturbances and supply disturbances. It can be mitigated by passive filters as well as active filters. The passive filters are economically cheap but their performance is poor compared to the active power filters. Hence active power filters are preferred in the modern power system.

ABOUT INSTRUCTOR :
Prof. Avik Bhattacharya is working as Assistant Professor in IIT Roorkee from February 2014. Before joining IIT Roorkee he was research and development team of Danfoss Solar inverter and ABB. He has over a decade of experience in power quality issues and published four IEEE transaction on it. He is also teaching this course in IIT Roorkee for past two years for UG and PG (B.Tech fourth year and M.Tech) . His teaching is right blending of Industry, research and academic interest

COURSE PLAN :

Week 1 : Concept of Power Quality: Frequency variations, voltage variations- sag and swell, waveform distortion –dc offset,harmonics, inter-harmonics, notching and noise.
Week 2 : Representation of harmonics, waveform, harmonic power,measures of harmonic distortion; Current and voltage limits of harmonic distortions: IEEE, IEC, EN, NORSO
Week 3 : Causes of Harmonics: 2-pulse, 6-pulse and 12-pulse converter configurations, input current waveforms and their harmonic spectrum; Input supply harmonics of AC regulator, integral cycle control, cycloconverter, transformer, rotating machines, ARC furnace, TV and battery charger.
Week 4 : Elimination/ Suppression of Harmonics: High power factor converter, multi-pulse converters using transformer connections
(delta, polygon)
Passive Filters: Types of passive filters, single tuned and high pass filters, filter design criteria, double tuned filters, damped filters
and their design
Week 5 : PWM Inverter: Voltage sourced active filter, current sourced active filter, constant frequency control, constant tolerance band control,variable tolerance band control.
Week 6 : Active Power Filters: Compensation principle, classification of active filters by objective, system configuration, power circuit andcontrol strategy
Week 7 : Hybrid Shunt Active power filter: Principle of operation, analysis and modelling
Week 8 : Unified power quality conditioner, voltage source and current source configurations, principle of operation for sag, swell and flicker control