

Course Syllabi: UEE524: Power Quality Monitoring and Conditioning (L : T : P :: 3 : 1 : 0)

1. **Course number and name:** UEE524: Transmission and Distribution of Power

2. **Credits and contact hours:** 3.5 and 4

3. **Text book, title, author, and year**

Text Books / Reference Books

- *Kennedy, B., Power Quality Primer, McGrawHill (2000).*
- *Beaty, H. and Santoso, S., Electrical Power System Quality, McGrawHill (2002).*
- *Bollen, M.H.J., Power Quality Problems: Voltage Sag and Interruptions, IEEE Press (2007).*

a. Other supplemental materials

- Nil

4. **Specific course information**

a. Brief description of the content of the course (catalog description)

Overview and definition of power quality (PQ): Sources of pollution and regulations, Power quality problems, Rapid voltage fluctuations voltage unbalance, Voltage dips and voltage swells, Short duration outages.

Definitions Voltage sag analysis and mitigation: Sag caused by motor starting, Sag caused by utility fault clearing, Sag mitigation, Sag magnitude and duration calculations, RMS voltage, Calculation in 1-phase systems, Equipment performance in presence of sag, Computers, AC and DC drives.

Harmonics: Effects-within the power system, Interference with communication harmonic measurements, Harmonic elimination.

Harmonic distortion: Power Overview system harmonics, Harmonic analysis, Harmonic sources-the static converters, Transformer magnetization and non-linearities, Rotating machines, Arc furnaces, Fluorescent lighting, Total harmonic distortion, rms and average value calculations, Effects of harmonic distortion.

Principles for controlling harmonics: Locating sources of harmonics, Passive and active filters, Harmonic filter design.

Monitoring power quality: Monitoring essentials, Power quality measuring equipment, Current industry trends.

Power Conditioning: Electric power conditioning, Active and passive filters. IEEE, IEC, ANSI standards, Power acceptability curves, Various standards.

5. **Specific goals for the course**

After the completion of the course, the students will be able to:

- Reliably identify the sources of various power quality problems.
- Explain about causes of harmonic and its distortion effect.
- Estimate the impact of various power quality problems on appliances.
- Educate the harmful effects of poor power quality and harmonics.
- Decide the compensators and filters to keep the power quality indices within the standards.

6. Brief list of topics to be covered

- Overview and definition of power quality
- Definitions Voltage sag analysis and mitigation
- Harmonics
- Harmonic distortion
- Principles for controlling harmonics
- Monitoring power quality
- Power Conditioning