

# GUJARAT TECHNOLOGICAL UNIVERSITY

## Electrical Engineering

M.E. Semester: IV

Subject Name: **Harmonics Measurements & Filtration Techniques**

Sr. No.	Course Content
1.	<b>Fundamentals of Harmonic Distortion:</b> Linear & Non Linear Loads, Power Quality Indices, Power Quantities under Non sinusoidal situations, Harmonic Sources: Traditional and future sources of harmonics, Standardization of harmonics levels
2.	<b>Effects of harmonics on Distribution systems:</b> Effects on capacitors, Transformers, Rotating machines, Lighting Devices, cables, relays , Telephone Interference, Solid state Devices etc.
3.	<b>Harmonics Measurements:</b> Necessity of harmonic measurement, Measurement procedure
4.	<b>Harmonic Filtering Techniques:</b> Passive filter design, single tuned filter, Band pass filter, Tuned harmonic filter design, other methods to decrease harmonic distortion Limits.
5.	<b>Active Filters:</b> General description of Shunt Active filters, 3-phase, 3-wire shunt active filters, Active filters for current minimization, Active filters for harmonic damping, 3-phase, 4-wire shunt active filters, Hybrid and series active filters, comparison with pure active filters, Combined series and shunt power conditioners, Unified Power Flow Controller (UPFC), Unified Power Quality Controller (UPQC)- basic concepts.
6.	<b>Harmonic Analysis:</b> Harmonic source representation, Harmonic Propagation facts, flux of harmonic currents, Interrelation between AC system and Load Parameters Analysis methods

### Reference Books:

1. Harmonics and Power systems By Francisco C. De La Rosa Taylor& Francis group, CRC Press
2. *Power System Harmonics, Second Edition* J. Arrillaga, N.R. Watson, John Wiley & Sons, Ltd ISBN: 0-470-85129-5
3. Power Electronics Converter Harmonics By Deare A Paice, IEEE Press
4. Instantaneous Power Theory and Application to Power Conditioning By Hirofumi Akagi et al., IEEE Press, Willey-Interscience A Jhon Willey & Son Publication,