



Kadi Sarva Vishwavidyalaya
Faculty of Engineering & Technology
Master of Engineering Semester I
(Electrical Power System)
 (With effect from Academic Year 2017-18 (CBCS))

Subject Code: MEEE-206-N-B	Subject Title: Harmonic Measurement and Filtration Techniques (Major Elective)
Pre-requisite	

A. Course Objective:

- To introduce students to measurement of harmonics in the power system
- To enable students to learn harmonic filtration techniques
- To impart knowledge of converter topologies and their control strategies in the field of active power filters

Teaching scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		Theory		IE Marks	CIA Marks	Pract. Marks	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
04	00	02	06	05	03	70	30	20	30	150

B. Outline of the Course:

Sr. No	Title of the Unit	Minimum Hours
1	The instantaneous Power Theory	08
2	Harmonic Filtering Techniques	12
3	Active Filters	28
4	Harmonic Analysis	12

Total Hours (Theory): 60

Total Hours (Lab): 30

Total Hours: 90



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Detailed Syllabus

Sr. No	Topic	Lecture Hours	Weight age(%)
1	The instantaneous Power Theory: Basics of p-q Theory, p-q theory in Three phase-Three wire systems, p-q theory in Three phase, Four-wire systems, Instantaneous abc Theory, comparison between pq and abc Theory.	8	10
2	Harmonic Filtering Techniques: Passive filter design, single tuned filter, Band pass filter, Tuned harmonic filter design, other methods to decrease harmonic distortion Limits	12	15
3	Active Filters: 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, Hybrid and series filters Combined series and shunt power conditioners, Unified Power Flow Controller (UPFC), Unified Power Quality Controller (UPQC)- basic concepts.	28	60
4	Harmonic Analysis: Harmonic source representation, Harmonic Propagation facts, flux of harmonic currents, Interrelation between AC system and Load Parameters Analysis methods	12	15
Total		60	100

C. Instructional Method and Pedagogy:



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- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures, which may carries five marks in overall evaluation.
- One internal exam of 30 marks is conducted as a part of mid semester evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carries a weight age of five marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar /Tutorial may be conducted and having share of five marks in the overall internal evaluation.

D. Learning Outcome

On successful completion of the course

- Students will be able to measure and mitigate harmonics in the power system.
- Students will be able to understand various power filter topologies for harmonic mitigation.

E. Text Books & Reference Books:

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