18PEE32	HARMONICS AND FILTERS FOR POWER ELECTRONIC CIRCUITS	L	T	P	C
		3	0	0	3

Course Objectives:

1.	To impart knowledge on the fundamentals of harmonics
2.	To understand the principle of operation of passive power filter
3.	To understand the principle of operation of shunt active power filter
4.	To understand the principle of operation of series active power filter
5.	To understand the principle of operation of hybrid active power filter

Unit I	FUNDAMENTALS OF HARMONICS	9	+	0

The mechanism of harmonic generation – Sources of harmonics: commercial and industrial loads– Effects of harmonics – Factors influencing - development of harmonic standards – General harmonic indices – Applied harmonics: Harmonic evaluations on the utility system, Harmonic evaluation for end-user facilities – Harmonic study procedure – Useful tools for harmonic assessment: Fourier series, Fourier Transform, DFT, FFT, Hartley Transform and Wavelet Transform.

Unit II	PASSIVE POWER FILTER	9	+	0

Classification: shunt, series – circuit configuration ,principle of operation – Analysis and design simulation and performance – limitation – mitigation of resonance problem of passive filters with the power supply system.

Unit III	SHUNT ACTIVE POWER FILTER	9	+	0

Classification, circuit configuration ,principle of operation and control, Analysis and design, modelling simulation and performance - numerical problems

Unit IV	SERIES ACTIVE POWER FILTER	9	+	0

Classification, circuit configuration ,principle of operation and control, Analysis and design, modelling simulation and performance - numerical problems

Unit V	HYBRID ACTIVE POWER FILTER	9	+	0

Classification, circuit configuration ,principle of operation and control, Analysis and design, modelling, simulation and performance - numerical problems

Total (L+T)= 45 Periods

Course Outcomes:

At the end of the course the student will be able to:

CO1	:	Understand the fundamentals of harmonics
CO2	:	Analyze and design of passive power filter
CO3	:	Analyze and design of shunt active power filter
CO4	:	Analyze and design of series active power filter
CO5	:	Analyze and design of hybrid active power filter

Text Books:

1.	Power quality problems and mitigation techniques " Bhim Singh, Ambrish Chandra and Kamal Al-Haddad" John Wiley and Sons limited, First Edition 2015
2.	Electrical power system quality "Roger C. Dugan, Mark F.McGranaghan, Surya Santoso, H.Wayne Beaty" McGraw – Hill publications, Second Edition 2009.

Reference Books:

1.	A.J.Arrillaga , "Power System Harmonics", John Wiley and Sons Limited, Second Edition, 2003
2.	G.T.Heydt, "Electric Power Quality", McGraw – Hill professional, 2007.

PO / CO	CO Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	*Understand the fundamentals of harmonics*	1	1	3	2	3	1	1	1	1	1	1
CO2	*Analyze and design of passive power filter*	1	3	2	2	1	1	1		1	1	1
CO3	*Analyze and design of shunt active power filter*	1	3	2	2	1	1	1		1	1	1
CO4	*Analyze and design of series active power filter*	1	3	2	2	1	1	1		1	1	1
CO5	*Analyze and design of hybrid active power filter*	1	3	2	2	1	1	1		1	1	1