

COURSE CODE: 1152EE101	COURSE TITLE: POWER QUALITY ENGINEERING	L	T	P	C
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COURSE CATEGORY:

Program Elective

PREAMBLE :

The functioning of power system components depends significantly on better structure. This course covers a refreshed pedagogy of Power System transmission and distribution the various issues affecting Power Quality, their production, monitoring and suppression

PREREQUISITE COURSES:

- Power System Analysis

COURSE EDUCATIONAL OBJECTIVES :

The objectives of the course are to make the students,

- An understanding about basics of power system quality
- Knowledge in calculation of voltage sags and interruptions
- An understanding about Load flow analysis – GS and NR method using MATLAB
- To calculate Short circuit analysis on DC network analyzer (EMTDC / PSCAD)
- An understanding of economic dispatch control using MATLAB

COURSE OUTCOMES :

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Gain Knowledge on basics of power system quality	K2
CO2	Calculate voltage sags and interruptions	K2
CO3	Have an insight on over voltages and its causes	K2
CO4	Understand about harmonics	K2
CO5	Understand the fundamentals of power quality monitoring	K2

CORRELATION OF COs AND POs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L			M					L			
CO2	L		H	M					L			
CO3			M	M					L			
CO4			H	M	H		L	H	H		M	
CO5			M	L					L			

COURSE CONTENT:		
UNIT I	INTRODUCTION TO POWER QUALITY	9
Terms and definitions – Overloading – Under voltage – Sustained interruption-Sags and Swells – Waveform distortion – Total Harmonic Distortion (THD) – Computer Business Equipment Manufacturers Associations (CBEMA) curve		
UNIT II	VOLTAGE SAGS AND INTERRUPTIONS	9
Sources of sags and interruptions – Estimating voltage sag performance – Motor starting sags – Estimating the sag severity – Mitigation of voltage sags – Active series compensators – Static transfer switches and fast transfer switches		
UNIT III	OVERVOLTAGES	9
Sources of over voltages – Capacitor switching – Lightning – Ferro resonance – Mitigation of voltage swells – Surge arresters – Low pass filters – Power conditioners – Lightning protection – Shielding – Line arresters – Protection of transformers and cables – Computer analysis tools for transients – PSCAD and EMTP		
UNIT IV	HARMONICS	9
Harmonic distortion – Voltage and current distortion – Harmonic indices – Harmonic sources from commercial and industrial loads – Locating harmonic sources – Power system response characteristics – Resonance – Harmonic distortion evaluation – Devices for controlling harmonic distortion – Passive filters – Active filters – IEEE and IEC standards		
UNIT V	POWER QUALITY MONITORING	9
Monitoring considerations – Power line disturbance analyzer – Power quality measurement equipment – Harmonic / spectrum analyzer – Flicker meters – Disturbance analyzer – Applications of expert system for power quality monitoring		
TOTAL: 45 PERIODS		
TEXT BOOKS:		
<ol style="list-style-type: none"> 1. Math H.J.Bollen, Understanding Power Quality Problems-Voltage sag & Interruptions, IEEE Press,2000 2. Roger C. Dugan, Mark F. McGranaghan, Surya Santoso and H.Wayne Beaty, “Electrical Power Systems Quality”, McGraw Hill, 2003. 		
REFERENCE BOOKS:		
<ol style="list-style-type: none"> 1. PSCAD User Manual. 2. Power Quality in Electrical Systems - Alexander Kusko ,McGraw-Hill 		