POWER QUALITY

PROF. BHIM SINGH
Department of Electrical Engineering
IIT Delhi

TYPE OF COURSE : New | Core | UG/PG
EXAM DATE : 24 Oct 2021

PRE-REQUISITES : Circuit and Networks, Basic Electrical Engineering, Power Electronics, Power System, and Linear Control System

INTENDED AUDIENCE : Primarily the graduate students working in the area of energy economics and energy policy domain. This course will also be useful for general audience

INDUSTRIES APPLICABLE TO : ABB Group, Schneider Electric, General Electric (GE), Siemens, Captech, Electrical India

COURSE OUTLINE :
This course is intended to provide tools to classify, quantify, and analyze the power quality problems and to provide practical engineering solutions to mitigate these problems. The objectives of this course are as follows.
• To understand the various power quality issues.
• To understand the concept of power and power factor in single-phase and three-phase systems supplying nonlinear loads.
• To understand the conventional compensation techniques used for power factor correction and load voltage regulation.
• To understand the active compensation techniques used for reactive power compensation, load balancing, power factor correction, and load voltage regulation.
• To understand the active filter techniques used for harmonics elimination.
• To understand the power quality improvement in SMPS, drive systems, and renewable energy systems.

ABOUT INSTRUCTOR :
Prof. Bhim Singh has received his B.E. (Electrical) from the University of Roorkee, India, in 1977 and his M.Tech. (Power Apparatus &amp; Systems) and Ph.D. from the Indian Institute of Technology Delhi, India, in 1979 and 1983, respectively. In 1983, he joined the Department of Electrical Engineering, University of Roorkee (Now IIT Roorkee), as a Lecturer. He became a Reader there in 1988. In December 1990, he joined the Department of Electrical Engineering, IIT Delhi, India, as an Assistant Professor, where he has become an Associate Professor in 1994 and a Professor in 1997. He has been ABB Chair Professor from September 2007 to September 2012. He has also been CEA Chair Professor from October 2012 to September 2017.

COURSE PLAN :
Week 1: Power quality: An Introduction
Week 2: Power quality standards and monitoring
Week 3: Passive Shunt and Series Compensation
Week 4: Active Shunt Compensation: DSTATCOM
Week 5: Active Series Compensation: DVR
Week 6: Unified Power Quality Compensators
Week 7: Loads That Cause Power Quality Problems
Week 8: Passive Power Filters
Week 9: Shunt Active Power Filters
Week 10: Series Active Power Filters
Week 11: Hybrid Active Power Filters
Week 12: AC-DC Converters That Cause Power Quality Problems; Improved Power Quality Converters:

AC-DC Converters; Improved Power Quality Converters; Power quality improvement in electrical system applications