Faculty of Engineering & Technology

Power Quality

Information :

Course Code :	EPR 533	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Specialization of Electrical Power Engineering

Instructor Information :

Title	Name	Office hours
Professor	Almoataz Youssef Abdelaziz Mohamed Abdelmaguied	8
Assistant Lecturer	Ahmed Moreab Hussien Mohamed	2

Area Of Study :

Upon successful completion of the course, the student should be able to:
1. understand the fundamentals of power quality.
2. know the main terminology and standards of power quality.
3. apply different techniques of solving power quality problems.
4. know the measuring devices and methods for the power quality problems.

Description :

Power Quality Fundamentals: Definition, Terminology, Criteria, Standards. VOLTAGE SAGS: Characteristics, Mitigation, Voltage Fluctuations and Lamp Flicker. Power Frequency Disturbance: Disturbances, Low Frequency Disturbances, Voltage Tolerance Criteria - ITIC Graph. Electrical Transients: Modeling, Types and Causes. Harmonics: Voltage and Current Harmonics, Individual and Total Harmonic Distortion. Grounding and Bonding: NEC Requirements, Earth Resistance Tests, Earth Ground Grid Systems, Power Ground System. Power Factor: Power Factor Improvement, Synchronous Condensers, Static Var Compensators, Advantages of Power Factor Correction. Electromagnetic Interference; Electrical and Magnetic Fields, Power Frequency Fields, High Frequency Interference, EMI Terminology. Measuring And Solving Power Quality Problems: Measurement Devices, Test Locations, and Duration.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Demonstrate knowledge and understanding of concepts and basic principles of power quality.
2 -	Illustrate and describe solutions for different problems in various ways: verbally, graphically, and using simulation.
3 -	Understand computer modeling, simulation, rendering and presentation techniques.
4 -	Identify problems, list customer needs and requirements and gather relevant information.
5 -	Demonstrate knowledge and understanding of electrical system regulations and standard codes.
b.Intellectual Skills: :	
1 -	Express ideas in structural and mathematic terms so that quantities evaluation is facilitated.
2 -	Ability to apply different alternative solutions.
3 -	Decide and choose among different solution alternatives.

4 -	Evaluate obtained results both individually or as a part of team.
c.Professional and Practical Skills: :	
1 -	Ability to integrate knowledge and understanding of mathematics, information technology, design and engineering concepts to design and plan electrical systems to solve problems.
2 -	Conduct research and collect data from different resources.
3 -	Use appropriate techniques for representation.
d.General and Transferable Skills: :	
1 -	Write technical reports in accordance with standard scientific guidelines.
2 -	Work in a self-directed manner.
3 -	Work coherently and successfully as a part of a team.
4 -	Analyze problems and use innovative thinking in their solution.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction	5	3	2
Power Quality Fundamentals: Terms and Definitions	15	9	6
Voltage Sags and Interruptions	10	6	4
Electrical Transients	5	3	2
Voltage Regulation	10	6	4
Power Factor Improvement	10	6	4
Harmonics	10	6	4

Teaching And Learning Methodologies :

Lectures
Tutorials
Laboratories

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Attendance	10.00		to assess the performance of students during the course
Final Exam	40.00	15	to assess the comprehensive understanding of the scientific background of the course, to assess the ability of problem solving with different techniques studied.
First Mid-Term Exam	15.00	7	to assess the skills of problem solving, understanding of related topics.
Quizzes and Assignments (1)	10.00	5	to assess the skills of problem solving, understanding of related topics.
Quizzes and Assignments (2)	10.00	9	to assess the skills of problem solving, understanding of related topics.
Second Mid-Term Exam	15.00	11	to assess the skills of problem solving, understanding of related topics.

Course Notes :

No course notes are required

Recommended books :

1. R. C. Dugan, M. F. McGranaghan, S. Santoso and H. W. Beaty, "Electrical Power Systems Quality", Second Edition, McGraw Hill, 2004.
2. C. Sankaran, "Power Quality", CRC Press, 2002.
3. Alexander Kusko and Marc T. Thompson, "Power Quality in Electrical Systems", McGraw Hill, 2007.

Periodicals :

4. IEEE SM 519-1992, "IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems", April 1993.
5. IEEE 1159-2008, IEEE Draft Recommended Practice for Monitoring Electric Power Quality, December 2008.