



NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	B. Tech in Electrical and Electronics Engineering		
Course Title	Electric Power Quality		
Course Code	EEPE48	No. of Credits	3
Course Code of Pre-requisite subject(s)	EEPC17, EEPC18		
Session	January 2021	Section	NA
Name of Faculty	Dr. Naveen Yalla	Department	Electrical and Electronics Engineering
Official Email	naveenyalla@nitt.edu	Telephone No.	+91 9068693477
Name of Course Coordinator (if applicable)	- -		
Course Type	<input type="checkbox"/> Core course	<input checked="" type="checkbox"/> Elective course	<input type="checkbox"/> Laboratory course

SYLLABUS (approved in BoS)

Electric power quality phenomena: Introduction to power quality, IEEE and IEC - EMC standards, overview of power quality disturbances - voltage variations, interruptions, transients, waveform distortion and power frequency variations.

Power quality indices and monitoring: Power definitions and power quality indices for single-phase, three-phase balanced and unbalanced systems under sinusoidal and nonsinusoidal conditions – importance and introduction to power quality monitoring.

Voltage variations: Definitions, sources, measurement, impact on equipment and mitigation of voltage sag, swell, interruption and voltage fluctuation.

Harmonics: Harmonic sources, measurement of harmonic distortion, current and voltage limits of distortion, harmonic analysis using Fourier transform, effects of harmonic distortion and harmonic filters – passive, active and hybrid.

Essential Readings / Reference:

1. Dugan R. C., Mc Granaghan M. F. Surya Santoso, and Beaty H. W., 'Electrical Power System Quality', McGraw-Hill 2003.
2. Math H. Bollen, 'Understanding Power Quality Problems: Voltage sags and interruptions', IEEE Press, New York, 2000.
3. Ghosh, Arindam, and Gerard Ledwich, 'Power quality enhancement using custom power devices' Springer Science & Business Media, 2012.
4. Math H. Bollen, Irene Gu, 'Signal Processing of Power Quality Disturbances' Wiley-IEEE Press, 2006.

5. J. Arrillaga, N.R. Watson, S. Chen, 'Power System Quality Assessment', Wiley, 2011.

COURSE OBJECTIVES

- To impart knowledge about various electric power quality phenomenon, causes and consequences.
- To familiarize the students to monitoring methods and essential mitigation techniques.

COURSE OUTCOMES (CO)

Course Outcomes

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

Aligned Programme Outcomes (PO)

1. Understand different types of power quality problems with their source of generation.	1, 2, 5, 6, 8, 11, 12, 14
2. Interpret results of power quality monitoring equipment and classify the power quality disturbances.	1, 2, 5, 6, 8, 11, 12,13, 14
3. Recommend viable solutions for mitigation of the power quality problems.	2, 5, 6, 8, 10,11, 13, 14
4. Design active & passive filters for harmonic elimination.	1, 2, 5, 6, 7, 8, 10, 11, 12, 13, 14

Course Plan – Part II

COURSE OVERVIEW

To understand the various power quality phenomenon, their origin and monitoring and mitigation methods, understand the effects of various power quality phenomenon in various equipment.

COURSE TEACHING AND LEARNING ACTIVITIES

S. No.	Week/ Contact Hour	Topic	Mode of Delivery
1.	18 – 22 January 2021 (2 hours)	Introduction to Power Quality and its importance Electric Power Quality phenomenon – IEC and IEEE definitions	Online lecture mode
2.	25 – 29 January 2021 (3 hours)	Introduction to Power Quality and its importance Electric Power Quality phenomenon – IEC and IEEE definitions	
3.	1 – 5 February 2021 (3 hours)	Overview of power quality disturbances - voltage variations, interruptions, transients, waveform distortion and power frequency variations.	Online lecture mode
4.	8 – 12 February 2021 (3 hours)	Overview of power quality disturbances - voltage variations, interruptions, transients, waveform distortion and power frequency variations.	
5.	15 - 19 February 2021 (3 hours)	Power definitions and power quality indices for single-phase, three-phase balanced and unbalanced	

		systems under sinusoidal and nonsinusoidal conditions.	
6.	22 - 26 February 2021 (3 hours)	importance and introduction to power quality monitoring.	
		ASSESSMENT – I	
7.	1 – 5 March 2021 (3 hours)	Voltage variations: Definitions, sources, measurement, impact on equipment and mitigation of voltage sag, swell, interruption and voltage fluctuation.	Online lecture mode
8.	8 – 12 March 2021 (3 hours)	Voltage variations: Definitions, sources, measurement, impact on equipment and mitigation of voltage sag, swell, interruption and voltage fluctuation	
9.	15 – 19 March 2021 (3 hours)	Harmonic sources, measurement of harmonic distortion, current and voltage limits of distortion, harmonic analysis using Fourier transform,	
10.	22 – 26 March 2021 (3 hours)	Harmonic sources, measurement of harmonic distortion, current and voltage limits of distortion, harmonic analysis using Fourier transform,	Online lecture mode
11.	30 Mar – 2 April 2021 (3 hours)	Effects of harmonic distortion and harmonic filters – passive, active and hybrid.	
12.	5 – 9 April 2021 (3 hours)	Effects of harmonic distortion and harmonic filters – passive, active and hybrid.	
		ASSESSMENT – II	
13.	12 – 16 April 2021 (3 hours)	Introduction to shunt and series compensators.	Online lecture mode
14.	19 – 23 April 2021 (3 hours)	Introduction to DSTATCOM, Dynamic Voltage Restorer (DVR) and Unified Power Quality Conditioner (UPQC).	
15.	26 – 30 April 2021 (3 hours)	Introduction to DSTATCOM, Dynamic Voltage Restorer (DVR) and Unified Power Quality Conditioner (UPQC).	
16.	3 – 7 May 2021 (3 hours)	<i>Compensation Assessment</i>	
17.	10 – 28 May 2021 (150 minutes)	<i>ASSESSMENT IV - End Semester Examination</i>	

COURSE ASSESSMENT METHODS (Shall Range from 4 to 6)

S. No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Assessment I	22 - 26 February 2021	1 hour	25%
2.	Assessment II	5 – 9 April 2021	1 hour	25%
3.	Continues evaluation	--	-	20%

CPA	Compensation test	3 – 7 May 2021	1 hour	25%
4.	End Semester Exam (entire syllabus)	10 – 28 May 2021	2 hours	30%

COURSE EXIT SURVEY

1. Students' feedback through class committee meetings
2. Feedback questionnaire from students – twice during the semester
3. Feedback from students on course outcomes shall be collected at the end of the semester

COURSE POLICY (preferred mode of correspondence with students, policy on attendance, compensation assessment, academic honesty and plagiarism etc.)

Mode of Correspondence

1. The faculty is available for consultation during the time intimated to the students then and there.
2. All correspondence will be sent to the NITT webmail of the students, if required.
3. The students can contact me in my office or through the email *thirumala@nitt.edu* for any academic related issues with respect to this course.

Compensation Assessment Policy

1. Flexibility is given to the students to fix the date for each assessment convenient to majority of the students.
2. Only one instance of absence in internal assessment is permitted. Only one compensation assessment for absentees in internal assessments will be conducted.
3. The compensation assessment (CPA) is for entire syllabus and the weightage is 80% of the weightage of the internal assessments A1 or A2. In any case, CPA is not considered as an improvement test.

Attendance Policy

1. All the students are expected to attend all the contact hours. Students should maintain 75% minimum physical attendance by the end of the course to attend the end semester examination.
2. Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' Grade. Student have to REDO the course.
3. A maximum of 10% attendance shall be allowed under On Duty (OD) category. OD is allowed only for the students having minimum attendance of 65%.



Academic Honesty & Plagiarism

1. Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
2. The answer sheet of the student will not be evaluated and ZERO mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
3. The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

ADDITIONAL INFORMATION

The minimum marks for passing this course and grading pattern will adhere to the regulations of the institute.

FOR APPROVAL

 Dr. Naveen Yalla AP/EEE Course Faculty	 Dr. S. Kayalvizhi CC-Chairperson	Approved by HOD HoD, Dept. of EEE
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Guidelines:

- a) The number of assessments for a course shall range from 4 to 6.
- b) Every course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in					P.G.
2019	2018	2017	2016	2015	
35% or class average/2 whichever is greater.			Peak/3 or class average/2 whichever is lower		40%

- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.