



# NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	B.TECH. and ELECTRICAL AND ELECTRONICS ENGINEERING		
Course Title	High Voltage Engineering		
Course Code	EEPE15	No. of Credits	3
Course Code of Pre-requisite subject(s)	EEPC11		
Session	July 2019	Section (if, applicable)	
Name of Faculty	Mr. KARTHICK KUMAR S A	Department	ELECTRICAL AND ELECTRONICS ENGINEERING
Official Email	<a href="mailto:karthicksa@nitt.edu">karthicksa@nitt.edu</a>	Telephone No.	8124441507
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	<input type="checkbox"/> Core course	<input checked="" type="checkbox"/> Elective course	
<b>Syllabus (approved in BoS)</b>			
<p>Causes and types of over voltages, effects of over voltages on power system components, Surge diverters, EMI and EMC protection against over voltages; Insulation coordination.</p> <p>Generation of high AC, DC, impulse and switching voltages; Generation of high impulse currents.</p> <p>Measurement of high AC, DC, impulse voltages using sphere gaps, peak voltmeters, potential dividers, High speed CRO and digital techniques. Measurement of high currents.</p> <p>Dielectric breakdown - break down in gases, liquids and solids; partial discharges and corona discharges.</p> <p>High Voltage Testing- testing of circuit breakers, insulators, bushings and surge diverters. Standards and specifications.</p>			
<b>COURSE OBJECTIVES</b>			
<p>To dispense an overview of various generation, measurement and testing methodologies of high DC and AC voltages and currents and also to edify the background of various breakdowns.</p>			



MAPPING OF COs with POs	
Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. Describe the causes and types of overvoltage.	1, 2, 5, 8, 9, 10, 11, 12, 13, 14
2. Illustrate different methods of generating and measuring various high voltages and currents.	
3. Explain various breakdown phenomena occurring in gaseous, liquid and solid dielectrics.	
4. Identify appropriate testing method(s) for various high voltage apparatus	

**COURSE PLAN – PART II**

**COURSE OVERVIEW**

High voltage engineering is a course covering power systems and high voltage testing. All the transmission lines above 132kV are high voltage lines. India is witnessing a rapid increase in electrical transmission industry due to ever increasing demand for electricity which implies the need of this course.

At the end of the course, students are able to understand how lightning and switching surges affect high voltage systems and possess the knowledge of the main features of the devices used in the high voltage field: overhead and cable line; Insulators; surge arresters; switchgears; DC, AC and impulse high voltage sources, voltage dividers. Students are aware of the concepts of dielectric breakdown in various mediums. The students are also getting the basics of insulation coordination and testing.

**COURSE TEACHING AND LEARNING ACTIVITIES**

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1.	Week 1 Two contact hours 22 <sup>nd</sup> July to 26 <sup>th</sup> July	Introduction, Causes over voltages	Chalk & Talk / PPT
2.	Week 2 Three contact hours 29 <sup>th</sup> July to 2 <sup>nd</sup> August	types of over voltages, effects of over voltages on power system components	Chalk & Talk / PPT
3.	Week 3 Three contact hours 5 <sup>th</sup> August to 9 <sup>th</sup> August	Surge diverters, EMI and EMC protection against over voltages	Chalk & Talk / PPT
4.	Week 4 Two contact hours 12 <sup>th</sup> August to 16 <sup>th</sup> August	Insulation coordination.	Chalk & Talk / PPT



5.	Week 5 Three contact hours 19 <sup>th</sup> August to 23 <sup>rd</sup> August	Generation of high AC, DC, impulse and switching voltages	Chalk & Talk / PPT
6.	Week 6 Three contact hours 26 <sup>th</sup> August to 30 <sup>th</sup> August	Generation of high AC, DC, impulse and switching voltages	Chalk & Talk / PPT
7.	Week 7 Three contact hours 2 <sup>nd</sup> September to 6 <sup>th</sup> September	Generation of high impulse currents. <b>First Assessment</b>	Chalk & Talk / PPT
8.	Week 8 Two contact hours 9 <sup>th</sup> September to 13 <sup>th</sup> September	Measurement of high AC, DC, impulse voltages using sphere gaps,	Chalk & Talk / PPT
9.	Week 9 Three contact hours 16 <sup>th</sup> September to 20 <sup>th</sup> September	Peak voltmeters, Potential dividers, High speed CRO and digital techniques.	Chalk & Talk / PPT
10.	Week 10 Three contact hours 23 <sup>th</sup> September to 27 <sup>th</sup> September	Measurement of high currents, Dielectric breakdown - break down in gases	Chalk & Talk / PPT
11.	Week 11 Two contact hours 30 <sup>th</sup> September to 4 <sup>th</sup> October	break down in liquids and solids	Chalk & Talk / PPT
12.	Week 12 Two contact hours 7 <sup>th</sup> October to 11 <sup>th</sup> October	Partial discharges and corona discharges, <b>Second Assessment</b>	Chalk & Talk / PPT
13.	Week 13 Three contact hours 14 <sup>th</sup> October to 18 <sup>th</sup> October	High Voltage Testing- testing of circuit breakers, insulators,	Chalk & Talk / PPT
14.	Week 14 Three contact hours 21 <sup>st</sup> October to 25 <sup>th</sup> October	bushings and surge diverters	Chalk & Talk / PPT
15.	Week 15 Three contact hours 28 <sup>th</sup> October to 1 <sup>st</sup> November	Standards and specifications. Revision,	Chalk & Talk / PPT
16.	Week 16 Three contact hours 4 <sup>th</sup> November to 8 <sup>th</sup> November	Revision	Chalk & Talk / PPT
17.	Week 17 Two contact hours 11 <sup>th</sup> November to 15 <sup>th</sup> November	Revision, Compensation Test	Chalk & Talk / PPT



<b>COURSE ASSESSMENT METHODS</b> (shall range from 4 to 6)				
<b>S.No.</b>	<b>Mode of Assessment</b>	<b>Week/Date</b>	<b>Duration</b>	<b>% Weightage</b>
1	First Assessment – First Class Test	Week 7 2 <sup>nd</sup> September to 6 <sup>th</sup> September	One Hour 15 Minutes	25
2	Second Assessment – Second Class Test	Week 12 7 <sup>th</sup> October to 11 <sup>th</sup> October	One Hour 15 Minutes	25
3	Assignment/ Surprise Test/ Attendance/ Seminar /	Throughout Semester		20
CPA	Compensation Assessment*	Week 17 11 <sup>th</sup> November to 15 <sup>th</sup> November	One Hour 15 Minutes	25
4	Final Assessment *	18 <sup>th</sup> November to 4 <sup>th</sup> December	One and Half Hour	30
<b>*mandatory; refer to guidelines on page 6</b>				
<b>ESSENTIAL READINGS: Textbooks, Reference books, website address, journals,etc</b>				
<b>Text Books:</b>				
1. Wadhwa,C.L., ' High Voltage Engineering', 3rd Edition, New Age International Publishers Ltd., New Delhi, 2010.				
2. Naidu, M.S. and Kamaraju,V., 'High Voltage Engineering', 4th Edition, Tata McGraw-Hill Publishing Company, New Delhi,4th Edition, 2009.				
3. E. Kuffel, W. S. Zaengl, J. Kuffel, 'High Voltage Engineering: Fundamentals', Butterworth-Heinemann, 2nd Edition, 2000.				
<b>COURSE EXIT SURVEY</b>				
1. Feedback from the students during class committee meetings				
2. Anonymous feedback through questionnaire (Mid of the semester & End of the semester)				
3. End semester feedback on course outcomes				
<b>COURSE POLICY</b>				
1. Attending all the assessments mandatory for every student				
2. One compensation assessment will be conducted for those students who are being physically absent for the assessment 1 and/or 2, only for the valid reason.				
3. At any case CPA will not be considered as an improvement test.				
4. Absolute/Relative grading will be adopted for the course.				
<b>MODE OF CORRESPONDENCE (email/ phone etc.)</b>				
1. All the students are advised to check their NITT WEBMAIL regularly. All the correspondence (schedule of classes/ schedule of assessment/ course material/ any other information regarding this course) will be done through their webmail only.				
2. Queries to the course teacher shall only be emailed sakarthickkumar@gmail.com				
<b>ATTENDANCE POLICY</b> (A uniform attendance policy as specified below shall be followed)				
➤ At least 75% attendance in each course is mandatory.				



- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

**ACADEMIC DISHONESTY & PLAGIARISM**

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- 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.
- The above policy against academic dishonesty shall be applicable for all the programmes.

**ADDITIONAL INFORMATION, IF ANY**

**FOR APPROVAL**

Course Faculty

M. A. Anand

CC- Chairperson

S. Mageshvarani

HOD

S. Sridhar



**Guidelines**

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory 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.
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.