

# NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### COURSE PLAN – PART I

<b>Course Title</b>	Power System Protection and Switchgear		
<b>Course Code</b>	EEPC26	<b>No. of Credits</b>	03
<b>Department</b>	Electrical and Electronics Engineering	<b>Faculty</b>	Dr. Vivek Mohan
<b>Session:</b>	Jan 2019	<b>Section:</b>	3 <sup>rd</sup> year B
<b>Pre-requisite Course</b>	EEPC 25		
<b>Course Coordinator</b>			
<b>E-mail</b>	vivekmohan@nitt.edu	<b>Telephone No.</b>	+91 8113093716
<b>Course Type</b>	<b>Core</b>		

### **SYLLABUS (APPROVED BY BOS)**

Relays – General classification, Principle of operation, types, characteristics, Torque equation, Relaying Schemes, Relay Co-ordination.

Apparatus and line protection – Line Protection – Distance, Differential protection and Carrier current protection. Generator protection – protection against abnormal condition, stator and rotor protection Transformer Protection – Incipient fault–Differential protection, Feeder and Bus bar protection.

Protection against over voltages – Causes of over voltage, Ground wires, Surge absorbers and diverters. Earthing - types. Insulation co-ordination.

Theory of arcing and arc quenching circuit breakers-types – rating and comparison, RRRV, Resistor switching and capacitor switching.

Introduction to Static relays – Digital relays - Microprocessor based relays – Apparatus and line protection – Basics of Numerical relays.

### **ESSENTIAL READINGS : Textbooks, reference books, Website addresses, journals, etc**

- 1) Badri Ram and Vishwakarma, D.N., 'Power System Protection and Switchgear', Tata McGraw Hill Publishing Company Ltd., 2nd Edition, 2011.
- 2) Ravindranath B., and Chander, N., 'Power Systems Protection and Switch Gear', Wiley Eastern Ltd., 1st Edition, 1977.
- 3) Sunil S. Rao, 'Protective Switch Gear', Khanna Publishers, New Delhi, 13th Edition, 2008.
- 4) Y. G. Paithankar, 'Fundamentals of Power System Protection', PHI Learning Private Limited, 2<sup>nd</sup> Edition, 2010.
- 5) C.L. Wadhwa, 'Electrical Power Systems', Wiley-Blackwell, 6th Edition, 2007

### **COURSE OBJECTIVES**

To give a broad coverage on all types of protective relaying schemes, circuit breakers and provide a strong background on working in a practical power system protection system.

## COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
Upon completion of the course the students would be able to:	
1. Classify and describe the working of various relaying schemes	5, 8, 9, 11
2. Identify and implement an appropriate relaying schemes for different power apparatus	2, 5, 8, 9, 10, 11
3. Illustrate the function of various CBs and related switching issues	5, 8, 9, 11
4. Describe the causes of overvoltage and protection against overvoltage	2, 5, 8, 9, 11

## COURSE PLAN - PART II

### COURSE TEACHING AND LEARNING ACTIVITIES

S. No.	Week	Topic	Mode of Delivery
1.	2 <sup>nd</sup> Week of Jan (3 hrs)	General classification, Principle of operation, types, characteristics, Torque equation	PPT/Chalk & Talk
2.	3 <sup>rd</sup> Week of Jan (3hrs)	Relaying Schemes + CT & PT	PPT/Chalk & Talk
3.	4 <sup>th</sup> Week of Jan (3hrs)	Relay Co-ordination	PPT/Chalk & Talk
4.	1 <sup>st</sup> week of Feb (3)	TL protection + Quiz 1	PPT/Chalk & Talk
5.	2 <sup>nd</sup> " " (3)	TL protection	PPT/Chalk & Talk
6.	3 <sup>rd</sup> " " (3)	Transformer protection	PPT/Chalk & Talk
7.	4 <sup>th</sup> " " (3)	Generator protection + MIDSEM EXAM.	PPT/Chalk & Talk
8.	1 <sup>st</sup> week of March (3)	Generator protection	PPT/Chalk & Talk

9.	2 <sup>nd</sup> Week of March (3)	Bus Bar protection	PPT/Chalk & Talk
10.	3 <sup>rd</sup> " " (3)	Arcing, Insulation Co-ordination	PPT/Chalk & Talk
11.	4 <sup>th</sup> " " (3)	Static, Digital & Numerical relay + Presentation.	PPT/Chalk & Talk
12.	1 <sup>st</sup> week of Apr (2)	Matlab Simulation	PPT/Chalk & Talk
13.	2 <sup>nd</sup> week of Apr (2)	Over voltage protection	PPT/Chalk & Talk
14.	3 <sup>rd</sup> " " (2)	Matlab Simulation	PPT/Chalk & Talk

### COURSE ASSESSMENT METHODS

S. No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Quiz 1 (MCQ with 25% negative marking)	1 <sup>st</sup> week of Feb	15 minutes	15%
2.	Mid-Sem Exam	Last week of Feb	75 minutes	30%
3.	Group Activity	Presentation starts from Jan 29 <sup>th</sup> onwards	15 minutes per presentation	15%
4.	Compensation test (Full Portions)	Between april 23 <sup>rd</sup> & 26 <sup>th</sup>	1 hour	30%
5.	End Semester Examination	Last week of April/First week of May	2 hours	40%

### COURSE EXIT SURVEY

1. Students feedback through class committee meetings
2. Feedback from students on the course outcomes shall be obtained at the end of the course

### COURSE POLICY

**COMPENSATION ASSESSMENT:** Attending all the assessments (1, 2, 3 & 5) are mandatory for every student. If any student fails to attend the assessment 2 due to genuine reason, the student is permitted to appear the compensation assessment (CPA) on submission of appropriate documents as proof. The compensation assessment (CPA) will cover full syllabus. CPA is not considered as an improvement test.

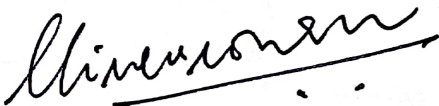
**ATTENDANCE POLICY:** All the students are expected to attend all the contact hours. Students should maintain 75% minimum physical attendance by the end of the course to

attend the end semester examination. Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' Grade and will have to REDO the course. 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%.

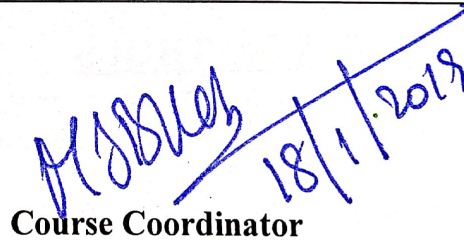
**ACADEMIC HONESTY & PLAGIARISM:** In case of any student found guilty indulging in any mal practice, the student will be awarded no marks in that assessment. If found using mobile phones or any other gadgets for mal-practice during the examination, the answer sheet of the student will not be evaluated and will be awarded ZERO marks.

**MODE OF COMMUNICATION:** The Faculty is available for consultation during the time intimated to the students then and there. The lecture notes will be posted through the faculty homepage [www.vivekmohangokulam.in](http://www.vivekmohangokulam.in) . For correspondence, please contact [vivekmohan@nitt.edu](mailto:vivekmohan@nitt.edu).

**FOR APPROVAL**

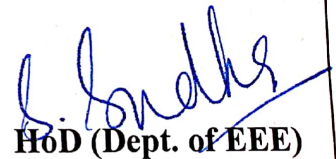


[Dr. Vivek Mohan, AP/EEE]  
Course Faculty



18/1/2019

Course Coordinator



HoD (Dept. of EEE)