

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

COURSE OUTLINE TEMPLATE																																																																									
<b>Course Title</b>	<b>Computer Relaying and Wide Area Measurement Systems</b>																																																																								
<b>Course Code</b>	EE678	<b>No. of Credits</b>				03																																																																			
<b>Department</b>	EEE	<b>Faculty</b>				M Jaya Bharata Reddy																																																																			
<b>Pre-requisites Course Code</b>	Digital Signal Processor, Power System Protection																																																																								
<b>Course Coordinator(s) (if, applicable)</b>	---																																																																								
<b>Other Course Teacher(s)/Tutor(s) E-mail</b>	---		<b>Telephone No.</b>				0431-2503270																																																																		
<b>Course Type</b>	<input type="checkbox"/> Core course				<input checked="" type="checkbox"/> Elective course																																																																				
<b>COURSE OVERVIEW</b>																																																																									
The course is designed to understand the operating principles of computer relays and wide area measurement systems. Learning about main classification of computer relay, Wide area measurement systems and their behavior, mathematical background for understanding relaying algorithms and also examining line relaying algorithms and protection of power system components.																																																																									
<b>COURSE OBJECTIVES</b>																																																																									
<ul style="list-style-type: none"> <li>• To provide the key concepts and operating principles of a computer relays and wide area measurement systems.</li> </ul>																																																																									
<b>COURSE OUTCOMES (CO)</b>																																																																									
<b>Course Outcomes</b>	<b>Aligned Programme Outcomes (PO)</b>																																																																								
Upon completion of the course, the students will be able to 1. Demonstrate knowledge of fundamental aspects of theories, principles and practice of computer relaying. 2. Define and understand the concepts of Wide area measurement systems 3. Understand and design wide area measurement systems applications in Smart grid	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>CO no.</th> <th>PO 1</th> <th>PO 2</th> <th>PO 3</th> <th>PO 4</th> <th>PO 5</th> <th>PO 6</th> <th>PO 7</th> <th>PO 8</th> <th>PO 9</th> <th>PO 10</th> <th>PO 11</th> <th>PO 12</th> <th>PO 13</th> <th>PO 14</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>H</td> <td>H</td> <td>H</td> <td>NA</td> <td>M</td> <td>M</td> <td>M</td> <td>H</td> <td>M</td> <td>M</td> <td>M</td> <td>H</td> <td>M</td> <td>M</td> </tr> <tr> <td>2</td> <td>M</td> <td>H</td> <td>H</td> <td>NA</td> <td>M</td> <td>H</td> <td>M</td> <td>H</td> <td>M</td> <td>M</td> <td>M</td> <td>H</td> <td>M</td> <td>M</td> </tr> <tr> <td>3</td> <td>H</td> <td>H</td> <td>H</td> <td>NA</td> <td>M</td> <td>M</td> <td>M</td> <td>H</td> <td>M</td> <td>M</td> <td>M</td> <td>H</td> <td>M</td> <td>M</td> </tr> </tbody> </table>													CO no.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	1	H	H	H	NA	M	M	M	H	M	M	M	H	M	M	2	M	H	H	NA	M	H	M	H	M	M	M	H	M	M	3	H	H	H	NA	M	M	M	H	M	M	M	H	M	M
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COURSE TEACHING AND LEARNING ACTIVITIES				
S.No.	Week	Topic	Mode of Delivery	
1	Weeks 1 to 2 (6 contact hours, including two contact hours for problem solving)	Fundamentals of DSP, DFT, FFT	Lecture/Tutorial	
2		Numerical examples/Problem Solving	Group work (exercise)	
3	Weeks 3 to 5 (9 contact hours, including two contact hours for problem solving)	Computer relaying architecture	Lecture/Tutorial	
4		Numerical examples/Problem Solving	Group work (exercise)	
5	Weeks 6 to 8 (9 contact hours, including two contact hours for problem solving)	Implementation of different types of computer relays	Lecture/Tutorial	
6		Numerical examples/Problem Solving	Group work (exercise)	
7	Weeks 9 to 11 (9 contact hours, including two contact hours for problem solving)	Fundamentals of PMU and WAMS	Lecture/Tutorial	
8		Numerical examples/Problem Solving	Group work (exercise)	
9	Weeks 12 to 14 (9 contact hours, including two contact hours for problem solving)	Application of PMU in Power System	Lecture/Tutorial	
10		Numerical examples/Problem Solving	Group work (exercise)	
Mode of Assessment				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	1 <sup>st</sup> Mid Semester Examination (Written test) (1 <sup>st</sup> and 2 <sup>nd</sup> Units)	5 <sup>th</sup> Week	60 Minutes	15
2	2 <sup>nd</sup> Mid Semester Examination (Written test) (3 <sup>rd</sup> and 4 <sup>th</sup> Units)	11 <sup>th</sup> Week	60 Minutes	15
3	Quiz	3 <sup>rd</sup> to 12 <sup>th</sup> week	100 Minutes	10
4	Take Home / Team Task	3 <sup>rd</sup> to 12 <sup>th</sup> week	Work will be carried out along with the course	10
5	Retest (Written Test) (1 <sup>st</sup> to 4 <sup>th</sup> Unit)	13 <sup>th</sup> week	60 Minutes	20
6	End Semester Examination (Written test)	15 <sup>th</sup> week	180 Minutes	50

**Note:**

1. Attending all the assessments (Assessment 1-4 and 6) are MANDATORY for every student.
2. If any student is not able to attend Assessment-1 (1<sup>st</sup> Mid Sem) / Assessment-2 (2<sup>nd</sup> Mid Sem) due to genuine reason, student is permitted to attend the Assessment- 5 (retest) with 20% weightage (20 marks).

3. In any case, retest will not be considered as an improvement test.

**ESSENTIAL READINGS :**

**Text Books:**

1. A.G. Phadke, J.S. Thorp, 'Computer Relaying for Power Systems', John Wiley and Sons Ltd., Research Studies Press Limited, 2<sup>nd</sup> Edition, 2009.
2. A.G. Phadke, J.S. Thorp, 'Synchronized Phasor Measurements and Their Applications', Springer Publications, 2008..

**COURSE EXIT SURVEY**

Shall be obtained at the end of the course

**COURSE POLICY**

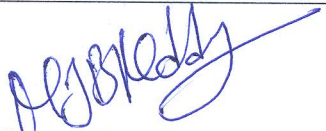
**ATTENDANCE**

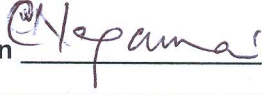
1. Attendance will be taken by the faculty in all the contact hours. Every student should maintain minimum 75 % physical attendance in these contact hours to attend the end semester examination.
2. Any student, who fails to maintain 75% attendance need to appear for the retest. Student who scores more than 50 % marks in the retest will be eligible for attending the end semester examination.
3. Students not having 75% minimum attendance at the end of the semester and also fail in retest (scoring less than 50%) will have to RE-DO the course.

**ACADEMIC HONESTY & PLAGIARISM**

1. Copying in any form during assessments is considered as academic dishonesty and will attract suitable penalty.

**FOR APPROVAL**

  
Course Faculty \_\_\_\_\_

CC-Chairperson  HOD \_\_\_\_\_

  
3/07/2017