

No	Course Information	
1	Unit name:	Power System Relaying
2	Code:	EP 51022
3	Classification:	Engineering subject
4	Credit value:	2.5
5	Semester/ Year Offered:	1/5
6	Pre-requisite:	Generation, Transmission and Distribution
7	Mode of delivery:	Lecture, Tutorial
8	Assessment system and breakdown of marks:	
	Test	20%
	Mid-term Examination	30%
9	Academic staff teaching unit:	
10	Course outcome of unit: In this course students will be able	
	-To describe the fundamentals of protective relaying	
	-To explain the relay operating principles	
	-To explain the current and voltage transformers	
	-To employ nonpilot overcurrent protection of transmission lines	
	-To employ nonpilot distance protection of transmission lines	
	-To employ pilot protection of transmission lines	
11	Synopsis of unit: The course covers introduction to protective relaying. The course introduces explain the relay operating principles and the current and voltage transformers. The course explains employ nonpilot overcurrent protection of transmission lines ,nonpilot distance protection of transmission lines and pilot protection of transmission lines.	

	<p>Topic:</p> <p><b>Chapter      Title</b></p>
	<p><b>1. Introduction to Protective Relaying</b></p> <ol style="list-style-type: none"> <li>1. Power System Structural Considerations</li> <li>2. Power System Bus Configurations</li> <li>3. The Nature of Relaying</li> <li>4. Elements of a Protection System</li> </ol> <p><b>2. Relay Operating Principles</b></p> <ol style="list-style-type: none"> <li>1. Detection of Faults</li> <li>2. Relay Designs</li> <li>3. Electromechanical Relays</li> <li>4. Solid-State Relays</li> <li>5. Computer Relays</li> <li>6. Other Relay Design Considerations</li> <li>7. Control Circuits: A Beginning -Phase sequence filters</li> </ol> <p><b>3. Current and Voltage Transformers</b></p> <ol style="list-style-type: none"> <li>1. Steady-State Performance of Current Transformers</li> <li>2. Transient Performance of Current Transformers</li> <li>3. Special Connections of Current Transformers</li> <li>4. Linear Couplers and Electronic Current Transformers</li> <li>5. Voltage Transformers</li> <li>6. Coupling Capacitor Voltage Transformers</li> <li>7. Transient Performance of CCVTs</li> <li>8. Electronic Voltage Transformers</li> </ol> <p><b>4. Nonpilot Overcurrent Protection of Transmission Lines</b></p> <ol style="list-style-type: none"> <li>1. Fuses, Sectionalizers, and Reclosers</li> <li>2. Inverse, Time-Delay Overcurrent Relays</li> <li>3. Instantaneous Overcurrent Relays</li> <li>4. Directional Overcurrent Relays</li> <li>5. Polarizing</li> </ol>

	<p><b>5. Nonpilot Distance Protection of Transmission Lines</b></p> <ol style="list-style-type: none"> <li>1. Stepped Distance Protection</li> <li>2. <math>R-X</math> Diagram</li> <li>3. Three-Phase Distance Relays</li> <li>4. Distance Relay Types</li> <li>5. Relay Operation with Zero Voltage</li> <li>6. Polyphase Relays</li> <li>7. Relays for Multiterminal Lines</li> <li>8. Protection of Parallel Lines</li> <li>9. Effect of Transmission Line Compensation Devices</li> <li>10. Load ability of Relays</li> </ol> <p><b>6. Pilot Protection of Transmission Lines</b></p> <ol style="list-style-type: none"> <li>1. Communication Channels</li> <li>2. Tripping Versus Blocking</li> <li>3. Directional Comparison Blocking</li> <li>4. Directional Comparison Unblocking</li> <li>5. Under reaching Transfer Trip</li> <li>6. Permissive Overreaching Transfer Trip</li> <li>7. Permissive Under reaching Transfer Trip</li> <li>8. Phase Comparison Relaying</li> <li>9. Current Differential</li> <li>10. Pilot Wire Relaying</li> <li>11. Multiterminal Lines</li> <li>12. The Smart Grid</li> </ol>
14	<p>Main Reference:</p> <p>Power System Relaying, Fourth Edition, Stanley H. Horowitz, Arun G. Phadke</p>
15	<p>Additional references:</p> <p>Power System Relaying, First, Second, Third Edition, Stanley H. Horowitz, Arun G. Phadke</p>

