



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

## COURSE CONTENT

ELECTRICAL POWER SYSTEMS LABORATORY								
<b>VII Semester: EEE</b>								
CourseCode	Category	Hours/Week			Credits	Maximum Marks		
		L	T	P		CIA	SEE	Total
AEEC44	Core	0	0	3	1.5	30	70	100
<b>Contact Classes:45</b>		<b>Tutorial Classes:Nil</b>			<b>Practical Classes: Nil</b>		<b>Total Classes:45</b>	
<b>Prerequisite:</b> Electrical Power Generating Systems, Electrical Power Transmission Systems								
<p><b>I. COURSE OVERVIEW:</b>            The main objective of the course is to provide an overview of the principles of basic protection circuits such as miniature circuit breaker, High rupturing fuse and protection under thermal overload condition. It provides in depth analysis of Ferranti effect and surge impedance loading of a transmission line. It provides in depth knowledge on working principles of various types of relays. It also deals with earth fault protection and feeder protection schemes</p> <p><b>II. COURSE OBJECTIVES:</b>  <b>The students will try to learn:</b></p> <ol style="list-style-type: none"> <li>I. The importance of protection and plotting the characteristics of MCB and Fuse</li> <li>II. The parameters, surge impedance loading and reactive power compensation of transmission lines</li> <li>III. The concept of Ferranti effect of a transmission lines</li> <li>IV. How to Calculate positive, negative and zero sequence impedances of synchronous machine</li> </ol> <p><b>III. COURSE SYLLABUS:</b></p> <p><b>LIST OF EXPERIMENTS</b></p> <p><b>Week-1: CHARACTERISTICS OF AN MCB</b>            Plotting the Characteristics of Miniature Circuit Breaker (MCB).</p> <p><b>Week-2: CHARACTERISTICS OF FUSE AND THERMAL OVERLOAD PROTECTION</b>            Study of characteristics of High Rupturing Capacity (HRC) fuse and tripping of bimetallic thermal overload protection and its characteristics.</p> <p><b>Week-3: ABCD PARAMETERS OF TRANSMISSION LINE</b>            Measurement of ABCD parameters of a transmission line</p> <p><b>Week-4: FERRANTI EFFECT IN A TRANSMISSION LINE</b>            Study of Ferranti effect in the transmission line</p> <p><b>Week-5: SURGE IMPEDANCE LOADING</b>            Study of Surge Impedance Loading (SIL) of a transmission line.</p> <p><b>Week-6: EFFECT OF SHUNT COMPENSATION</b>            Determine shunt compensation to counteract the voltage rise on no load and zero regulation at different loads in a transmission line.</p> <p><b>Week-7: VOLTAGE PROFILE IMPROVEMENT USING TAP CHANGING TRANSFORMER</b>            Study of voltage improvement by reactive power control using tap changing transformer.</p>								

**Week-8: EFFICIENCY AND REGULATION OF A TRANSMISSION LINE**

Determine the performance of a transmission line by calculating its efficiency and regulation.

**Week-9: PERFORMANCE OF IMPEDANCE RELAY**

Study the working principle of impedance relay and its effect during faults in a transmission line.

**Week-10: PERFORMANCE OF OVER CURRENT RELAY**

Study the working principle of over current relay and its effect during faults in a transmission line.

**Week-11: EARTH FAULT PROTECTION**

Study of earth fault detection methods and various earth fault protection schemes.

**Week-12: FEEDER PROTECTION**

Study the various protection schemes in radial feeder under various fault conditions.

**Week-13: MEASUREMENT OF SEQUENCE IMPEDANCES OF SYNCHRONOUS MACHINE**

Measurement of positive, negative and zero sequence impedances of synchronous machine by using direct method and fault analysis method.

**Week-14: STRING EFFICIENCY OF INSULATORS**

Determination of string efficiency in a string of insulators.

**IV. TEXTBOOKS:**

1. Paithankar, S R Bhide, "Fundamentals of Power System Protection", PHI, 1<sup>st</sup> Edition, 2003.
2. C L Wadhwa, "Electrical Power Systems", New Age international (P) Limited, 6<sup>th</sup> Edition, 2010.
3. VK Mehta, "Principles of power systems", S Chand Publications, 4<sup>th</sup> Edition, 2009.

**V. REFERENCEBOOKS:**

1. Badri Ram and D N Vishwakarma, "Power system Protection and Switchgear", Tata McGraw-Hill Publication company limited, 1<sup>st</sup> Edition, 1995.
2. TS Madhava Rao, "Power system Protection static relay", Tata McGraw-Hill Publishing Company limited, 2<sup>nd</sup> Edition, 1989.