

**Lightning Protection
and Transient Overvoltage**
by Abhay Chitre
27-28 February 2018 | Mumbai, India



Overview

Great emphasis is placed on assisting attendees with an understanding of the key principles and concepts regarding lightning protection of power systems. The effects of routing, structure type, insulation, shielding, and grounding on transmission lines will be discussed. The course will also provide design information for the methods historically and typically applied by substation designers to reduce direct lightning strokes to equipment and busy work within substations. Identification and discussion of design procedures to provide protection of outdoor substations and transmission lines from standards will be presented.

Learning Objectives

After participating in this course, you will be able to:

- Gain familiarity with the management and design of lightning protection for transmission and distribution lines, high voltage power substations, and industrial applications.
- Select an efficient lightning protection design system in order to avoid the main cause of transmission and distribution line outages affecting reliability of power supply and economic losses.
- Provide cost-effective solutions to reduce lightning overvoltage in power systems.
- Apply the principles of lightning protection to other industries, such as oil and gas, chemical, industrial, renewable energy, and nuclear and
- Understand the key principles and concepts regarding lightning protection and transient overvoltage.

Who should attend?

- Design Engineers
- Design Technicians
- Engineers in Training
- Construction personnel
- Power Engineers
- Consulting Engineers
- Project Engineers
- Electrical and Mechanical Engineers
- Project Managers
- Plant Managers
- Operating and Maintenance personnel
- Commissioning and Testing Engineers
- Electrical Contractors

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Training Methodology

The course is based on a balanced combination of classroom teaching and syndicate exercises supported by case studies and exercises within the industrial environment. This course is designed in with leading industry knowledge and practical case studies discussion and analysis to provide an interactive learning environment.

Course Outline

- Lightning Stroke Phenomena
- Empirical Design Methods
- The Electro geometric Model (EGM)
- Lightning Protection of Substations
- Lightning Protection of Transmission Lines
- Lightning Protection Risk Assessment
- Lightning Protection of Industrial Applications
- Fundamentals of Grounding for Lightning Protection
- Sample Calculation – Application Design Procedure
- Transient Overvoltage
- Tankages – Lighting and Overvoltage

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Day1

**Welcome, Introduction, Workshop Preview,
Learning Outcomes and the Assessment
Method**

Lightning Stroke Phenomena

- Charge formation in clouds
- Types of lightning
- Statistics on lightning occurrence
- Striking distance
- Stroke current magnitude
- Keraunic Level
- Ground flash density
- Lightning detection networks

Empirical Design Methods

- Fixed angles
- Empirical curves
- Application of empirical curves

The Electro geometric Model (EGM)

- Application of EGM by the rolling sphere method
- Calculation of failure probability

Lightning Protection of Substations

- Insulation coordination overview
- Substation shielding methods
- Empirical design methods
- Electro geometric model (EGM)
- Equipment BIL and probabilities

Lightning Protection of Transmission Lines

- Electro geometric model (EGM)
- Line shielding principles
- Controlling back flashover on shielded lines
- Unshielded lines

Questions and Answers

Day 2

Lightning Protection Risk Assessment

- Risk assessment methodology
- Ground flash density
- Calculation of lightning exposure area
- Relationship to lightning statistical distributions

**Lightning Protection of Industrial
Application**

- Reduction of damage
- Fundamental principles of protection
- Protection measures
- Protection of specific classes of structures

**Sample Calculation – Application Design
Procedure**

- Fixed angle method
- Empirical method
- Electro geometric model – Rolling sphere method

**Fundamentals of Grounding for Lightning
Protection**

- Ground measurement techniques
- Soil properties
- Resistance of various grounding electrodes

Transient Overvoltage

- Insulation coordination overview
- Lightning overvoltage's
- Switching overvoltage's
- Surge arrester application

Questions and Answers

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About the Trainer

Mr. Abhay Chitre – Education, B.E. (ELECTRICAL) HONS. GOLD MEDALIST IN SAGAR UNIVERSITY, 1969 Professional Experience Over 40 Years

The mentor has worked with Maharashtra state electricity board (MSEB) for 20 years in various capacities from junior engineer to Dy. Chief engineer in various depts., handling Engineering, Testing and Commissioning of power plant construction (120,210 and 500 mw units). The professional experience gained in MSEB includes Design and Engineering of electrical auxiliary power distribution system for thermal power plants of 120 mw to 500 mw capacity (coal based & gas turbine based) 220 and 400 kv switchyards, grid synchronizing, SCADA systems, installation testing and commissioning of Electricals for power plants and inspection at vendors works in India and in many countries abroad.

He has also worked with a German engineering consultant and EPC Company, for 15 years as General Manager (Electrical). He was the Head of Electrical Department for 13 years and was involved in many national and international projects in design, engineering and projects. The experience in includes Design and Engineering of Electrical power distribution systems for large size Petrochemical plants, Chemical plants, Refineries, Fertilizer plants and Captive power plants. Site experience includes supervision of erection, testing and commissioning of the above plants. While in MSEB, worked as member of Indian Standards Committees (ETDC 57 & ETDC 58) covering all electrical equipments and actively participated in formulating/amending Indian standards for electrical equipments.

Teaching and Training assignments

- Has conducted number of training programmes in India and abroad.
- Has conducted many training programmes in the Middle East
- Conducted training programme for many corporate companies including L&T, Jindal Steel & Power, Essar Engg, Reliance etc.
- Was guide to students in post graduate programme of Mumbai university, M. Tech (power system), every year for dissertation in Industrial projects in particular
- Visiting faculty for many institutes for masters programme in Electrical department
- Conducted training programme in specialized topics relating to design of electrical systems and maintenance of electrical equipments for experienced engineers and Managers

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Investment Fee

Course Title	Number of Days	Standard Price
Lightning Protection And Transient Overvoltage	2 Days	SG\$ 995.00

DELEGATE DETAILS

1st Delegate Name	Mr <input type="checkbox"/> Mrs <input type="checkbox"/> Ms <input type="checkbox"/> Dr <input type="checkbox"/> Others <input type="checkbox"/>
Direct Line	Email
Job Title	Department
Head of Department	

2nd Delegate Name	Mr <input type="checkbox"/> Mrs <input type="checkbox"/> Ms <input type="checkbox"/> Dr <input type="checkbox"/> Others <input type="checkbox"/>
Direct Line	Email
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Head of Department	

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