

# Workshop on “Lightning Protection Systems and Earthing”

Saturday 5<sup>th</sup> December 2009, Venue: PGIS Auditorium

*Organized by the  
Postgraduate Institute of Science (PGIS), University of Peradeniya*

## TOPICS TO BE COVERED:

<b>Physics of lightning, Lightning Hazards and precautions against lightning</b>
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### 1 Introduction

- 1.1 Lightning
- 1.2 Static electric charges of Cumulonimbus clouds
  - 1.2.1 Ground Flash – Discharge between a cloud and the earth
  - 1.2.2 Cloud Flash – Discharge within a cloud or between clouds
- 1.3 Ground Flash
- 1.4 Thunder
  - 1.4.1 Thunder day
- 1.5 Thunderstorm

### 2 Thunderstorm Hazards in Sri Lanka

- 2.1 Hazards of Lightning
- 2.2 Hazards of thunder
- 2.3 Vulnerability of coastal regions to thunderstorms /lightning
- 2.4 Historical examples

### 3 Modes of lightning Strikes

- 3.1 Direct Strikes
- 3.2 Side Flash
- 3.3 Contact Potential
- 3.4 Step Voltage
- 3.5 Surge Propagation

### 4 Lightning Activity over Sri Lanka

- 4.1 The peaks of lightning activity are during,
  - 4.1.1 March –May First Inter Monsoon and initial part of the South West Monsoon seasons
  - 4.1.2 September – December Second Inter Monsoon and initial part of North East Monsoon season

### 5 Protection Against lightning

- 5.1 Protection of Buildings from Lightning Strikes
- 5.2 Technology used for protection of buildings
  - 5.2.1 Lightning conductor
  - 5.2.2 Surge diverters
  - 5.2.3 Earth rods
    - 5.2.3.1 Installing a set of parallel rods
- 5.3 Other Protective Measures
  - 5.3.1 Protection of Electrical Equipment
- 5.4 Authority and standards in Lightning Protection

## **6. General Precautions against Lightning**

- 6.1 Before thunderstorm
- 6.2 During thunderstorms
- 6.3 After thunderstorms
  - 6.3.1 First aid

<b>Protection of Electrical/Electronic/ Telecommunication Systems</b>
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### **1 Introduction**

- 1.1 Damages and Types of Damages,
- 1.2 Reasons for Damages (Power/signal anomalies - Surges, Sags, Over Voltages, Under Voltages, Noises, and Transients)
- 1.3 Damage prevention approaches and methodology
- 1.4 Impotence Of Damage Prevention/minimization and methodology in domestic and commercial environment.
- 1.4 Equipment surge withstand capabilities,
- 1.5 Ability of RCD (trip switch), MCB, MCCB and UPS in protection against surges and their functions?

### **2. Modes of entry and coupling methods (Surges/Transients)**

- 2.1 The way of entering transients/over voltage into our power and electronic system (Mode of Entry and Coupling Method)
  - Resistive Coupling
  - Inductive Coupling
  - Capacitive Coupling

### **3. Surge protective device (SPD)**

- 3.1 What is a SPD?
- 3.2 Why it is required?
- 3.3 SPD's basic components and passive elements (GDT, Spark Gap, MOV, Silicon Diode, etc.)
- 3.4 Configuration of SPD
- 3.5 Important Parameters and SELECTION OF SPD for Different application,
- 3.6 Testing Methods and test values.
- 3.7 Categories of SPD (Class 1 etc.)
- 3.8 Relevant standard ITU K series, IEC, AS 1768, IEEE (ANSI), BS
- 3.9 Over Voltage and Over current Protection (Communication application)

### **4. LV power Distribution system in Sri Lanka**

### **5. Protection of Following system and practical considerations**

- 5.1 Protection Of PC in an Internet application
- 5.2 Protection of PABX
- 5.3 Protection Of Radio Base Station site and towers
- 5.4 Practical approaches for effective installation

### **6. Concern and practical considerations in maintaining a LPS**

# Structural Lightning Protection and Standards

## **1. Electrical Grounding – Overview**

- 1.1 Grounding- Definitions
- 1.2 Grounding methods
- 1.3 System Grounding
- 1.4 Single Point Grounding
- 1.5 Solid Grounding
- 1.6 Ground Faults
- 1.7 Why Ground Circuits and Systems
- 1.8 Electrical Grounding Electrode System
- 1.9 Grounding Theory

## **2. Parameters, Measurements and Calculations**

*(Determination of number of earth electrodes)*

- 2.1 Grounding Electrodes: Construction And Installation
- 2.2 Ground Resistance and Resistivity
- 2.3 Electrical Grounding and Corrosion
- 2.4 Earth Resistivity and resistance /Impedance measurement

## **3. Equipment Grounding**

- 3.1 Electrical Grounding two or more Buildings
- 3.2 Grounded and Ungrounded Systems
- 3.3 Electronic Equipment Grounding
- 3.4 Computer and Electronic Equipment Grounding
- 3.5 Telecommunication Rooms and Closets
- 3.6 Data Processing Equipment Grounding
- 3.7 Telecommunication Site Grounding
- 3.8 Grounding Subsystems
- 3.9 Computer Room Grounding
- 3.10 System Reference Zero
- 3.11 Detection of a faulty Neutral-Ground System