SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

SPARKS FLASHOVERS AND CORONA DISCHARGE ASSOCIATED WITH ELECTRICAL EQUIPMENT AND PLANTS

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- Every Electrical plant and equipment has current carrying conductors and their insulation system.
- The plant has main power circuit and Low voltage circuits for protection, control monitoring etc Every switching operation is accompanied by a spark/are between contacts white opening the current carrying circuit and closing a current carrying circuit.
- Every switching operation by in Isolatore produces a flash-over between the contacts of isolator poles while opening the circuit and white closing the circuit Corona discharge occurs in our at surface of dirty conductor or at sharp corners of a conductors and at point of high dielectrical stress.

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- Flashover can occur in space between phase or to earth or a between phase to phase during switching surge or lightning surges.
- Loose contacts in current carrying circuit produce sparks due to jumping of current Sparks and arcs are produces when Conductor breaks due to mechanical/thermal load and when insulation fails due to ageing, moisture, deterioration or overvol- tage

SPARKS, FLASHOVERS, AND CORONA DISCHARGE

Sparks, flashovers, and corona discharge are critical electrical phenomena that can occur in high-voltage systems, often with significant implications for the safety and performance of electrical equipment and plants. Understanding these phenomena is key to ensuring electrical safety and preventing potential hazards.

1. Sparks

- **What It Is**: A spark is a sudden electrical discharge that occurs when the voltage difference between two conductive objects becomes large enough to overcome the air (or insulation) between them.

FLASHOVERS

- **Causes**: Sparks often happen due to poor insulation, damaged wires, or faulty electrical connections.
- **Safety Concerns**:
  - Sparks can ignite flammable gases, liquids, or dust in industrial environments, leading to explosions or fires.
  - Repeated sparking can degrade equipment, increasing maintenance needs and reducing system reliability.
- **Preventive Measures**:
  - Proper insulation of equipment and regular maintenance to check for wear and tear.
  - Grounding of electrical systems to reduce the risk of accidental discharge.

FLASHOVERS

Flashovers

- **What It Is**: A flashover is an electrical arc or discharge that travels across an insulator due to high voltage. It occurs when the insulator can no longer withstand the electrical stress, and the air or insulation around it becomes ionized.
- **Causes**:
  - High humidity, pollution, or contamination (such as dust or dirt) on insulators can reduce their effectiveness, leading to flashovers.
  - Overvoltage conditions or lightning strikes can cause flashovers in high-voltage transmission systems.

FLASHOVERS

- **Safety Concerns**:
  - Flashovers can cause damage to electrical equipment, leading to outages and expensive repairs.
  - In substations or plants, a flashover can result in electrical fires, endangering personnel and equipment.
- **Preventive Measures**:
  - Regular cleaning of insulators to avoid contamination.
  - Use of proper surge protection devices and lightning arresters.
  - Ensuring that insulation is rated for the appropriate voltage levels.

CORONA DISCHARGE

Corona Discharge

•**What It Is**: Corona discharge is a localized electrical discharge caused by the ionization of the surrounding air near a high-voltage conductor. It typically occurs around sharp points or edges on conductors when the voltage gradient exceeds a critical value.

•**Causes**:

- Corona discharge occurs due to imperfections on conductors or insulation, as well as at points of high electrical stress, such as where wires are bent or have sharp edges.
- It is more common at high voltages (above 30kV) and is often observed in high-voltage transmission lines.

CORONA DISCHARGE

- **Safety Concerns**:
- While not as immediately dangerous as sparks or flashovers, corona discharge can lead to long-term degradation of electrical insulation and equipment, reducing the lifespan of high-voltage components.
- Corona can produce ozone and nitrogen oxides, which can be harmful in confined spaces.
- **Preventive Measures**:
- Proper design of high-voltage components to avoid sharp edges or points that can cause corona.
- Use of corona rings and shields to distribute the electric field more evenly and reduce corona.
- Regular inspections for signs of corona discharge, such as a buzzing noise or the presence of ozone.

IMPORTANCE OF ELECTRICAL SAFETY

- The presence of sparks, flashovers, and corona discharge in electrical systems can lead to equipment failure, electrical fires, and other safety hazards. To mitigate these risks, regular maintenance, proper insulation, grounding, and the use of high-quality materials are essential.
- Additionally, compliance with safety standards (such as IEC, IEEE, or NFPA guidelines) and the use of advanced monitoring systems to detect early signs of these phenomena can help improve the safety and longevity of electrical equipment in plants and industrial settings.

THANK YOU