

**G H Patel College of Engineering & Technology**  
(A Constituent College of CVM University) Vallabh Vidyanagar

### **Event Report**

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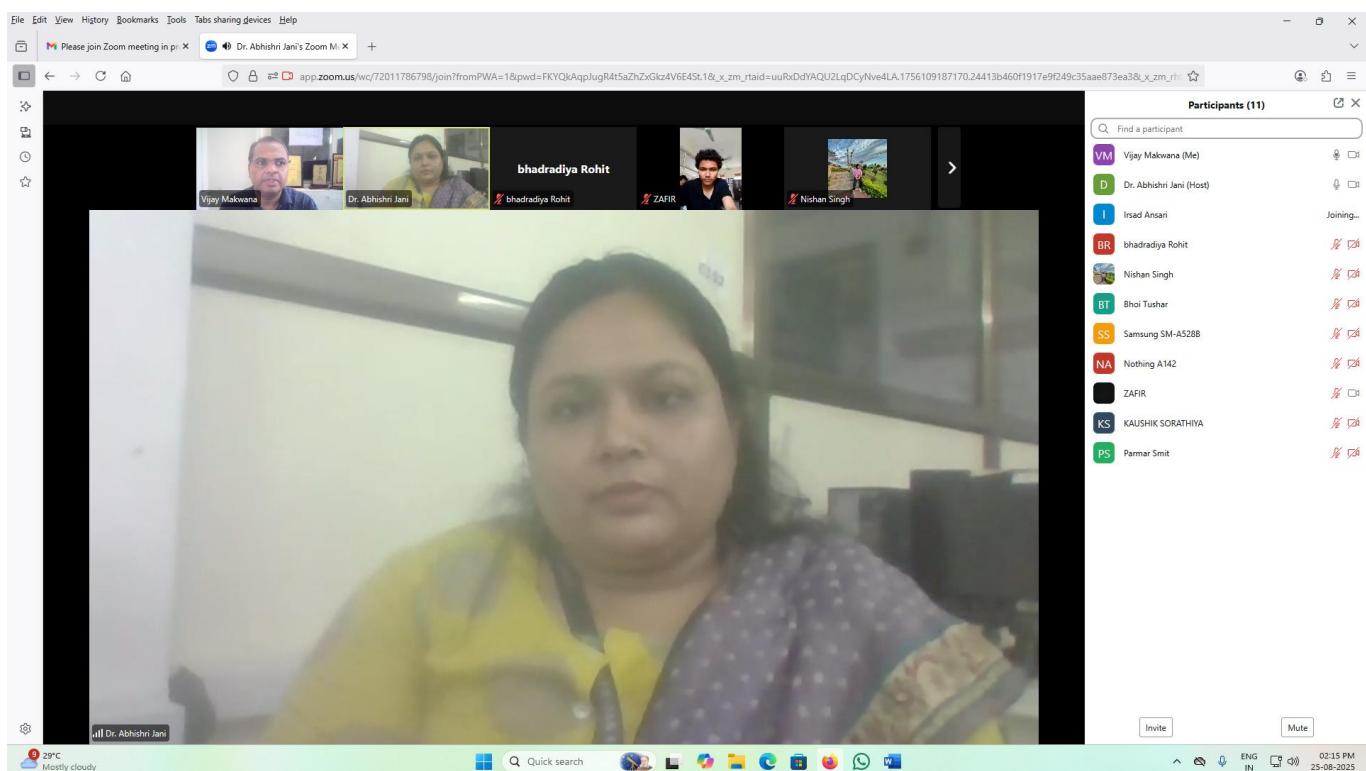
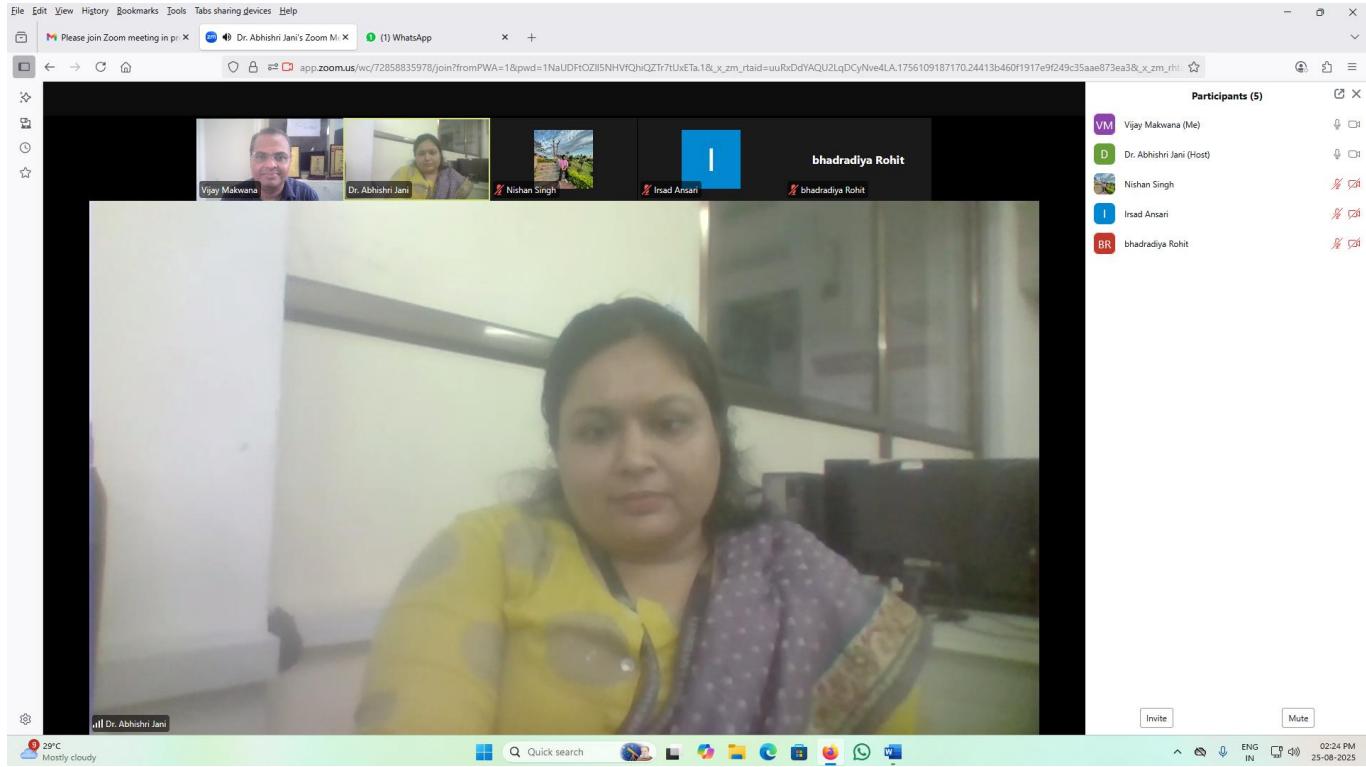
## **Expert Talk on “Protection of Transmission Lines using Distance Relays” at Electrical Engineering Department, GCET, V V Nagar**

- ➡ **Date:** 25<sup>th</sup> August 2025
- ➡ **Time:** 2:00 PM to 3:00 PM
- ➡ **Institute:** G H Patel College of Engineering and Technology, Vallabh Vidyanagar, Gujarat.
- ➡ **Mode of Conduct & Venue:** Online at Lab. C-306
- ➡ **Faculty Coordinator:** Dr. Vijay Makwana, Professor, Electrical Department, GCET.
- ➡ **Expert Details:** Dr. Abhishri Jani, Assistant Professor, Silver Oak University, Ahmedabad.
- ➡ **Event Details:**

Dr. Vijay Makwana of Electrical Engineering Department, G H Patel College of Engineering & Technology (GCET) organized an Expert Talk on “Protection of Transmission Lines using Distance Relays” on 25<sup>th</sup> August 2025 for the final year Electrical Department students of GCET.

Dr. Abhishri Jani of Silver Oak University, Ahmedabad, shared her technical expertise by explaining different types of distance relays, such as impedance relay, reactance relay, ohm relay, mho relay, etc. She has also covered the fundamentals of distance protection, the working principle and operation of the distance protection in the electrical power system network. Students enthusiastically participated in the program. The expert talk ended with the question-answer session about various distance protection schemes.

 **Photographs:**



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## Distance relays

- Types?

Impedance	Reactance	Ohm	Mho
$Z = \frac{V}{I}$	Reactance $X$	$V = IR$	Admittance $Y$
For phase fault protection of transmission line at a	For ground-fault protection of the line	Protects against overheating and damage Used in short transmission lines or as	For phase fault protection of long transmission line

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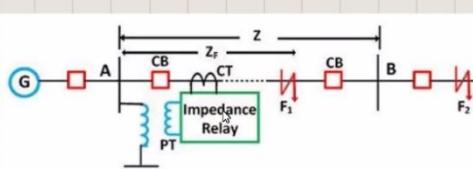
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## Impedance relays



Principle of operation of an Impedance Relay

Opening Characteristic of an Impedance Relay

Operating Characteristic of an Impedance Relay on an R-X Diagram

Participants (12)

- Vijay Makwana (Me)
- Dr. Abhishti Jani (Host)
- Isad Ansari
- bhadrahi Rohit
- Nishan Singh
- Parmer Smit
- Bhai Tushar
- Samsung SM-A5288
- Nothing A142
- ZAFIR
- Vijay Makwana
- KAUSHIK SORATHYA
- Joining...

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**Ohm relay**

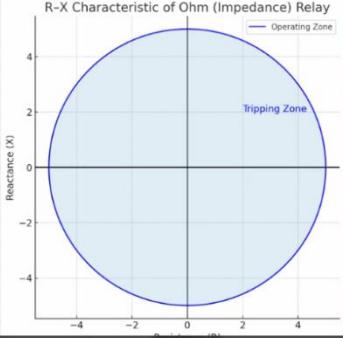
Overload Relay

• Works on **Ohm's Law principle** ( $V=I.R$ ).  
• Senses excess **current** in motors/circuits.  
• Protects against overheating and damage.

**Uses:**

1. **Motors** → installed in motor starters to prevent winding burnout.
2. **Transformers** → protect against overloads.
3. **Industrial panels** → safety against prolonged excess current.

R-X Characteristic of Ohm (Impedance) Relay



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D Dr. Abhishti Jani (Host)  
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BR bhadrahi Rohit  
Nishan Singh  
PS Parmar Smit  
BT Bhoi Tushar  
SS Samsung SM-A5288  
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**Mho relays**

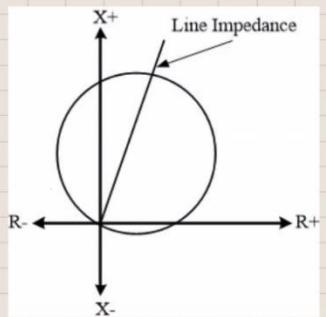
**1. Purpose**

- Protects **transmission lines** against **short-circuits**.
- Directional: Operates only when the **fault is in the forward direction**.
- Sensitive to **both R and X** (impedance).

**2. Principle**

- Operates based on the **apparent impedance** seen by the relay:  $Z_L = R + jX$
- **Relay operates** if the impedance lies **within a circle** in the **R-X plane**, centered along the line connecting the **origin to the fault point**.
- Often called **Impedance relays with Mho characteristic** because of "circle passing through origin" property.

Line Impedance



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## Reactance relays

**Operating Principle**

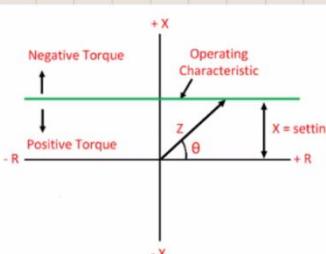
- Operates based only on the **reactance (X)** component of impedance, Ignores the resistance (R).
- Relay operates if:  $X \leq X_{\text{setting}}$

**Features**

- **Not affected by fault resistance** (e.g., arc resistance).
- **Non-directional** → may operate for reverse faults too.
- More suitable for **ground faults on short lines**.

**Applications**

- Used mainly for **short lines**, where fault resistance can be significant.
- Often used in combination with **Mho relay** to add directionality.



The diagram shows a graph of torque versus impedance. The vertical axis is labeled  $+X$  (Positive Reactance) and  $-X$  (Negative Reactance). The horizontal axis is labeled  $+R$  (Positive Resistance) and  $-R$  (Negative Resistance). A diagonal line represents the 'Operating Characteristic' of the relay. The region above and to the left of this line is shaded green and labeled 'Positive Torque'. The region below and to the right is shaded red and labeled 'Negative Torque'. The angle between the positive reactance axis and the operating characteristic line is labeled  $\theta$ . A vertical line labeled  $Z$  represents the total impedance. A horizontal line labeled  $X = \text{setting}$  represents the reactance setting of the relay.

Operating Characteristic of Reactance Type Distance Relay

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Questions???

**Dr. Abhishri Jani**  
abhishrijani.ce@silveroakuni.ac.in

**DO SOMETHING  
TODAY THAT  
YOUR FUTURE  
SELF WILL  
THANK YOU FOR.**



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