G H Patel College of Engineering & Technology

(A Constituent College of CVM University) Vallabh Vidyanagar

Event Report

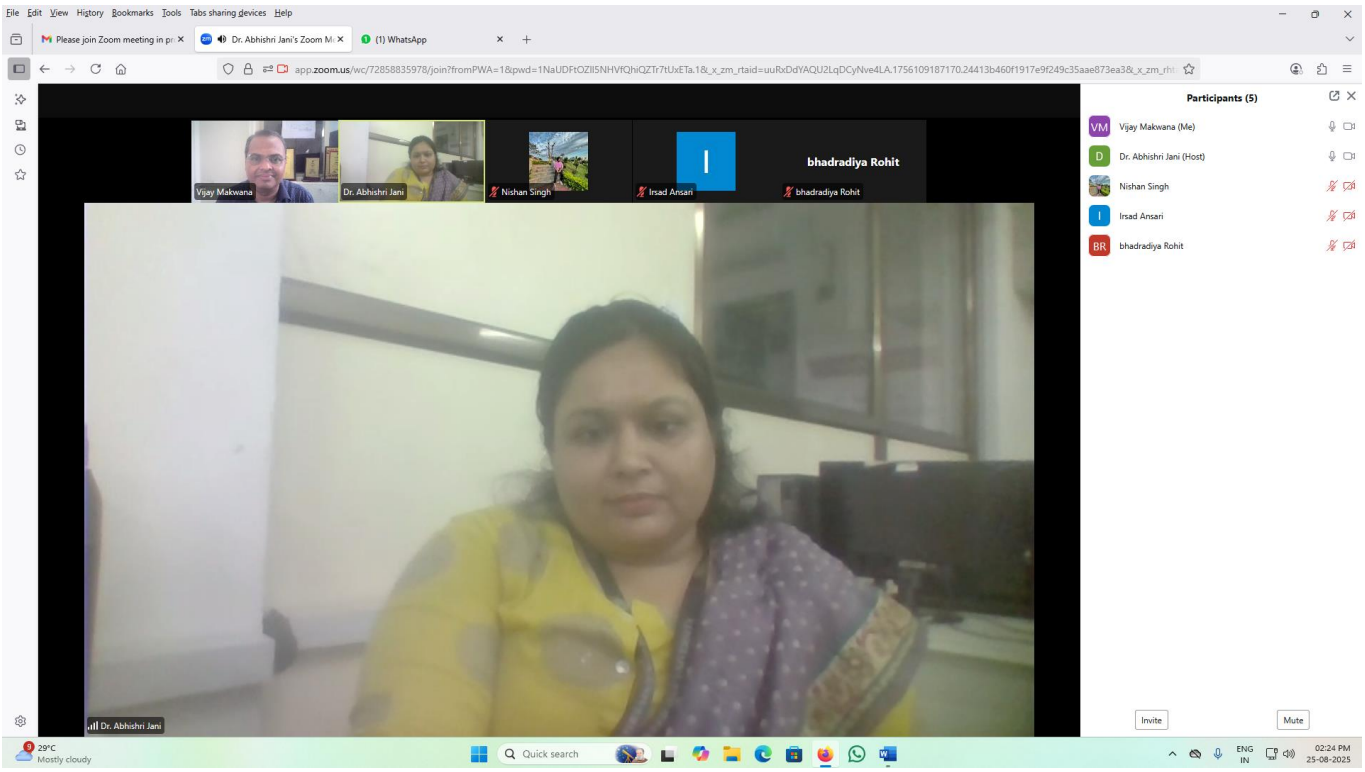
Expert Talk on "Protection of Transmission Lines using Distance Relays" at Electrical Engineering Department, GCET, V V Nagar

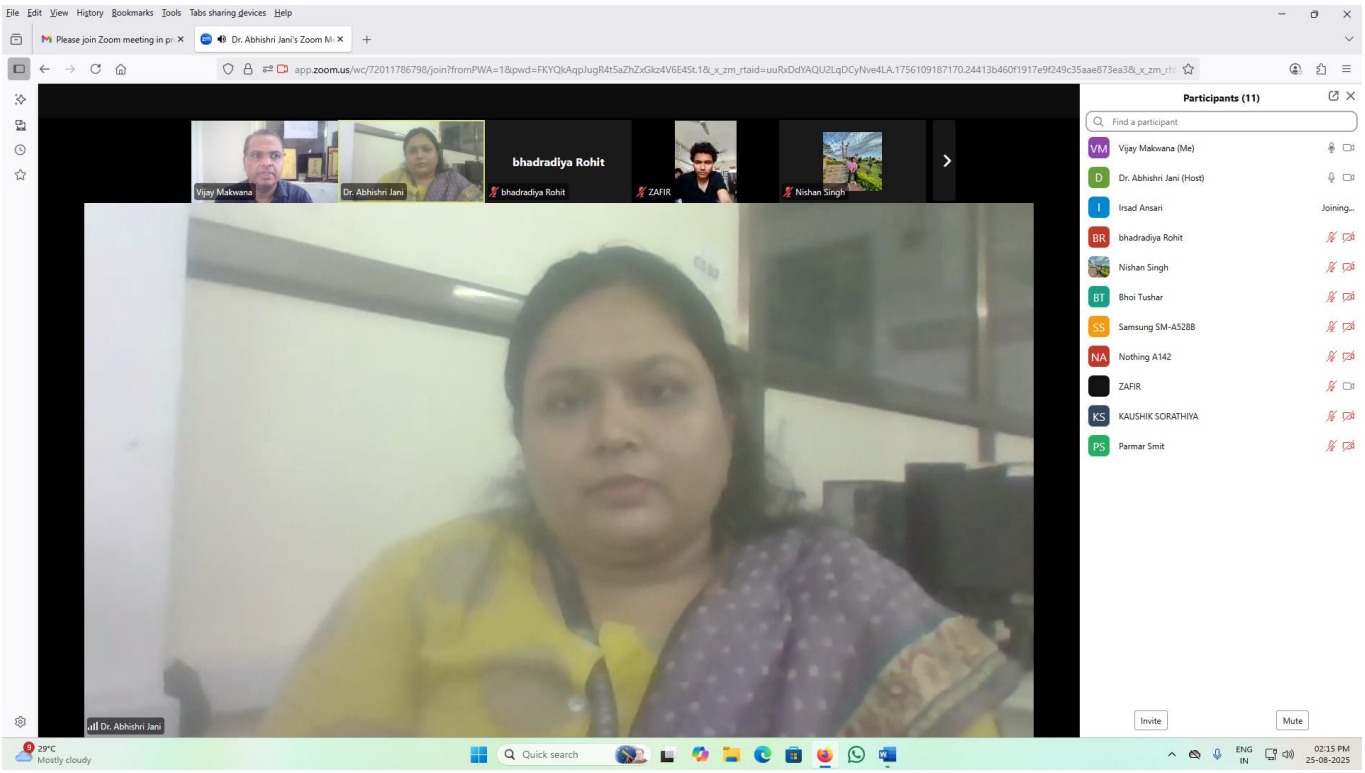
- **Date:** 25th August 2025
- **Time:** 2:00 PM to 3:00 PM
- **Institute:** G H Patel College of Engineering and Technology, Vallabh Vidyanagar, Gujarat.
- **Mode of Conduct & Venue:** Online at Lab. C-306
- **Faculty Coordinator**: Dr. Vijay Makwana, Professor, Electrical Department, GCET.
- **Expert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

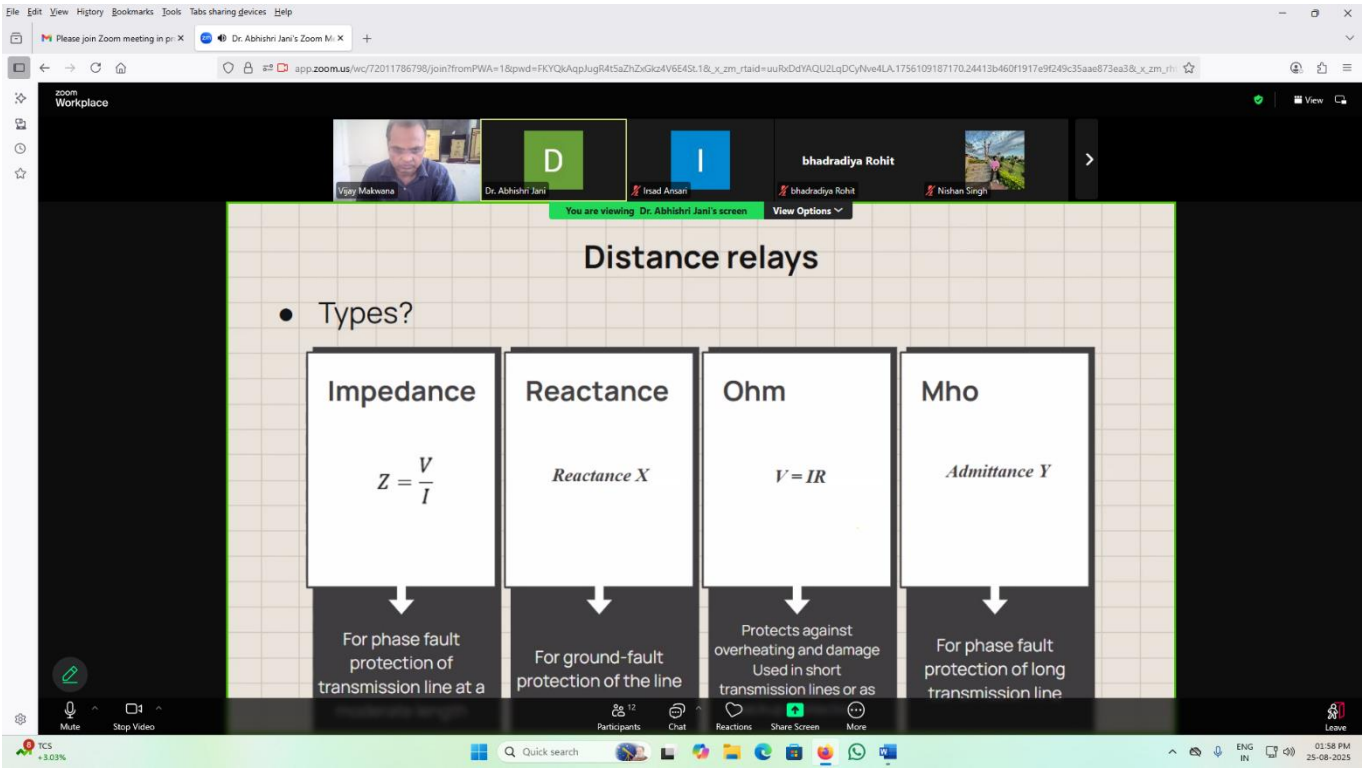
Dr. Vijay Makwana of Electrical Engineering Department, G H Patel College of Engineering & Technology (GCET) organized an Expert Talk on "Protection of Transmission Lines using Distance Relays" on 25th August 2025 for the final year Electrical Department students of GCET.

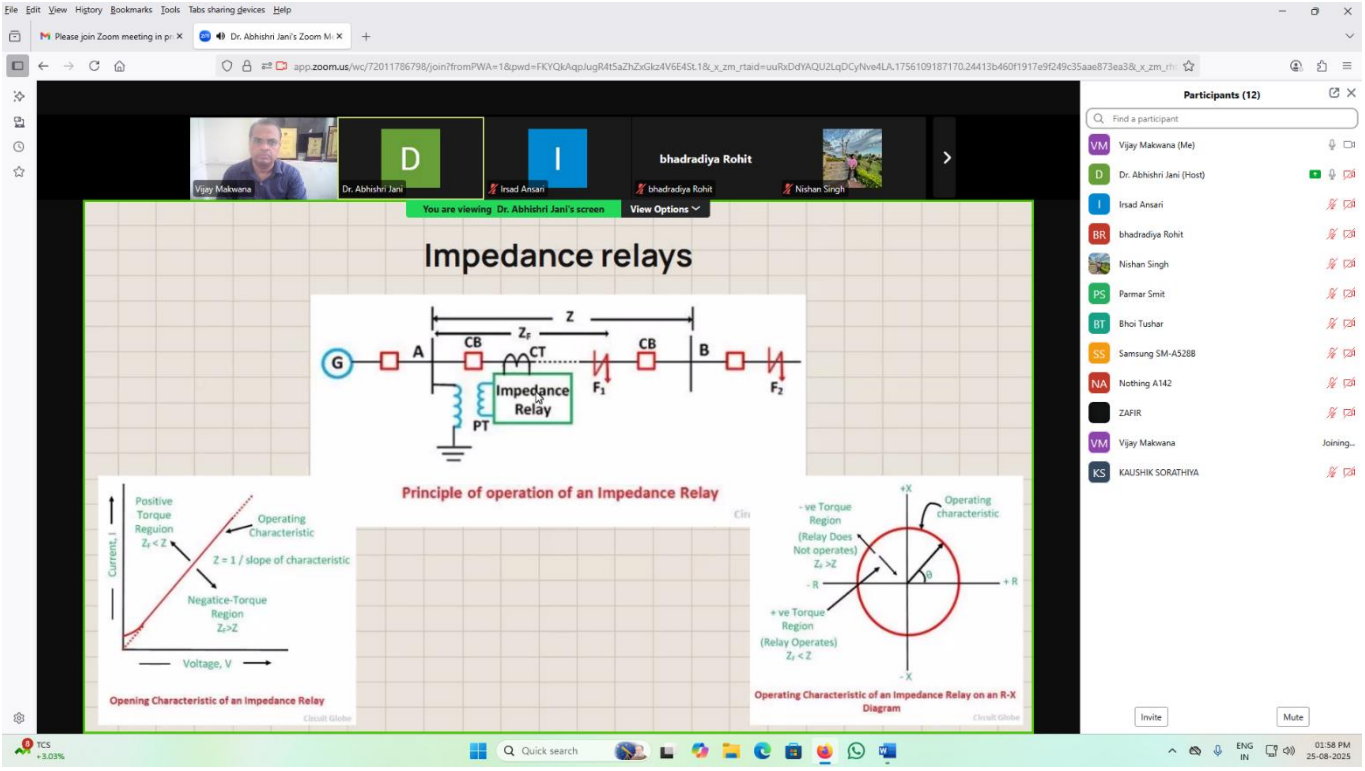
Dr. Abhishri Jani of Silver Oak University, Ahmedabad, shared her technical expertise by explaining different types of distance relays, such as impedance relay, reactance relay, ohm relay, mho relay, etc. She has also covered the fundamentals of distance protection, the working principle and operation 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.

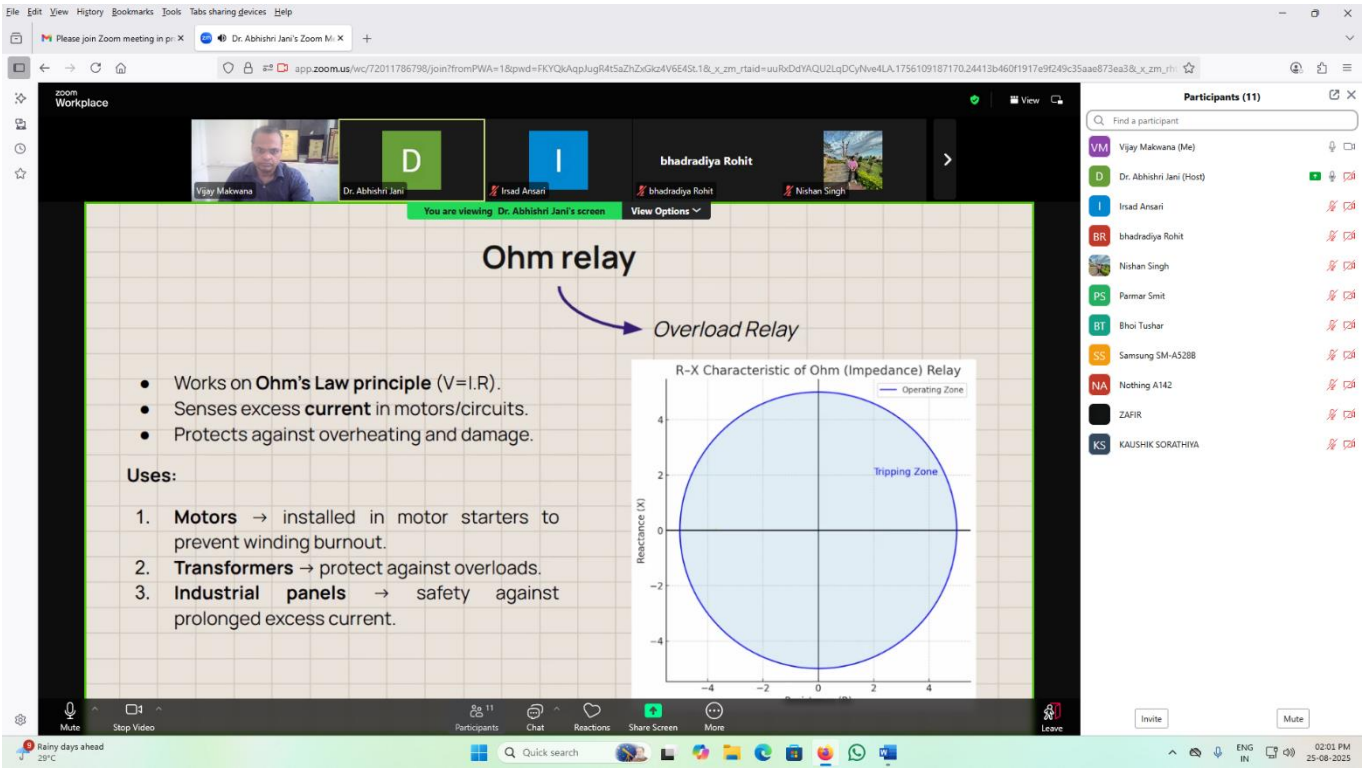
Photographs:

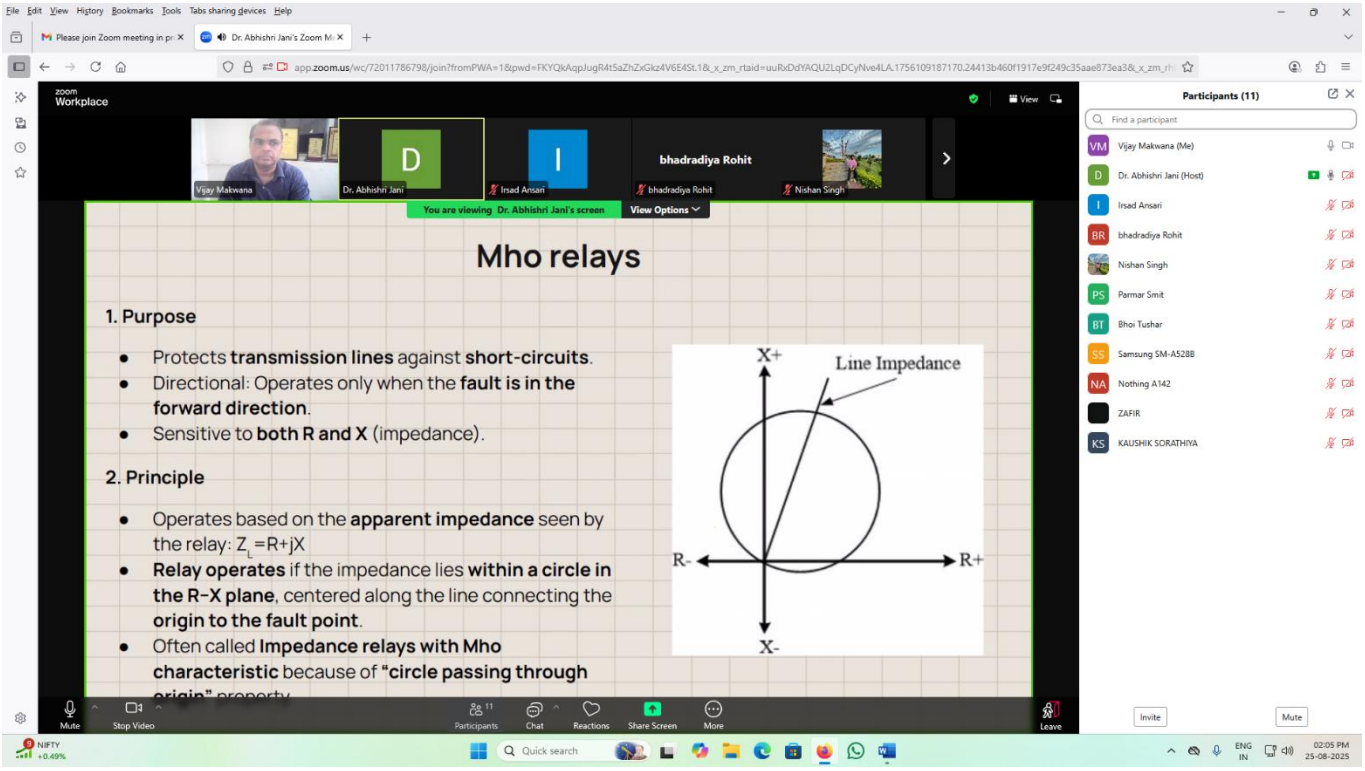





Distance relays
Types?
Impedance
$Z = \frac{V}{I}$
For phase fault protection of transmission line at a
Reactance
Reactance X
For ground-fault protection of the line
Ohm
V = IR
Protects against overheating and damage Used in short transmission lines or as
Mho
Admittance Y
For phase fault protection of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


Impedance relays
Z
Z_F
A
CB
CT
CB
B
G
F_1
F_2
Impedance Relay
PT
Principle of operation of an Impedance Relay
Positive Torque Reguion $Z_r < Z$
Operating Characteristic
Z = 1 / slope of characteristic
Negatice-Torque Region $Z_r > Z$
Current, I
Voltage, V
Opening Characteristic of an Impedance Relay
-ve Torque Region (Relay Does Not operates) $Z_r > Z$
Operating characteristic
+ve Torque Region (Relay Operates) $Z_r < Z$
Operating Characteristic of an Impedance Relay on an R-X Diagram
Participants (12)


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
Operating Zone
Tripping Zone
Reactance (X)
bhadradiya Rohit
You are viewing Dr. Abhishri Jani's screen
View Options
Participants (11)


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
X+
Line Impedance
R-
R+
X-
bhadradiya Rohit
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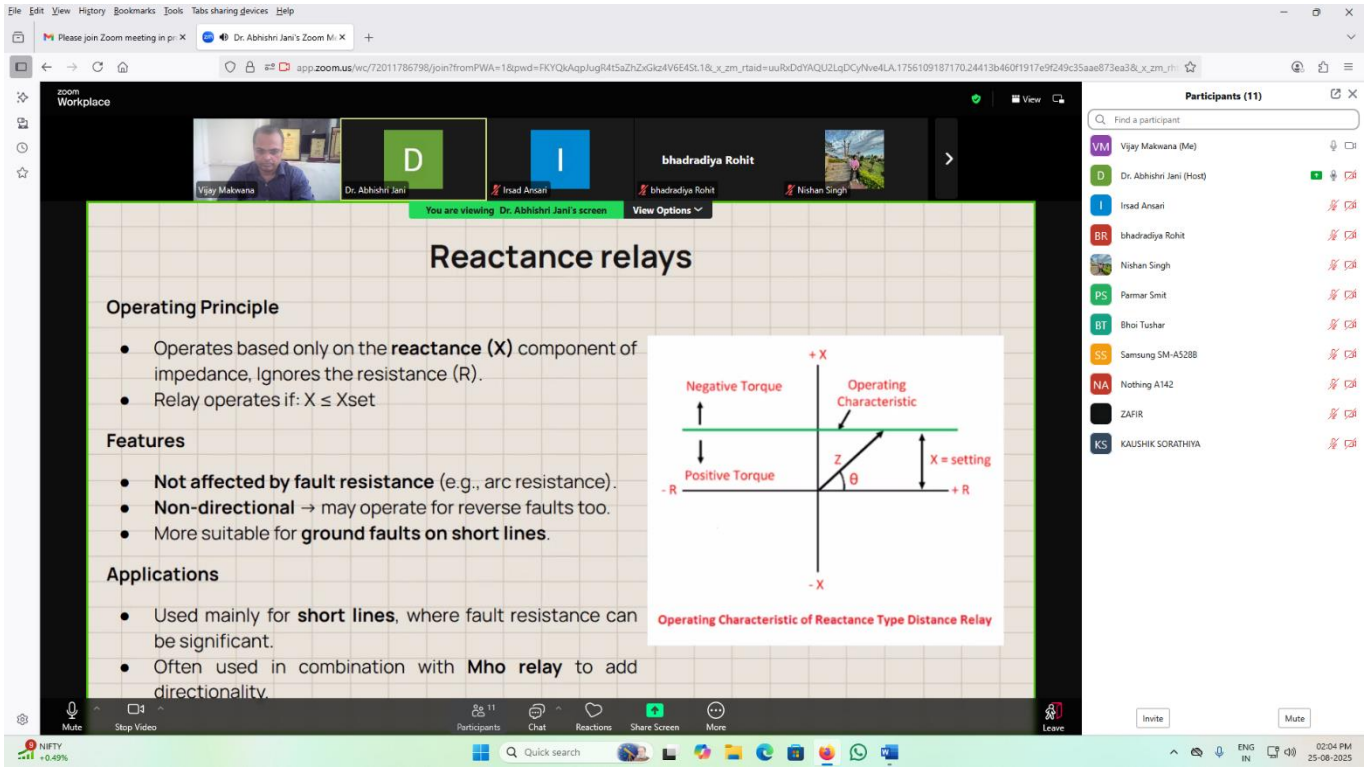
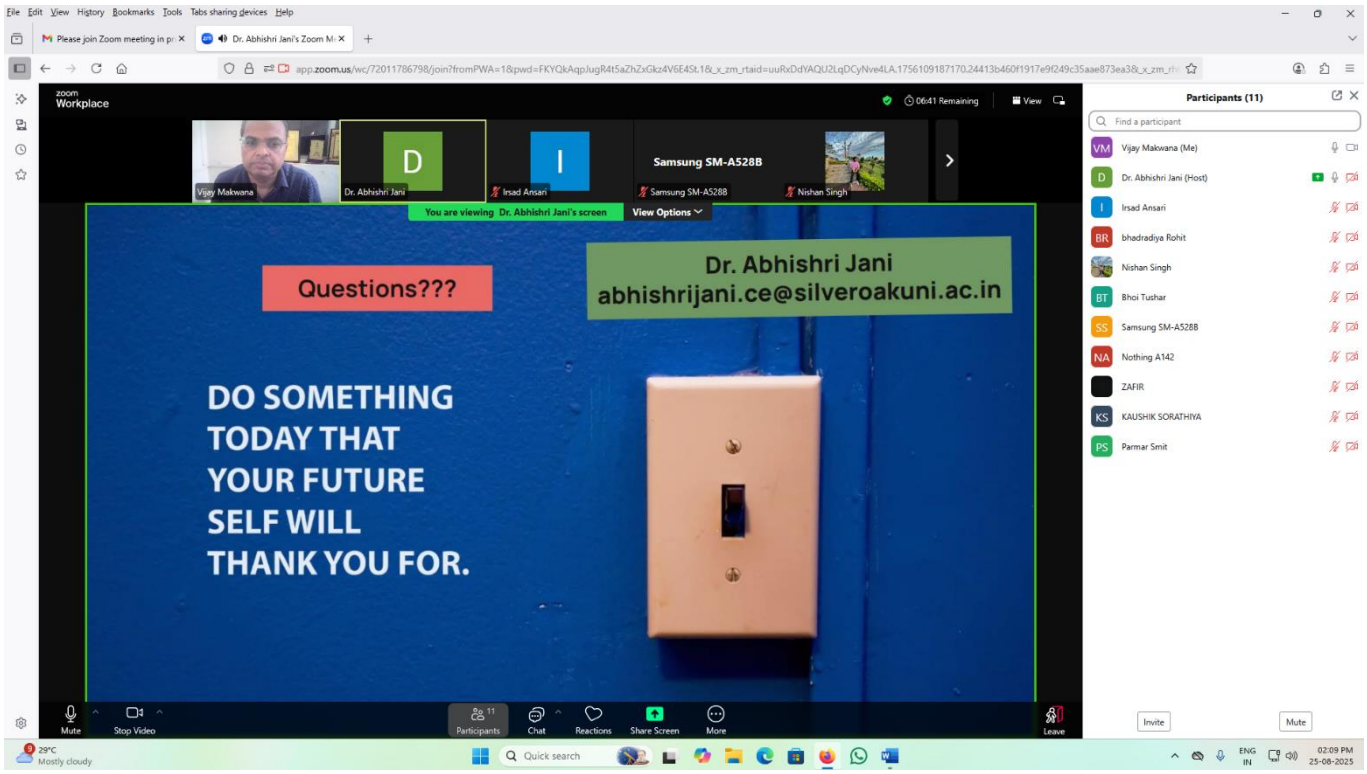

Reactance relays
Operating Principle
Operates based only on the reactance (X) component of impedance, Ignores the resistance (R).
Relay operates if: X ≤ Xset
Features
Not affected by fault resistance (e.g., arc resistance).
Non-directional → may operate for reverse faults too.
More suitable for ground 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.
+ X
Negative Torque
Operating Characteristic
Positive Torque
Z
θ
X = setting
- R
+ R
- X
Operating Characteristic of Reactance Type Distance Relay
Participants (11)


Questions???
Dr. Abhishri Jani
abhishrijani.ce@silveroakuni.ac.in
DO SOMETHING TODAY THAT YOUR FUTURE SELF WILL THANK YOU FOR.
Participants (11)