

# **REPORT ON SUBSTATION VISIT**

## **OBJECTIVE:**

TO SEE LAYOUT OF SUBSTATION EQUIPMENT IN SUBSTATION, RATINGS AND TYPE OF EQUIPMENT USED AND ALSO TYPE OF PROTECTION SCHEMES USED IN SUBSTATIONS. ALSO KNOW DIFFERENT TYPES OF RELAYS, CIRCUITBREAKERS USED IN SUBSTATION.

## **LOCATION:**

33/11 KV SUBSTATION-MUNGAMUR (KADANUTHALA) 524142



FIG: SUBSTATION MAIN ENTRANCE

## INCOMING AND OUTGOING LINES OF SUBSTATION:

THIS MUNGAMUR SUBSTATION (33/11KV) HAS TWO (2) INCOMING LINES AND FOUR (4) OUTGOING LINES

INCOMING LINES:

1. FROM KAVALI
2. FROM ALLUR

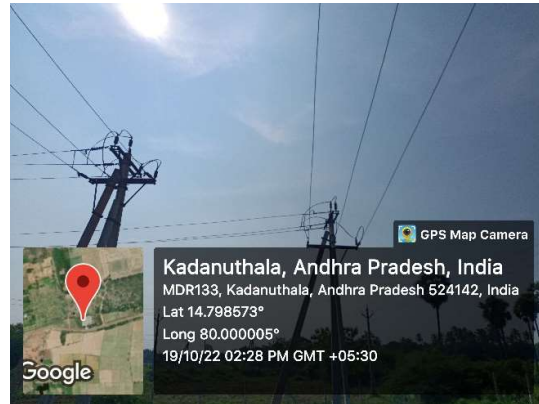


FIG: ICOMING LINES FROM ALLUR AND KAVALI

OUTGOING LINES:

1. ALLIMADUGU
2. KADANUTHALA RURAL
3. MUNGAMUR INDUSTRIES
4. HIGHWAY EXPRESS



FIG: OUTGOING FEEDER LINES AND AREAS

## **SWITCH GEAR AND PROTECTION OF POWER SYSTEM IN SUBSTATION:**

### **❖ CIRCUIT BREAKERS**

IN THIS SUBSTATION, VACUUM CIRCUIT BREAKERS (VCB) ARE USED. THESE VCBS ARE MOUNTED ON BUSHES.

CIRCUIT BREAKERS ARE USED BOTH AT OUTGOING LINES AND INCOMING LINES.

EACH INDIVIDUAL CIRCUIT BREAKER IS USED FOR EACH FEEDER RESPECTIVELY.

ALL THE CONTROLS OF CIRCUIT BREAKERS ARE AVAILABLE AT CONTROL ROOM.



**FIG: CIRCUIT BREAKER**

## ❖ RELAYS

IN THIS SUBSTATION, DIFFERENTIAL PROTECTION RELAYS ARE MAJORLY USED.

THESE RELAYS ARE AUTOMATICALLY OPERATED WHEN ANY KIND OF FAULT OCCURS.

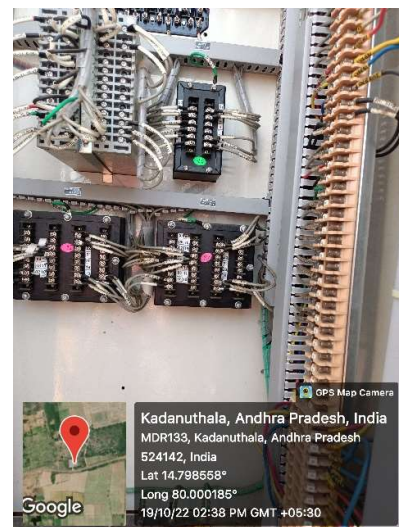
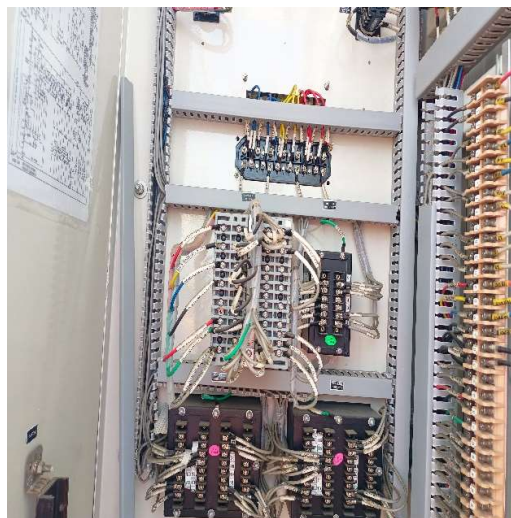
THESE RELAY CONTROLS ARE ALSO GIVEN TO CONTROL ROOM.

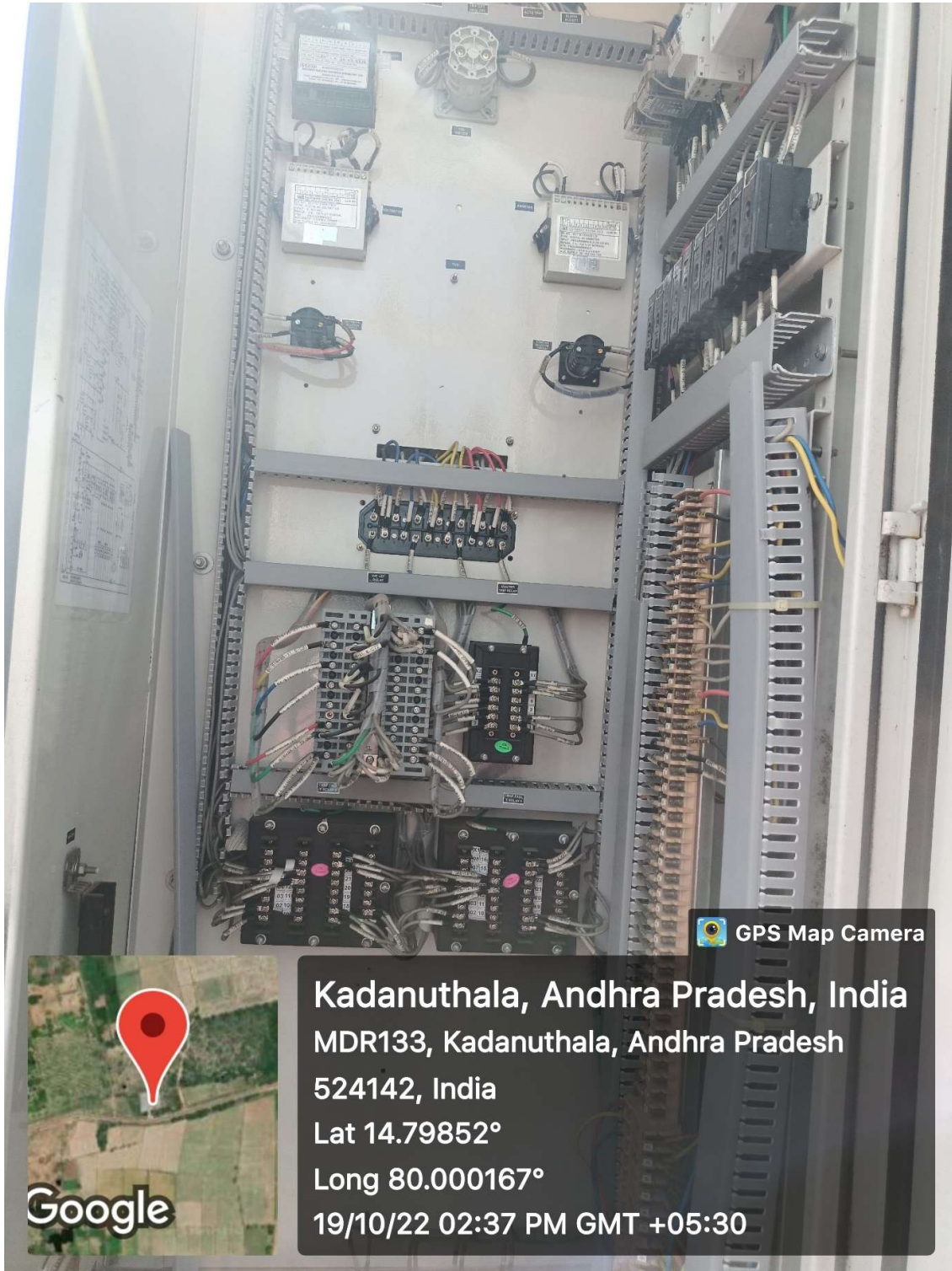


FIG: OVER CURRENT  
AND EARTH FAULT RELAY



FIG: MASTER TRIP RELAY





Kadanuthala, Andhra Pradesh, India

MDR133, Kadanuthala, Andhra Pradesh

524142, India

Lat 14.79852°

Long 80.000167°

19/10/22 02:37 PM GMT +05:30

FIG: RELAY CONTROL PANEL

### ❖ LIGHTNING ARRESTORS

LIGHTNING ARRESTORS ARE USED TO PROTECT THE EQUIPMENT AGAINST VOLTAGE SURGES AND LIGHTNING. THEY ARE PROPERLY EARTHED AND ARE PROVIDED AT ENTRY POINT OF LINES INTO SUB STATION AND TRANSFORMERS.



FIG: LIGHTNING ARRESTOR

### ❖ EARTHING

EACH IS EQUIPMENT IS EARTHED SEPERATELY USING MS FLAT OR 1.5 TO 2 mm WIDTH. FOR SUBSATAION EARTH RESISTANCE SHOULD BE LESS THAN 1 OHM. EARTH PIT OF 6 TO 8 FEET, 2'X2' SIZE IS DUG FILLED WITH SAND, CHARCOAL AND SALT. 1.5 TO 2M GI PIPE

### ❖ GROUND WIRE ON SUBSTATION

GRID OF EARTHWIRES ARE PROVIDED ON THE TOP OF SUBSTATION STRUCTURE TO PROTECT EQUIPMENT FROM DIRECT LIGHTNING STRIKES.

## TRANSFORMERS USED IN SUBSTATION

POWER TRANSFORMERS ARE USED IN THIS SUBSTATION OF RATING 5MVA.

TWO TRANSFORMERS OF RATING 5MVA ARE USED TO TRANSFER POWER.

STEP-DOWN TRANSFORMERS ARE USED HERE.

A SINGLE DISTRIBUTION TRANSFORMER IS USED FOR POWER SUPPLY INSIDE THE SUBSTATION.

TWO TRANSFORMERS ARE USED TO IMPROVE THE RELIABILITY OF DISTRIBUTION. IN CASE OF FAILURE OF ONE TRANSFORMER THE OTHER TRANSFORMER SUPPLIES POWER (50%).



FIG: ON LOAD TAP CHANGER RATINGS



FIG: POWER TRANSFORMER RATING

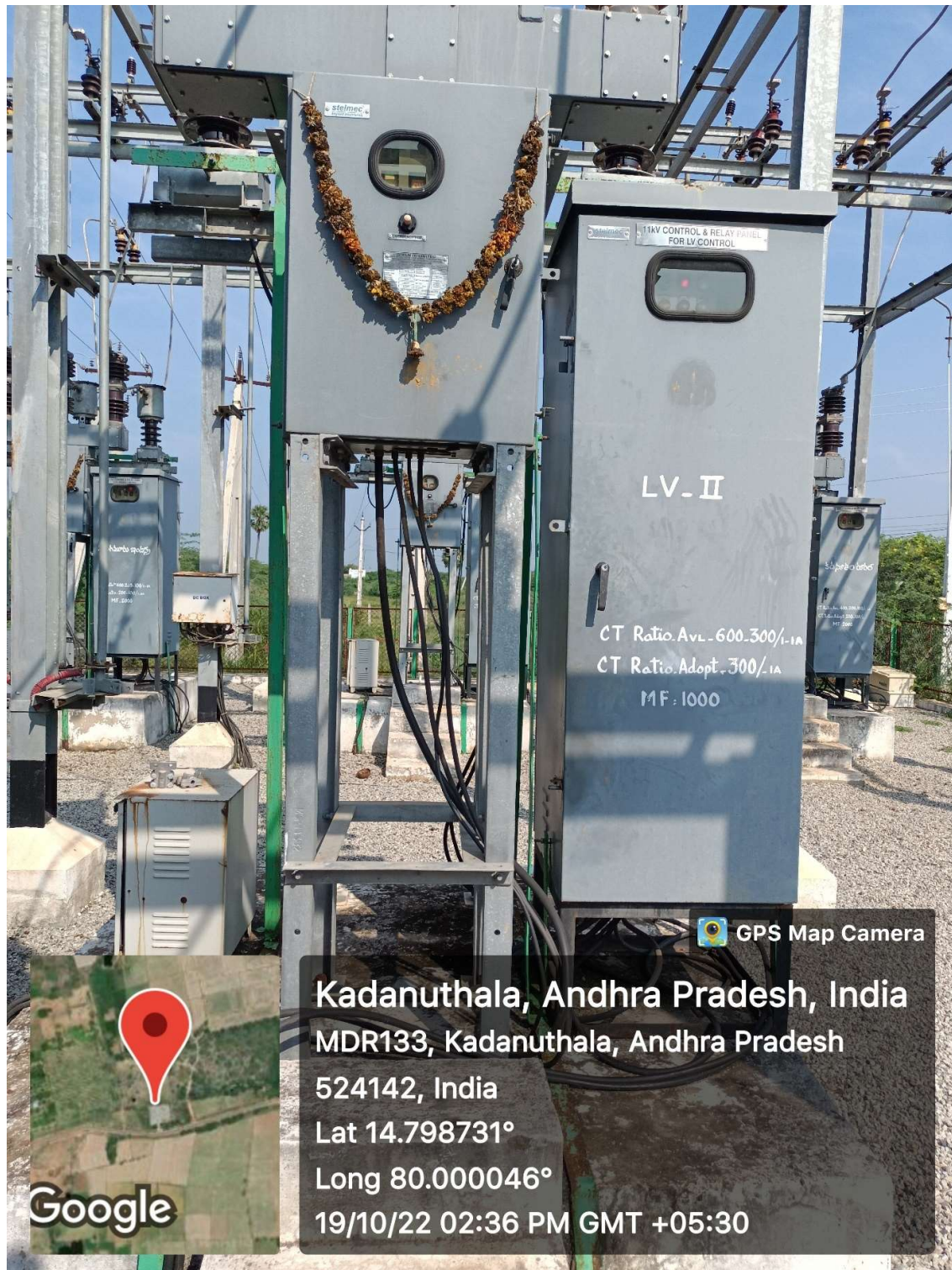


FIG: CURRENT TRANSFORMER AND RATINGS

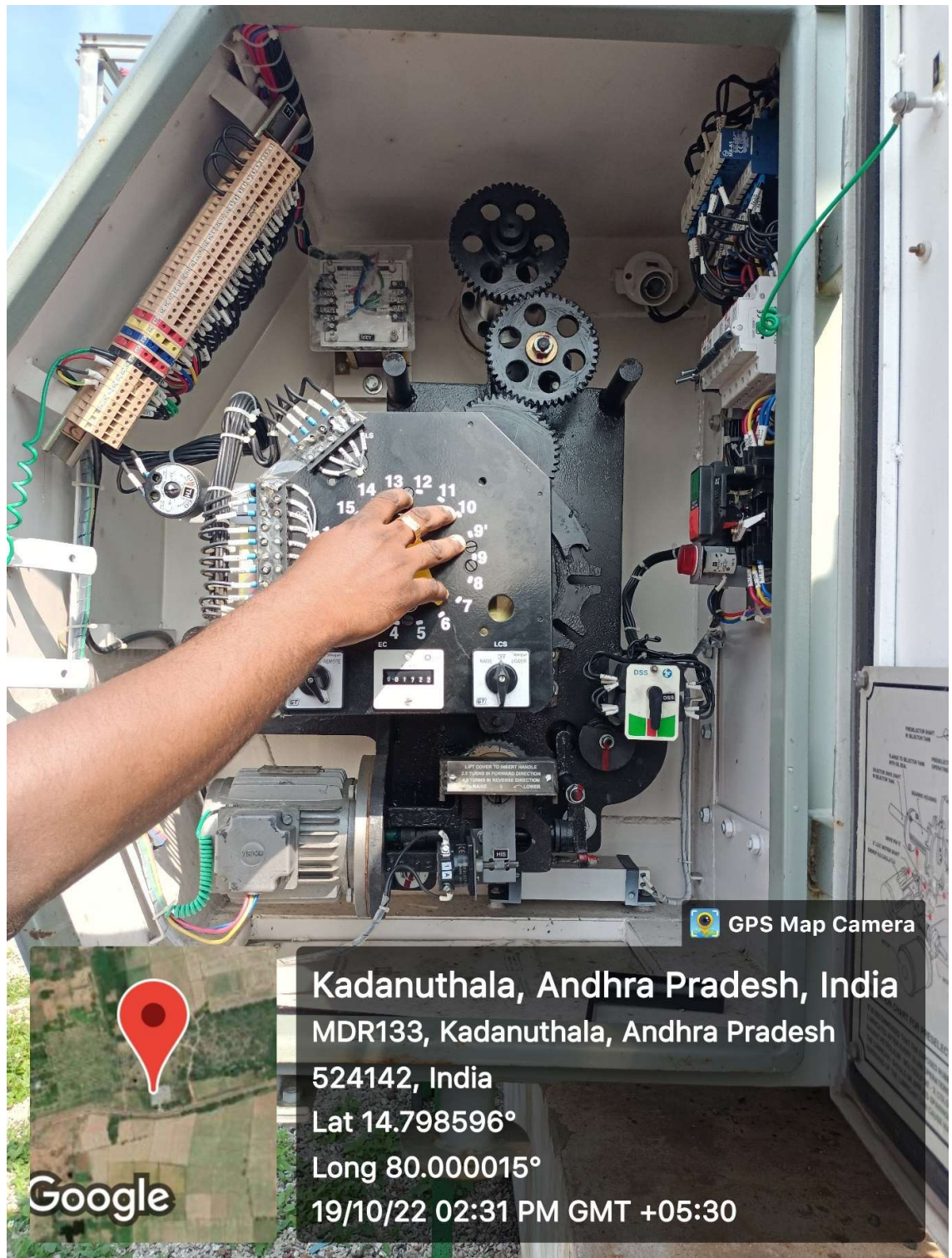


FIG: TAP CHANGER CONTROLS

## DC SUPPLY IN SUBSTATION

DEDICATED DC SUPPLY IS GIVEN TO ALL KINDS OF CIRCUIT BREAKERS USED IN THE SUBSTATION.

IF ANY FAULT OCCURS AND AC SUPPLY IS INTERRUPTED, THEN DC SUPPLY IS USED FOR OPERATION OF CIRCUIT BREAKERS.



FIG: DC SUPPLY INTERIOR VIEW



FIG: DC BOX FOR CIRCUIT BREAKER

## SUBSTATION YARD

SUBSTATION YARD IS FILLED WITH GRAVEL FOR BETTER PROTECTION AND AVOID GROWING OF PLANTS OR GRASS.

WATER SWEEPAGE IS ALSO PROVIDED TO GROUND TO REDUCE THE RESISTANCE OF EARTH.



FIG: SUBSTATION YARD FILLED WITH GRAVEL

## CAPACITOR BANKING

CAPACITOR BANKING IS PROVIDED IN THE SUBSTATION FOR IMPROVEMENT OF POWER FACTOR IN THE SUBSTATION.

AS ALL THE LOADS USED ARE INDUCTIVE IN NATURE THEY POSSESS LAGGING NATURE. IF LAGGING NATURE IS THERE, THERE WILL BE USAGE OF LARGE AMOUNTS OF CURRENTS.

TO COMPENSATE THE LAGGING NATURE OF THE LOADS THE CAPACITOR BANKS ARE PROVIDED FOR IMPROVING POWER FACTOR.



FIG: CAPACITOR BANKING IN SUBSTATION

## ISOLATORS

AIR BRAKE SWITCHES (AB SWITCHES) ARE PROVIDED BEFORE AND AFTER THE CIRCUIT BREAKERS CONNECTED TO SYSTEM.

FOR 33KV LINE, POWER FLOWS ONLY IN ONE DIRECTION. HENCE ISOLATORS ARE PROVIDED BEFORE CIRCUIT BREAKER.

ISOLATORS ARE OPENED AFTER CB BREAKS THE CURRENT, WHILE CLOSING CIRCUIT BREAKERS ARE CLOSED FIRST AND THEN ISOLATORS ARE CLOSED.

ISOLATORS CANNOT BE OPERATED ON LOAD i.e., GREATER THAN 11KV.

BUT FOR 11KV SIDE, AB SWITCHES CAN BE OPENED OR CLOSED ON LOAD.



FIG: ISOLATOR USED IN SUBSTATION

SUBSTATION VISIT GALLERY



FIG: ENTRY NAME PLATE OF SUBSTATION



FIG: CONTROL ROOM IN SUBSTATION



FIG: SUB-ENTRY FOR 33/11KV SUBSTATION, MUNGAMUR



FIG: GROUP PICS WITH ASSISTANT ENGINEER (OPERATIONS) BOGOLE DURING EXPLANATION



FIG: RSR ENGINEERING COLLEGE VAN USED FOR SUBSTATION VISIT

## **CONCLUSION**

WE STUDY IN DETAIL ABOUT TYPES OF CIRCUIT BREAKERS, TYPES OF RELAYS USED FOR PROTECTION OF POWER SYSTEM AGAINST FAULTS, LIGHTNING STRIKES AND OVER VOLTAGES.

BY THE VISIT OUR UNDERSTANDING OF THE SUBJECT HAD BEEN ENHANCED TO NEXT LEVEL.

**\*\*\*\*\*THE END\*\*\*\*\***