



EAST WEST UNIVERSITY

INTERNSHIP REPORT

ON

SUBSTATION OF ASHUGANJ POWER STATION COMPANY LIMITED  
(APSCL)

By

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Submitted to the

Department of Electrical and Electronic Engineering

Faculty of Sciences and Engineering

East West University

In partial fulfillment of the requirements for the degree of  
Bachelor of Science in Electrical and Electronic Engineering

(B.Sc. in EEE)

Spring, 2013

Approved By

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Chairperson and Associate Professor

## Training Certificate

*ASHUGANJ POWER STATION COMPANY LTD. (APSCCL)*  
*(An Enterprise of Bangladesh Power Development Board)*



*Certificate*  
*For*  
*Industrial Attachment Training Program*

*This is to certify that Md. Anisur Rahman , ID No. 2008-2-80-026 ,the Student of B.Sc in Electrical and Electronic Engineering from East-West University , Dhaka has successfully completed the Industrial Attachment Training Program held from 24-08-2012 to 07-09-2012. During the training period , he paid due attention to the practical work.*

*I wish him every success in life.*

*Jahur*  
*Manager (HRD)*  
*Ashuganj Power Station Company Ltd.*  
*Ashuganj, B-Baria*

## **Authorization Page**

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Md. Anisur Rahman

## Approval Letter

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(An Enterprise of Bangladesh Power Development Board)  
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APSCCL

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**Subject : Industrial Attachment.**

Ref - (1) Your Letter No-EWU(CCC) 01/11/Fall-12/01, Dated:- 01.07.2012.  
(2) Letter No-EWU(CCC) 01/11/Fall-12/23, Dated:- 11.07.2012  
(3) Your Letter No-EWU(CCC) 01/11/Fall-12/07, Dated:- 30.06.2012

Dear Sir,

With reference to the above, Ashuganj Power Station Company Ltd. (APSCCL) has agreed to arrange the **Industrial Attachment Program** for your 18+3+3= 24 (Twenty Four) students from 24-8-2012 to 07-9-2012. The students may reside in Power Plant Training Center Hostel by arranging food by themselves. We also indicate that **Honorarium & Hostel Rent** including others require Tk. 41400/- (Fourty One Thousand Four Hundred) only payable in favor of APSCCL, Ashuganj, B-Baria, for conducting the Industrial Attachment Program.

Thanking you,  
As directed

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*22-7-2012*  
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8. Office Copy.

## Acknowledgement

First of all I would like to thank the almighty Allah for giving me the chance to complete my internship and preparing the internship report.

In the preparation of this internship report, I acknowledge the encouragement and assistance given by a number of people from Ashugonj Power Station Company Ltd. I am grateful to Engr. Md. Nurul Alam, Managing Director APSCL, Engr. Noor Mohammad, Manager (Substation), Engr. Md. Shahid Ullah, Assistant Engineer (Substation) and also Engr. Mohammad Kaium for their valuable suggestions and assurance.

I would also like to thank my advisor Anwarul Azim, Lecturer, Department of Electrical & Electronic Engineering, East West University, Bangladesh.

I would also like to mention the name of Dr. Mohammad Mojammel Al Hakim, Chairperson and Associate Professor of the Department of Electrical & Electronic Engineering, East West University and all of our teachers for their support.

Lastly, I want to show our gratefulness to all the respondents who spared their precious time in answering our questionnaires.

## Executive Summary

The power sector in Bangladesh faced numerous problems characterized by lack of supply capacity, frequent power cuts, unacceptable quality of supply, and poor financial and operational performance of the sector entities. The generation of electricity is one of the most complex processes in the world. A lot of steps are needed to be completed to supply the power to the grid. In Bangladesh public and private sector produces 63% and 37% of electricity respectively. Public sector produces electricity through Bangladesh Power Development Board (BPDB), Ashuganj Power Station Company LTD (APSCL) and Electricity Generation Company of Bangladesh (EGCB). APSCL individually produces 15% of the total production.

To fulfill the large demand of electric power in Bangladesh, the Ashuganj Power Station Company Ltd. (APSCL) plays a vital role in power generation being the second power station in Bangladesh. The APSCL produces 731 MW of electric power and supplies to the national grid.

During our internship period we observed and gathered various knowledge and experiences over the topics which we have learned inside the class room or from books. In this report we have focused on the process which is used in APSCL for power generation, various equipments which are used for switchgear protection, power distribution system and substation.

Substation is an important part of a power station to distribute power and protection purpose. We acquired knowledge about various types of transformers, bus-bars, circuit breakers (SF6 and Oil), lightning arresters, CT, PT and other equipments of the substation which were clearly taught and shown by the senior engineers of the substation of APSCL.

There are various types of tests (Megger test, CT test, Relay test) which are performed by the technicians and engineers of the APSCL. With the help of the engineers and technicians we observed these tests successfully during our internship period.

## Training Schedule

Date	Topic	Mentor	Time Duration	Training Hour
24/08/2012	Introduce APSCL and Substation	Engr. Md. Shahidullah Assistant Engineer (S/S)	8 am – 1 pm 2 pm – 4 pm	7
25/08/2012	Current Transformer (CT)	Engr. Md. Shahidullah Assistant Engineer (S/S)	8 am – 1 pm 2 pm – 4 pm	7
26/08/2012	Feeder energize and de-energize	Engr. Md. Shahidullah Assistant Engineer (S/S)	8 am – 1 pm 2 pm – 4 pm	7
27/08/2012	Battery Room	Engr. Md. Shahidullah Assistant Engineer (S/S)	8 am – 1 pm 2 pm – 4 pm	7
28/08/2012	Bus Coupler	Engr. Md. Shahidullah Assistant Engineer (S/S)	8 am – 1 pm 2 pm – 4 pm	7
29/08/2012	CT Testing	Engr. Md. Shahidullah Assistant Engineer (S/S)	8 am – 1 pm 2 pm – 4 pm	7
30/08/2012	Potential Transformer (PT)	Engr. Md. Shahidullah Assistant Engineer (S/S)	8 am – 1 pm 2 pm – 4 pm	7
31/08/2012	Isolator Maintenance	Engr. Md. Shahidullah Assistant Engineer (S/S)	8 am – 1 pm 2 pm – 4 pm	7
01/09/2012	Single Phase Transformer	Engr. Md. Shahidullah Assistant Engineer (S/S)	8 am – 1 pm 2 pm – 4 pm	7
02/09/2012	Circuit Breaker	Engr. Md. Shahidullah Assistant Engineer (S/S)	8 am – 1 pm 2 pm – 4 pm	7
03/09/2012	Coupling Transformer	Engr. Md. Shahidullah Assistant Engineer (S/S)	8 am – 1 pm 2 pm – 4 pm	7
04/09/2012	Different Switchgear Equipments	Engr. Md. Shahidullah Assistant Engineer (S/S)	8 am – 1 pm 2 pm – 4 pm	7
05/09/2012	Auxiliary Transformers	Engr. Md. Shahidullah Assistant Engineer (S/S)	8 am – 1 pm 2 pm – 4 pm	7
06/09/2012	Control Room	Engr. Md. Shahidullah Assistant Engineer (S/S)	8 am – 1 pm 2 pm – 4 pm	7
07/09/2012	Different types Relay	Engr. Md. Shahidullah Assistant Engineer (S/S)	8 am – 1 pm 2 pm – 4 pm	7

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## CHAPTER 01: INTRODUCTION OF APSCL

### 1.1 Introduction

Ashugonj power station is the second largest power station in Bangladesh. The present total power generation capacity of its 9 units is 674 MW. As a part of the power sector development and reform program of the government of Bangladesh, Ashugonj power station company ltd. has been incorporated under the companies' act 1994 to 28 June 2000. There are three types of power plants in APSCL such as thermal power plant, gas turbine power plant and combine cycle power plant. So here is lot of opportunity to learn about various types of power plant. The vision of APSCL is to become the leading power generation company in Bangladesh and the mission is to increase Ashugonj Power Station's generation capacity to 1500 MW by 2015 [1].

The main objective of APSCL is enhance the station's dependable capacity in order to comply with the government's target to provide electricity for all by 2021 and increase overall thermal efficiency of the station by installing new plant in order to generate more power consuming the same amount of gas.

### 1.2 Company Profile

Ashugonj Power Station Company Ltd owns the second largest power station in Bangladesh. The installed capacity by its 9 units is 777 MW and present de-rated capacity is 731 MW. Ashugonj Power Station fulfills about 15% of power requirements of the country [2].

- Corporate Office : Ashugonj Power Station Company Ltd., Brahmanbaria.
- Registration No. : C-40630 (2328)/2000
- Date of Incorporation : 28 June 2000
- Status : Public Limited Company
- Business : Power Generation
- No. of Generating Units : 9 (6 Steam Turbine + 2 Gas Turbine+ 1 Gas Engine)
- Installed Capacity : 777 MW
- Present de-rated capacity : 731 MW
- Area of Land : 263.55 Acres

**Plant 1: Thermal Power Plant (TPP)**

- Two Steam Units of 64 MW Unit # 1 & 2 each-commissioned in 1970.

**Plant 2: Combined Cycle Power Plant (CCPP)**

- Gas Turbine Units-GT1 and GT2 of capacity 56 MW each-commissioned in 1982 and 1986 respectively.
- One Steam Turbine (ST) of capacity 34 MW with waste heat recovery boiler commissioned in 1984.
- 50 MW Gas Engine Power Plant was commissioned in 2011.

**Plant 3: Thermal Power Plant (TPP)**

- Unit # 3 of 150 MW capacity was commissioned in 1986.
- Unit # 4 of 150 MW capacity was commissioned in 1987.
- Unit # 5 of 150 MW capacity was commissioned in 1988.

**1.3 Production Report**

The production report of APSCL was very good. Its present capacity is almost the installed capacity. It's lost little accuracy. In the following table 1.1 is shown the unit wise installed capacity and present capacity at APSCL.

Table 1.1: Production Report of ASPCL [3].

Description	Unit-1	Unit-2	Unit-3	Unit-4	Unit-5	GT-1	GT-2	ST(CC)	50MW GE	Total
Date of Comm.	17 Jul 1970	08 Jul 1970	17 Dec 1985	04Mar1 987	21 Mar 1988	15 Nov 1982	23 Mar 1986	28 Mar 1984	01 Mar 2011	
Installed Capacity(MW)	64	64	150	150	150	56	56	34	53	777
Present Capacity(MW)	64	64	150	150	150	40	40	20	53	731

## **1.4 Future projects of APSCL**

Considering the future power demand, APSCL has started to undertake some projects in order to decommission the old and inefficient plant after the implementing the new projects. APSCL has already been floated a tender of 225 MW CCPP project through their own arrangement of funding. According to schedule the 225 MW project is expected to be implemented last quarter of 2013 [4].

The following are near future power project of APSCL:

1. 225 MW CCPP Project,
2. 450 MW CCPP (North) and
3. 450 MW CCPP (South).

## **1.5 Objective of the Internship**

The primary objective of the internship for us was monitoring, evaluating and understanding of generation process, management process and also overall transiting and maintenance process of a power plant. The internship was a part of completing our requirement for electrical and electronic engineering program.

The secondary objectives were as follows:

- Understanding of corporate job pattern.
- Understanding of generation & substation system in a power plant.
- Understanding protection techniques.
- Understanding maintenance process.
- To have an idea about sub-station equipments and maintenance.
- To have a practical idea about what we learnt in Electrical and electronic engineering program at the university.

## **1.6 Scope And Methodology**

The scope of organization part covers the organizational structure, background, and objectives, functional departmentalization, generation process, design strategy of Ashuganj Power Station Company Ltd as a whole. This report focuses on substation, control and

protection of substation equipments, maintenance of individual equipments of substation and power distribution of Ashuganj Power Station Company Ltd.

The information's that are used in this report is collected in different methods:

- The primary sources of information were the direct interactions with APSCL engineers and employees. They also provide us some documents and diagrams from their offices.
- The secondary information's were collected from website of APSCL and using their annual reports. Different websites and books also provide us information's which are mentioned in reference part.

## CHAPTER 02: INTRODUCTION OF SUBSTATION

### 2.1 Introduction

A sub-station is a subsidiary station where electricity is transformed for distribution by low-voltage network. The sub-station is interconnected to generators, transformer, transmission and distribution lines and all other protecting and maintaining equipment's. We observed the activities of substation were i) transformation of power from one voltage level to another switching for alternate connections, ii) isolation of failed or overloaded lines and equipment, iii) controlling system voltage and power flow, iv) suppression of over voltage and v) detection of faults, monitoring, recording of information, power measurements, and remote communications. The APSCL substation is shown in following figure 2.1 below [5],[6].



Figure 2.1: Power Generation and Distribution network at APSCL [7].



## 2.2 Main Equipment of the Substation

1. Power Transformer:
  - (i) Single Phase Transformer,
  - (ii) Earthing Transformer,
  - (iii) Auxiliary Transformer and
  - (iv) Coupling Transformer.
2. Instrument Transformer:
  - (i) Current Transformer (CT) and
  - (ii) Potential Transformer (PT).
3. Circuit Breaker (CB): i) SF<sub>6</sub> CB and ii) Oil CB.
4. Isolator.
5. Bus Bar:
  - (i) Single Bus Bar and
  - (ii) Double Bus Bar.
6. Incoming and Outgoing Feeder.
7. Bus Coupler.
8. Lighting Arrester.
9. Sky Wire.
10. Support Insulator.
11. Wave Tray.
12. Earth Switch.
13. Relay.
14. Battery Room.
15. Control Room.

## 2.3 Feeder

Feeder is a set of electric conductors that originate at a primary distribution center and supply power to one or more secondary distribution centers. We saw the feeders in 3th day of our internship. An energy balance diagram is shown in figure 2.2 below.

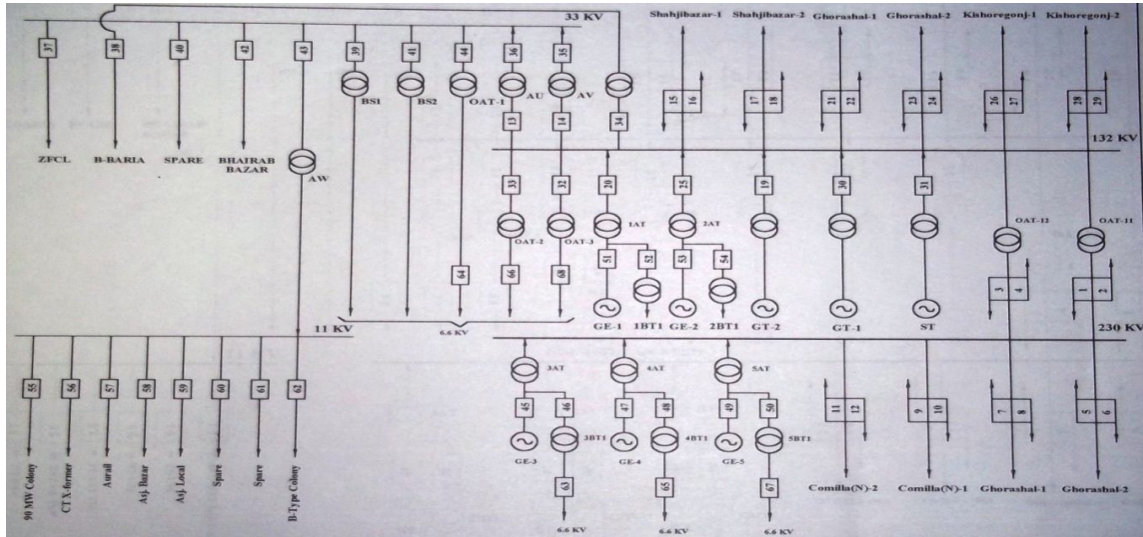


Figure 2.2: Energy Balance Diagram of APSCL [8].

## 2.4 Outgoing Feeder

Outgoing feeders carry power from substation to other substation or consumers. In APSCL we saw different voltage level outgoing feeders for bus bar system which is used for power transmitting and receiving purpose. They were mainly four types of voltage level feeders:

1. 230 kV Outgoing Feeder,
2. 132 kV Outgoing Feeder,
3. 33 kV Outgoing Feeder and
4. 11 kV Outgoing Feeder.

### 2.4.1 230 kV Outgoing Feeders

230 kV outgoing feeders are distributed at long distance and also some private companies' project. It is highest voltage level supplied from APSCL. The 230 kV outgoing feeder's single line diagram is shown in figure 2.3. 230 kV feeders were connected with Ghorashal-1,

Ghorashal-2, Comilla-1, Comilla-2, Serajgonj-1, Serajgonj-2, Aggreko Rental (80 MW) and United Rental (50 MW).

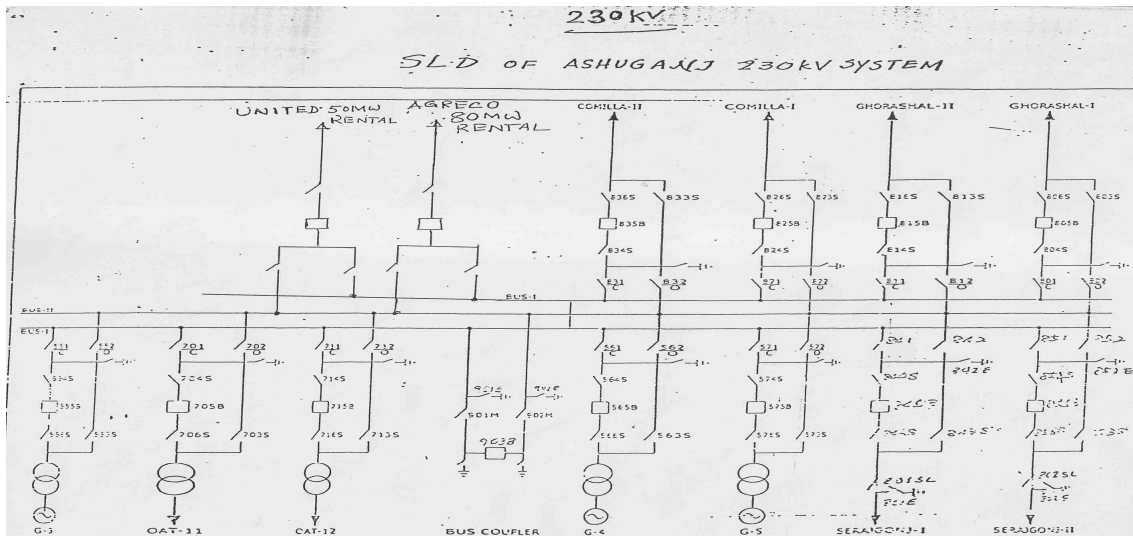


Figure 2.3: Single Line Diagram of 230 kV Feeder of APSCL [8].

### 2.4.2 132 kV Outgoing Feeders

We observed that 132 kV outgoing feeders are distributed at the near district areas like Ghorashal. These feeders connect with the different district substations to distribute. The 132 kV outgoing feeder's single line diagram is shown in figure 2.4. 132 kV feeders were connected with substations Shajibazar (unit 1, 2, 3), Ghorashal (unit 1, 2) and Kishoregonj (unit 1, 2).

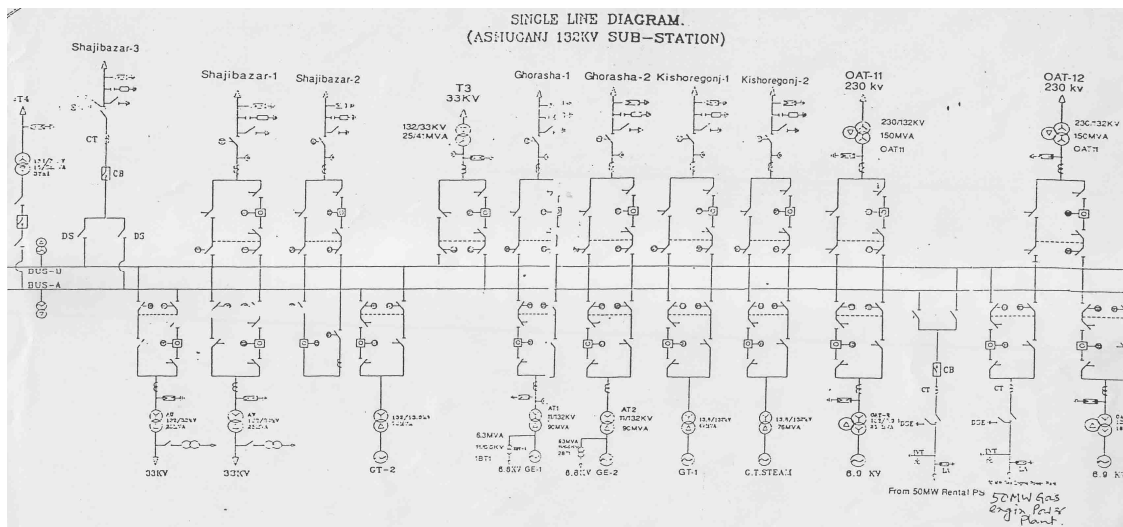


Figure 2.4: Single Line Diagram of 132 kV Outgoing Feeder of APSCL [8].

### 2.4.3 33 kV Outgoing Feeders

33 kV outgoing feeders are used in APSCL to distribute electricity at the nearest district areas of ashugonj like Bhairab Bazar. The 33 kV outgoing feeder's single line diagram is shown in figure 2.5 below. 33 kV feeders were connected with B-Baria, Bhairab Bazar and ZFCL.

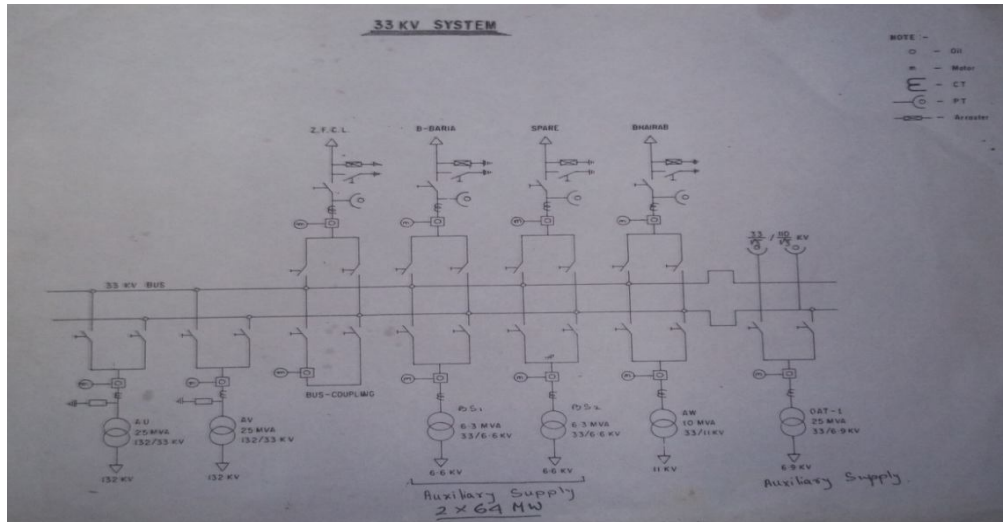


Figure 2.5: Single Line Diagram of 33 kV Feeder of APSCL [8].

### 2.4.4 11 kV Outgoing Feeders

We saw that 11 kV feeders are used for the APSCL own usage and also nearest areas and APSCL colonies. These feeders also use CT transformers. The Ashugonj local areas are connected this feeder. So 11 kV feeders are the lowest feeder which use for own Ashugonj area. 11 kV feeders were connected with 90 MW colony, Current Transformer, Aurail, Ashugonj Bazar, Ashugonj local and B-type colony.

## CHAPTER 03: TRANSFORMERS

### 3.1 Introduction

Our supervisor Engineer Md. Shahid Ullah, Assistant Engineer (Substation) demonstrated the substation switchyard to us. He told us that there are various types of switchyard equipments but the most important part of the substation switchyard is transformer. Power Transformer is a static device which transforms power one voltage level to another voltage level. It transforms power from one circuit to another without changing its frequency but may be in different voltage level. The instrument transformers are used the measuring and protection purposes [5],[6].

### 3.2 Types of Transformer

In substation two types of transformers are mainly used. These are:

1. Power transformers:
  - Single Phase Transformer,
  - Earthing Transformer,
  - Auxiliary Transformer and
  - Coupling Transformer.
2. Instrument transformers:
  - Current Transformer and
  - Potential Transformer.

### 3.3 Power Transformers

The power transformers are used in substations to step up or step down the voltage level. It can be single phase transformer banks of three each or three-phase transformer. For efficient use three single phase transformer are used in high voltage level. When single-phase transformers are operating in parallel, their voltage rating should be identical and impedance should equal [5],[6].

### 3.3.1 Single Phase Transformer

In APSCL, almost all the high voltage level (HV) power transformers were single phase transformers. We saw that single phase transformers were used at 132 kV & 230 kV voltage levels. For power transmission, the generated voltage from generators was low voltage either 11 kV or 15 kV. The single phase transformers were step up from low voltage to high voltage like 15.6 kV to 132 kV and 15.6 kV to 230 kV. In single phase transformers, generation side or primary side was  $\Delta$  connected and grid side or secondary side was Y connected. A single phase transformer is shown in figure 3.1 below.



Figure 3.1: Single Phase Transformer at APSCL [7].

### 3.3.2 Earthing Transformer

Our supervisor showed the earthing transformer and told us that earthing transformers are used to create a neutral point in a three-phase system, which provides possibility for neutral earthing. The earthing can be through an arc-suppression reactor, a neutral earthing reactor or

resistor or directly. When the neutral point is not available or does not exist with a delta secondary winding of the transformer, a neutral point needs to be created. We had seen some earthing transformers at 33 kV line in APSCL [5].

Earthing transformers are used to create a neutral point in a three-phase system, which provides possibility for neutral earthing. Neutral earthing transformers are normally provided in 3-phase system, which without neutral and earth fault protection. An earthing transformer is shown in figure 3.2 below.



Figure 3.2: Earthing Transformer at APSCL [7].

### 3.3.3 Auxiliary Transformer

We found out that every unit at APSCL has an auxiliary transformer. Unit auxiliary transformer is the power transformer that provides power to the auxiliary equipment of a power generating station during its normal operation. This transformer was connected directly to the generator out-put by a tap-off of the isolated phase bus duct and thus became the cheapest source of power to the generating station.

It is generally a three-winding transformer i.e. one primary and two separate secondary windings. Primary winding of UAT is equal to the main generator voltage rating. The secondary windings could be same or different voltages i.e. generally 11 kV and or 6.6 kV as per plant layout. Some auxiliary transformers are shown in figure 3.3 below.



Figure 3.3: Auxiliary Transformers at APSCL [7].

### 3.3.4 Coupling Transformer

When we visited the substation switchyard, we observed the coupling transformer. The coupling transformer is the power transformer that provides power between two different voltage level buses. In APSCL the coupling transformers are used between the 132 kV bus and 230 kV bus or 33 kV bus and 132 kV bus. It is a three phase power transformer which transferred power one bus to another. Coupling transformer is shown in figure 3.4.





Figure 3.4: Coupling Transformer between 132 kV and 230 kV Buses [7].

### 3.4 Transformer Protection

#### 3.4.1 Coolant

During operation, we saw transformer's temperature was increasing when the loads were increasing. So, larger dry type transformer has some cooling fans to remove the waste heat produced by losses from the radiators. The fans start automatically when the temperature increased. When the load is increased, the temperature also increases then the fans turn ON one by one. Some cooling fans are shown in figure 3.5.



Figure 3.5: Cooling Fans of Transformer at APSCL [7].

### 3.4.2 Buchholz Relay

On the 8<sup>th</sup> day of our internship, we visited the power transformers in the unit- 4 which was shut down. So we saw the whole transformer including the top of the transformer. Then we were showed Buchholz relay and the engineers described the relay. Buchholz relay is a gas actuate relay installed in oil immersed transformers for protection against fault. Buchholz relay acute the incipient faults in transformer tank below oil level and then give an alarm. Due to fault, the arc causes decomposition of transformer oil. The product of decomposition contain more than 70% of hydrogen gas, which very light, rises upwards and tried to go into conservator. The Buchholz relay is fitted in the pipe leading to the conservator so gas goes into the relay, trigger an alarm and transformer tripped [5].

A Buchholz relay is shown in figure 3.6 below.



Figure 3.6: Buchholz Relay of Transformer [7].

The Buchholz relay detects i) the gas produced within the transformer, ii) an oil surge from the tank to the conservator iii) a complete loss of oil from the conservator (very low oil level).

Buchholz relay is the most important relay for transformers. But we found out that it has some limitation such as i) only faults below oil level are detected, ii) setting the mercury switch cannot be too sensitive otherwise there can be a false operation by vibrations, earthquakes, mechanical shocks to the pipe, sitting of birds etc and iii) the relay is slow; minimum operating time is 0.1 second, average time 0.2 second. Such a slow timing is unsatisfactory.

However, it is an excellent relay to bring to notice incipient fault. In APSCL, Buchholz relay were not provided for transformers below 500 kVA. A separate Buchholz relay was provided with the tap changer to detect the incipient fault in the tap changer. This does not respond to a small arching.

### **3.5 Maintenance of a Power Transformer**

In a substation, the most important equipments are power transformers. The transformers are very expensive. So it should be maintained carefully. We asked the supervisor, engineers and substation employees how they the transformer maintained. They gave us some the information about this.

- Checking all the overhead connections monthly.
- Checking the transformer tank, cooling fans, tubes, radiators, and all gasketed and other openings visually for any possible leaks monthly.
- Checking the gauges on the transformer for oil level, oil temperature, and tank pressure weekly. Look for signs of overheating or corrosion.
- Observing any change in operating sound regularly. A louder hum than normal could indicate low oil level or temperature rise inside the tank.
- Obtaining oil sample and perform lab tests for dielectric strength, neutralization number, interfacial tension, and gas-in-oil analysis annually.
- Changing the silica gel when its color is changing.
- Checking the connections of incoming and outgoing overhead/underground conductors of the bushing by annually.
- Checking the current and potential transformers and the disconnect switches for manual operation annually.

## CHAPTER 04: INSTRUMENT TRANSFORMERS

### 4.1 Introduction

Instrument transformers are widely used in a substation to protect measuring equipments from current over flow. Instrument transformer steps down primary current or voltage to the secondary circuit with sufficient accuracy to connecting an instrument to the secondary. Instrument transformers were used for low currents or low voltages that are brought to the instrument. We observed the instrument transformers in three days (2<sup>nd</sup> day: CT, 5<sup>th</sup> day: CT Testing and 6<sup>th</sup> day: PT).

Instrument transformers are two types:

1. Current Transformer (CT) and
2. Potential Transformer (PT).

### 4.2 Current Transformer

During our internship our supervisor showed us various types of current transformers. He informed us about the usage of current transformer in series with equipment for the protection. Current transformer (CT) is used for measuring the current of electric equipment. It is a step down transformer. CT has one primary winding and four secondary windings. Secondary winding were used one for measurement and others for protection [5],[6].

For the safety of the system, current transformer's secondary winding are checked regularly, because if it gets unloaded or open, then it can create arc, which is harmful. Sometimes current transformers step up the current in the transmission line that reduces the cost of transmission with less power loss.

#### 4.2.1 230 kV Voltage Level Current Transformer (CT)

We worked with the 230 kV Voltage Level CT at APSCL. The CT had primary side one coil with one turn and secondary side 4 coil with multiple turns. One coil is used for measurement and others are used for protection.

The rating of 230 kV voltage level CT is shown in table 4.1 below.

Table 4.1: Rating of 230 kV Current Transformer [8].

kV	245/460/1050
Hz	50
$I_{th}$	40 kA
$I_{dyn}$	100 kA

A figure of 230 kV voltage level CT is shown in figure 4.1 below.



Figure 4.1: 230 kV Voltage Level CT at APSCCL [7].

#### 4.2.2 132 kV Voltage Level Current Transformer (CT)

We observed the name plate of current transformer which is used in APSCCL 132 kV substation is made by CROMPTON GREAVAS and made in India. The rating of 132 kV voltage level CT is shown in table 4.2.

Table 4.2: Rating of 132 kV Current Transformer [8].

<b>Current Transformer</b>	
Rated Voltage	132 kV
Rated Current	1920 A
Frequency	50 Hz
Short Current 1 sec	31.5 kA
Ratio	800/1
Burden	30 VA
Highest System Voltage	145 kV
Class of Accuracy	0.2

A 132 kV voltage level CT is shown in figure 4.2 below.



Figure 4.2: 132 kV Voltage Level CT at APSCL [7].

### 4.2.3 Current Transformer (CT) Testing

In APSCL we observed two types of CT testing. They are:

1. Megger Test and
2. Primary Current Injection

#### 4.2.3.1 Megger Test

During our internship APSCCL engineers measured the current transformers DC resistance to test a new CT, they used megger tester to check whether the current transformer is fault free or have any fault. He informed us that the megger S1-5010 is an advanced insulation tester for measurements of insulation resistance of current transformer. Engineers used a "megger" or "meg out" electrical wiring and equipment to see if it is shorted to ground in any way. The megger uses much higher voltages to check resistance than a normal volt-ohm meter. In this case, applied voltage was 5 kV. At first they shorted secondary side two point P1 and P2 top of the current transformer then connected ground line in bottom. Then they connected the CT with megger S1-5010 and took the reading after 10 minute. The value of resistance was increasing with time. After few readings were taken, the value was decreasing. A megger test machine is shown in figure 4.3 below.



Figure 4.3: Megger Test Machine at APSCCL [7].

The engineers of APSCCL took 500 V, 1000 V, 2500 V, and 5000 V standard test voltages for this test and they selected variable test voltage 25 V to 5000 V. They measured insulation resistance, voltage, (test) current and capacitance. The measured insulation resistance was greater than 5 T $\Omega$ . For fast measurement circuit, they had new reading every second. Test current measurement was down to 0.01 nA.

#### 4.2.3.2 Primary Current Injection

Current transformers should be checked regularly to ensure that it is always ready to operate correctly. Routine current injection testing quickly detects faulty or incorrectly adjusted protection devices and prevents serious damage to the system. The primary current injection testing checks all parts of the protection system by injecting current from current injection machine. The current injection machine of the APSCL was handmade. Normally current supplies in CT from power line, but in current injection test they supplied current in CT from current injection machine. In this test, high current flowed in primary side and an ammeter connected in secondary side. Then they measured the current by ammeter and then checked the value from control room. If the value was same then the CT was OK. The current injection machines gave 220 V in primary side and got very high current in secondary side. This test can also check the protective devices such as relays, overload coils, circuit breakers. The current injection machine is shown in figure 4.4 below.



Figure 4.4: Primary Current Injection Process [7].



### 4.3 Potential Transformer

At APSCL, we saw various types of potential transformer. Potential transformer is a kind of step down transformer which steps down the voltage very accurately for the purpose of measurement and protection. Potential transformer is used for measurement and protection. Potential transformer step down the voltage and it is designed to provide a low voltage in the secondary winding which is proportional to the primary winding voltage. We observed that the primary side of PT was connected to power circuit between phase and ground.

#### 4.3.1 132 kV Voltage Level PT

We saw the name plate of 132 kV potential transformers (PT) which were constructed by ENERGOPAC ENGINEERING LTD. It was installed with rated primary voltage of 132 kV and the secondary voltage of 110 V. Some 132 kV voltage level potential transformers are shown in figure 4.5 below.



Figure 4.5: 132 kV Voltage Level PT at APSCL [7].

The rating of a 132 kV voltage level potential transformer is shown in table 4.3.

Table 4.3: Rating of 132 kV Potential Transformer [8].

<b>Potential Transformer</b>	
Rated Voltage	132 kV
Construction	Out Door
No of Phase	Single
Ratio	$\frac{132000}{\sqrt{3}} / \frac{110}{\sqrt{3}}$
Burden	60 VA
Serial No	132 P.S 153
Highest System Voltage	145 kV
Insulation Level	275/650 kV
Rated Frequency	50 Hz
Total Weight	600 Kg
Class of Accuracy	0.2

#### 4.3.2 230 kV Voltage Level PT

The potential transformer that was used in APSCL 230 kV substation was constructed by CROMPTON GREAVAS and made in India. It was a 245 kV potential transformer with rated frequency of 50 Hz. A figure of 230 kV voltage level PT is shown in figure 4.6 below.



Figure 4.6: 230 kV Voltage level PT Reduces Line Voltage [7].

## **CHAPTER 05: SWITCHGEAR PROTECTION & CONTROL SYSTEM**

### **5.1 Introduction**

The switchgear, protection and control systems are used to protect and control the equipments in a power plant. We saw the electrical apparatus like relay, circuit breaker, isolator, lighting arrester, bus coupler used for switching, controlling and protecting purpose at APSCL. We worked on switchgear equipment for 3 days, two days in control room and battery room and spent two days on relays and circuit breaker.

### **5.2 Equipments of Switchgear**

There are many types of equipment in the switchgear of the substation in APSCL. Some of them are given below:

#### **5.2.1 Isolator**

When we visited the switchyard for the first time, we saw the disconnecting and connecting the isolators. Isolators are disconnecting switches which can be used for disconnecting a circuit under no current. Isolators are generally installed along with circuit breaker. An isolator can be opened after the circuit breaker. The major difference between an isolator and a circuit breaker is that an isolator is an off-load device intended to be opened only after current has been interrupted by some other control device. Safety regulations of the utility must prevent any attempt to open the isolator while it supplies a circuit.

In APSCL, we observed the maintenance process of isolator. Generally, substation engineers don't want to replace an isolator because during the replacing process, the whole power supply of that section will be turned off. That's why isolators need regular maintenances for increasing their life-time. In APSCL, we saw some maintenance procedures for isolators. They are giving oil in the mechanical contact of isolators every week to increase the speed of operation, checking the connections of motorized isolators operation and checking manual operation switch that they will operate perfectly when needed.

We saw the disconnecting and connecting process of isolator. To disconnect the isolator at first open the circuit breakers to break the circuit then open isolators from both sides of circuit breaker. At last we closed ground connection from each side to service.

We also observed the connecting process of isolator. At first the temporary ground connection is removed then the isolators both side of the circuit breaker are closed. At last the circuit breaker is closed to turn on the circuit. An isolator is shown in figure 5.1 below.



Figure 5.1: Isolator at APSCL [7].

### 5.2.2 Bus Bar

Bus bars are some parallel copper or aluminum conductors which operating at the same voltage level and directly connect electrically. The incoming and outgoing lines in a substation are connected to the bus bar. In APSCL, we have seen two types of bus bar arrangement (single and double) for 132 kV and 230 kV systems. Figure 5.2 shows the bus bars of APSCL substation.



Figure 5.2: Over Voltage Protection at APSCL [7].

There are several bus bar arrangements that can be used in a substation. But in APSCL there were two types of bus bar arrangements in use. They were single bus bar arrangement and double bus bar arrangement.

### 5.2.3 Lighting Arrester

In APSCL we saw various lighting arresters. Lighting arrester is also known as surge arrester. Lightning is a huge spark and a lightning arrester is a device used on electrical power system to protect the insulation system and other equipment from the damaging effect of lightning. It has two terminals high voltage terminal and ground terminal. One end is connected to the equipment and the other end is grounded [5].

We found out that if protection fails or absent lightning that strikes the electrical system introduces thousands of kilovolts that may damage the transmission lines, and can also cause severe damage to transformers and other electrical or electronic devices. Lightning-produced extreme voltage spikes in incoming power lines can damage electrical home appliances [5].

Figure 5.3 shows various types of lighting Arrester of APSCL substation.



Figure 5.3: Various Types of Lighting Arrester [7].

In APSCL, we observed the maintenance process of lighting Arresters. To maintain the lightning arrester, at first the line should be de-energized and the earth connection should be checked periodically before the maintenance of the lightning arrester. Then the readings of the surge counter are recorded. Then the outside of the arrester house is cleaned.

#### 5.2.4 Sky Wire (Over Head Ground Wire)

Sky wires are used for lightning protection. Over head ground wires are also called sky wires. In short, wires which are used in transmission lines to protect the lines by providing a ground path for lightning is called sky wires. Figure 5.4 shows the sky wires of APSCL substation.

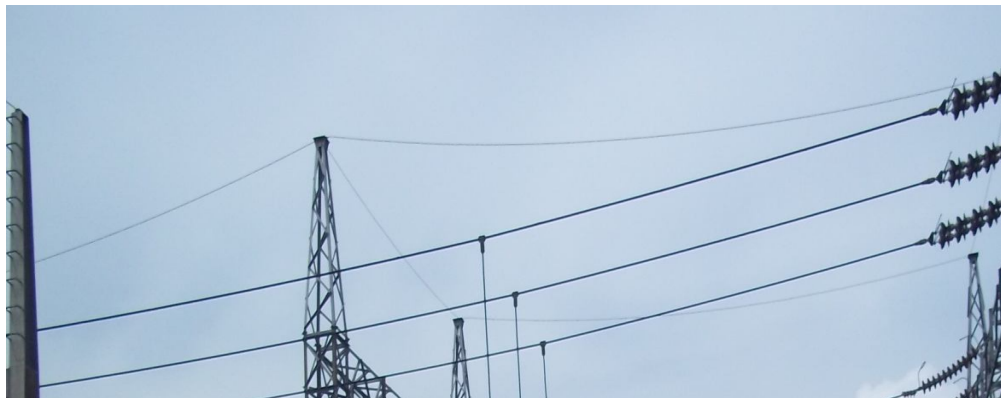


Figure 5.4: Sky Wire at APSCL [7].

## 5.2.5 Insulators

In APSCL, we saw various types of insulator. The insulator resists the current to be flown from the supports to the conductor. Three different type of insulator is used in transmission line depending on the amount of voltage range. They are:

- 1) Suspension type insulator, 2) Pin type insulator and 3) Strain insulator

### 5.2.5.1 Pin Type Insulator

Pin type insulators are used for the transmission of lower voltages. A single pin type insulator is used to transmit voltages up to 11 kV and for higher voltages require more piece pin insulators. But they are not economically feasible for 33 kV and higher transmission lines. Figure 5.5(a) shows pin type insulator of APSCL substation.

### 5.2.5.2 Suspension Type Insulator

Suspension type of insulator is cheaper than pin type insulator used for 33 kV voltages. These are cost effective for higher voltage transmission than multiple pin type insulators. This type insulator has a number of interconnected porcelain discs, with each individual unit designed to support a particular voltage. The desired number of disc can be connected in series for suspension type insulator. Figure 5.5(b) shows Suspension type insulator of substation.

### 5.2.5.3 Strain Insulator

A strain insulator is an insulator that provides both large electrical insulation and a large load-bearing capacity. For high voltage transmission lines, strain insulators consist of an assembly of suspension insulators. The disc of strain insulators are used in the vertical plane. Figure 5.5(c) shows strain type insulator of APSCL substation.

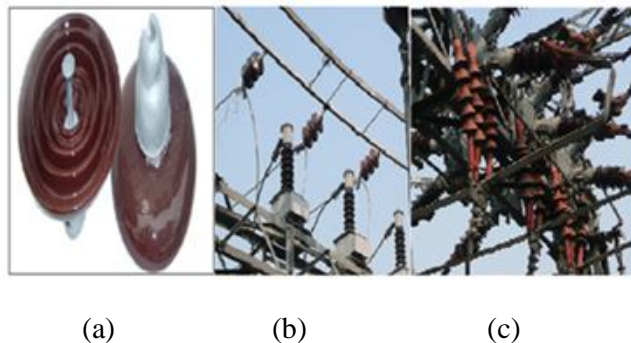


Figure 5.5: Insulators (a) Pin type (b) Suspension type (c) Strain type [7].

### 5.2.6 Wave Trap

Wave trap is also known as line trap. Wave trap is used for communication with other substation from APSCL substation. It is also used for communicate with SCADA from APSCL control room. Lighting arrester was used surround of wave trap for giving protection from lighting surge. It is an electronic filtering device [5],[6].

The main purpose of wave trap is to communicate between two substation and also use the same transmission line between those substations. This is relevant to Power Line Carrier Communication (PLCC) systems for communication among various substations without dependence on the telecom company network. These signals are mainly teleportation signals and also there are voice and data communication signals. In wave trap, there is high impedance, so this communication signal cannot flow through the substation bus bar and transformer. Figure 5.6 shows wave trap of APSCL substation.

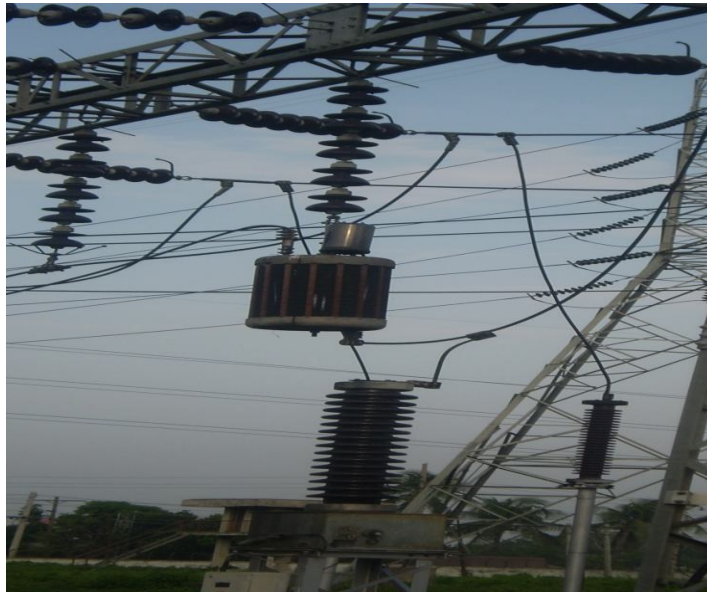


Figure 5.6: Wave Trap at APSCL [7].

### 5.2.7 Earthing Switch

Earthing switch is the switch that is connected between the line conductor and earth. Normally it is open. When the line is disconnected, the earthing switch is closed so as to discharge the voltage trapped on the line. Though the line is disconnected, there is some voltage on the line to which the capacitance between line and earth is charge. This voltage is significant in high voltage system. Before starting the maintenance work these voltages are discharged to earth by closing the earthing switch [5].



At APSCL, we saw the sequence of operation while opening/closing a circuit. During opening at first the circuit breaker is opened then isolator is opened and at last the earthing switch is closed. During closing, at first earthing switch is opened then the isolator is closed and then the circuit breaker is closed.

### 5.2.8 Bus Coupler

At APSCL, every bus bar had a bus coupler. Bus coupler is used to couple two bus bars and it operates when either one of the bus bar is absent for fault occurring or other reason. Bus coupler is a medium which is used to switch power from one bus to the other without any interruption in power supply. Its means the two buses will be shorted with the help of circuit breaker and isolators. Figure 5.7 shows the bus coupler single line diagram of APSCL.



Figure 5.7: Bus Coupler at APSCL [7].

## 5.3 Circuit Breaker

During our internship our supervisor Md. Shahid Ullah showed us different types of circuit breaker. Circuit Breaker is a protective device which protects electric load devices and electric power cables from a large fault current caused by an electrical shortage and a ground fault that can be generated on an electrical circuit. It also performs the breaking operation automatically when such fault current is generated. When the fault current occurs, then electric circuits

detect the leakage current and give a trip signal. Circuit breaker may include an electronic trip unit that senses the over rated current. If it sense that the over current is flowing through the circuit, then in response of trip signal, it will separate breaker contacts. Circuit breaker can be of many types. It is mainly divided on the basis of voltage level, construction type, interruption type and their structures. They are low voltage circuit breaker, high voltage circuit breaker, magnetic circuit breaker, and thermal circuit breaker [5],[6].

There are two types of circuit breaker that used in APSCL, i) Oil Circuit Breaker and ii) SF6 Circuit Breaker. They are described below:

### 5.3.1 Oil Circuit Breaker:

In APSCL oil circuit breaker was used in only 132 kV substations. Our instructors informed us that in oil circuit breaker, dielectric oil is used as an arc extinguishing medium and dielectric medium. The oil circuit breaker was manufactured by SIEMENS.

Figure 5.8 shows the oil circuit breaker of APSCL substation.



Figure 5.8: Oil Circuit Breaker at APSCL [7].

Its rated voltage is 132 kV and the maximum service voltage is 170 kV. Rated frequency is 50 Hz and rated current is 1250 A. Rated supply voltage for closing and opening devices is 220 V DC. Table 5.1 shows the rating of oil circuit breaker at APSCL substation.

Table 5.1: Rating of Oil Circuit Breaker [8].

<b>SIEMENS</b>		
Year of Constr. / No.		S69/30756803
Type		H 810-132/1250-5000E
Rated voltage	System solidly grounded	132 kV
Max. Service voltage		170 kV
Rated Current		1250 A
Frequency		50 Hz
Breaking Capacity		5000 MVA
Natural frequency		1.5 kHz
Amplitude factor		1.6
Making Current		55/43 kA
Short time Current	1sec	32 kA
Operating duty		O-0.3s-CO-3min-CO
Operating mechanism		220 V DC
Weight incl. oil		3280 Kg
Oil filling of breaker poles		330 Kg
MADE IN GERMANY		

Oil circuit breakers are maintained in every year. For this at first they clean the breaker, then clean the insulator and then check the joints. Then they check operation of pressure gauges, check accumulator pre-charge pressure and check for oil leaks and low pressure oil tank oil level. Another important job is to check dielectric strength of oil because after many times operation the dielectric strength and internal pressure decrease.

### 5.3.2 SF6 Circuit Breaker

In the substation we also saw the sulphur hexafluoride (SF6) circuit breaker. SF6 circuit breakers were used in 132 kV and 230 kV substations. In SF6 circuit breaker, sulphur hexafluoride gas is used as the dielectric and arc extinguishing properties. Current carrying contacts operate in sulphur hexafluoride. Figure 5.9 shows 145 kV SF6 circuit breaker in APSCL.

The SF6 circuit breaker that we observed was in 132 kV substations, rated voltage was 145 kV. Rated frequency was 50 Hz and rated normal current was 3150 A. Rated short circuit duration was 3s and short circuit breaking current was 40 kA. The rated operating pressure of sulphur hexafluoride gas was 6 bars. Control voltage was 220 V DC. The breaker can operate from -25°C to +55°C temperature.

Figure 5.9 shows the oil circuit breaker of APSCL substation.



Figure 5.9: SF6 Circuit Breaker at APSCL [7].

Table 5.2 provides the nameplate data of a 132 kV rated voltage SF6 circuit breaker used by APSCL.

Table 5.2: Nameplate Rating of SF6 Circuit Breaker in APSCL [8].

<b>SIEMENS</b>	
Type	3APDT
Year of Manufacturing/No	02/35076681
Rated voltage ( $V_r$ )	145 kV
Rated lightning impulse withstand voltage ( $V_p$ )	650 kV
Rated power frequency withstand voltage ( $V_d$ )	275 kV
Rated frequency ( $f_r$ )	50 Hz
Rated normal current ( $I_r$ )	3150 A
Rated Short-circuit breaking current ( $I_{sc}$ )	40 kA
Rated Duration of short-circuit ( $t_k$ )	3 s
Rated Out-of-phase breaking current ( $I_d$ )	10 kA
First-pole-to-clear factor	1.5
Rated Line-charging breaking current ( $I_l$ )	50 A
Rated pressure of SF6 at +20 C (gauge)	6.0 bar
Weight of SF6 filling	26.0 Kg
Weight including SF6	3530 Kg
Nominal supply voltage of auxiliary circuits	
Control voltage	220 V DC
Operating mechanism voltage	240 V AC
Heating voltage	415/240 V AC
Temperature class	-25 to +55°C
In line With :	IEC 60056

Every year circuit breakers are tested and maintained. For this purpose, at first they check SF6 gas pressure and charging mechanism and inspect the breaker do some test like timing and insulation resistance test.

Then connections and joints are checked. Clean the sensitive area of breaker because dust can cause of short circuit or other hazard. The insulation surface is cleaned frequently because dust can break down the insulator function. Before the maintenance work all the power should disconnected, isolator should open.

## **5.4 Protective Relay**

In APSCL, we saw various protective relay. Protective relay senses the abnormal conditions of the power system and gives an alarm to the trip circuit and disconnect the faulty part from the system. Relays are used at the both side of the circuit breaker. We observed relay panel and were shown how to operate it. Relay panel is operated by DC power supply. There are three different sources of DC power supply which are connected in parallel with relay panel. The DC power sources are Grid, DC battery and generator acting as automatic backup for each other. The relay must have some properties such as speed, sensitivity, selectivity and reliability [9].

### **5.4.1 Differential Relay**

At APSCL, differential relay is used to protect generators, transformers, buses, and transmission lines from the effects of internal faults. This type of relay responds to vector (phase or magnitude) difference between two or more similar electrical quantities. Most differential relay are current differential relay in which vector difference between the current entering the winding and current leaving the winding is used for sensing relay operation [10].

### **5.4.2 Over Current Relay**

At APSCL, over current relay is used to prevent extra current flow of current transformer. Over current relay is a type of protective relay which operates when the load current exceeds a preset value. When a fault occurs then a high current will flow and this relay sense fault and gives protection to open a circuit breaker. Especially it gives protection in the short circuit like earth fault.

### **5.4.3 Master trip relay**

In a protection system due to large number of protection relays provided for various types of faults, all the tripping devices are connected to a master trip from where the tripping command goes to the concerned circuit breaker [10].

### **5.4.4 Supervision Relay**

To check the healthiness of a trip circuit and a trip coil of a circuit breaker at APSCL supervision relay is used. Supervision relay monitor the proper functioning of trip circuits based on the feedback signal obtained from the tripped circuit [10].

### **5.4.5 Auxiliary Relay**

At APSCL, auxiliary relays are used to check all the electronic devices functioning correctly. An auxiliary relay is a relay that assists another relay or device in performing an action. It works when its operating circuit is opened or closed. Essentially, it is as simple as an action done to the relay causing a circuit to be opened completed or closed and not allows power to travel through it [11].

### **5.4.6 Earth Fault Relay**

An earth fault relay is activated by the fault current flowing from line to earth, while an over current relay is activated if the line current exceeds a certain value. Normally these are combined to form what is known as a combined over current and earth fault relay, which is widely used as back up protection if the main protection fails [10].

### **5.4.7 Restricted Earth Fault Relay**

Restricted earth fault relay is used at the plant to detect the earth fault from a restricted zone of a circuit. A restricted earth fault relay works by measuring the actual current flowing to earth from the frame of the unit. If that current exceeds a certain preset maximum value of milli amps (mA) then the relay will trip to cut off the power supply to the unit [10].

### **5.4.8 Directional Relay**

Directional relay is used to senses the direction of power flow by means of phase angle between voltage and current. When the phase angle between voltage and current exceeds certain set value, the directional relay operates with a condition that the current is above the

pickup value. Directional relay is double actuating quantities relay with one input as current  $I$  from CT and the other input voltage  $V$  from PT [9],[10].

#### 5.4.9 Under Voltage Relay

Under voltage relay is used to protection against voltage drops and short circuit fault. When line power is too low, or absent then the under voltage relay trips the circuit breaker [10].

#### 5.4.10 Relay Testing

At APSCL, we were part of a relay testing process and replacement of a relay. Replacement of a relay is a rare case .After testing the relay our supervisor found out that some cards of the relay were not working perfectly and also the relay was very old, that's why it needed to be changed. As relay protects the bus bar .If it fail to perform then the bus bar may fail causing failure to current distribute and serious load shedding. To prevent this serious damage the engineers of APSCL decided to change the relay. The new relay was REB 500 which is a microprocessor based relay. REB 500 checks the faults in bus components and if there is any fault occurs then it trips the circuit breakers and isolator. Figure 5.10 shows the REB 500 relay used in APSCL.

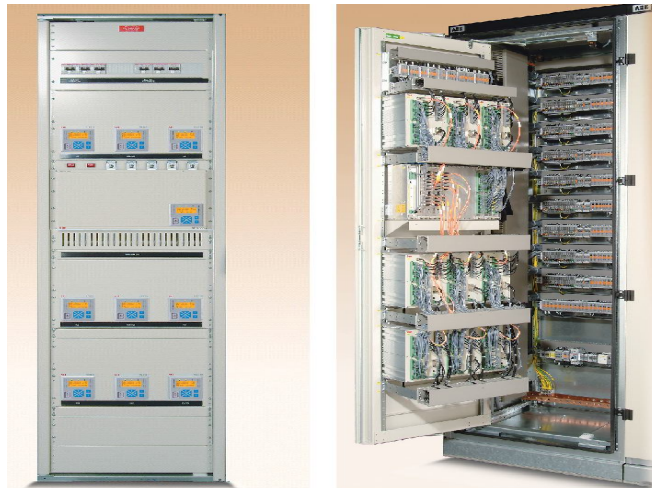


Figure 5.10: REB 500 Relay Front View (left) and Hinged Frame Rear Wall [12].

After the replacement, they tested the new relay to check that it is performing perfectly. At first engineers open the isolators and circuit breakers under no load condition. They checked that if the CBs and isolators were open then the apparatus of control room should sense these activities. If they found out that the new relay is working perfectly. This replacement of new relay was very time consuming and costly.

## 5.5 Battery Room

We visited battery room at APSCL. Battery is the most important source in the grid station. Because most of the equipments are run on DC power; battery is the only back up source of DC supply. Without DC power supply, the grid is unprotected, because some equipment like security lighting, fire alarm, control circuit, heating equipment, relay, and circuit breaker need uninterrupted power supply for the protection and supply. Normally this power comes from bus bar. But if bus bar fails to supply power then it creates crisis. To keep fault free and to drive this equipment used battery as a backup.

In the battery backup room, we saw NiCad batteries connected in series. There were 184 battery cells. The voltage level of all the batteries is the same (1.2 V). The battery capacity is denoted by the Ampere-Hour (A-H). These batteries are also connected to the system. The batteries are charging continuously from the system and when needed, these batteries will behave like a backup system. These batteries are charged regularly at 1.2 V and once a month at a higher voltage (1.6 V) to enhance the battery performance. Figure 5.11 shows the battery room at APSCL substation.



Figure 5.11: Battery Room of Substation at APSCL [7].



Some tests were continuously done for the backup system. The data was stored in a notebook. If there were any abnormalities in the test value, then the data was shown to the engineer in charge.

The tests are – The cell voltage test, specific gravity test, the tightness capacity test of the connection, breathing test to identify whether any chemical reaction has occurred or not and finally liquid level test.

## 5.6 Control Room

APSCCL have totally separated control room for controlling the substation. If any fault occurs in the substation then first the message reach to the control room and Engineers who are present there immediately fix the problem. Some problems can be fixed from the control room but for some, it is necessary to go to the substation. From substation control room how much electricity will deliver to which area is also controlled. How much electricity is given to the national grid is observed and for that proper frequency, voltage and current are maintained from the control room of substation. From substation control room the equipment of the substation is monitored and controlled. In the control room we saw the metering panel. Through this panel the supplied power to the grid is monitored. We also saw the announcement panel. If there is any announcement regarding the control room or substation, the respective people announce it from this panel. We also observed the outgoing feeder control portion of the APSCCL substation. At the control room, all the relay panels are automated. This relay panel includes protective relays, control switches, temperature sensor, energy meters and auxiliary relays. Figure 5.12 shows the control room of APSCCL substation.

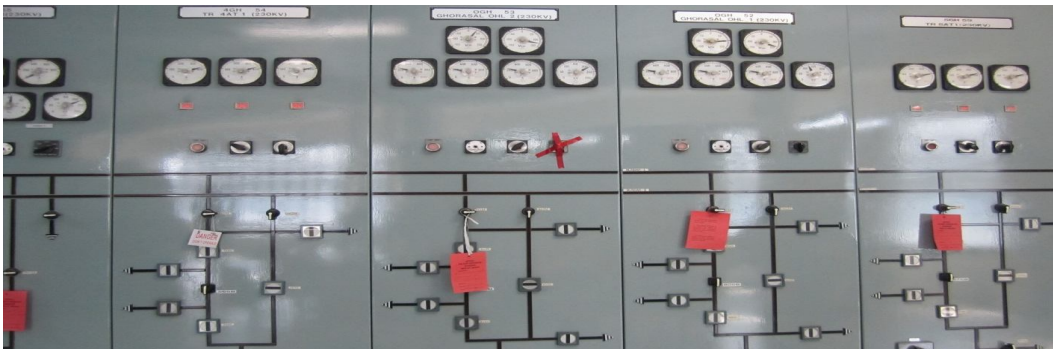


Figure 5.12: Substation Control Room [7].

## CHAPTER 06: CONCLUSION

### 6.1 Recommendations

1. Student should complete power plant related courses before going to intern.
2. Time period of intern should be more, because then student can have more time to understand the plant.
3. Snap taking should be more relaxed for the intern student.
4. Movement inside the switch yard should be more flexible for the student.

### 6.2 Discussion

For Electrical and Electronic Engineering students of East West University APSCCL could be considered as a very good place to gain practical knowledge on power generation and distribution systems. We are grateful that we got the opportunity to see the practical implementation at APSCCL of what we learned theoretically from the University. It has opened our eyes about power station and practical operation of different equipment's. We also gained knowledge its equipments maintenance specially substation. We observed the different types of feeders, CT, PT, transformers, CB, relays and control system which improved our technical skills. We studied about substation maintenance and its equipments maintenance in switchgear and protective relay course (EEE 442), but we saw it in real time which was very beneficial. We also saw some processes and techniques which we did not learn in the classroom. We observed some equipments testing like current transformer testing (megger test and primary current injection method) and relay testing (REB 500). But we faced some problems. The major problem was timing. In this season, APSCCL divided us four groups and we were the substation group. So we achieved only substation knowledge but we couldn't get knowledge others properly. We got only 15 days schedule from APSCCL. So we had to work back to back 15 days without holiday which was required for us. Most of the engineers at APSCCL were very busy; we had to stay with them until they became free from their works. Overall our internship was fulfilling and enriching. So we knew more about fault condition and its solution from everyday problems. This valuable internship will benefit our practical and professional life.

## Reference:

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- [7] Pictures taken by Authors.
- [8] Materials and Information collected from APSCL onsite.
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- [10] “Protective Relay”. [Online]. Available: <http://www.electrical4u.com/electrical-protection/protection-relay.php>, [Oct. 10, 2012].
- [11] “Auxiliary Relay”. [Online]. Available: <http://www.wisegeek.com/what-is-an-auxiliary-relay.htm>, [Oct. 10, 2012].
- [12] “REB500 Product Guide”. [Online]. Available: <http://www.abb.com/product>, [Oct. 15, 2012].

## Appendix:

### Work Sheets

Department of Electrical and Electronic Engineering  
East West University  
EEE 499  
Industrial Training  
Daily Activity Report

Separate Daily Activity Report should be completed by each intern for every day of work and should be signed by the mentor from the company and the academic advisor. Copy of all the reports should be attached to the final internship report.

Name of the company:	APSEL
Name of the student:	Md. Anisur Rahman
ID:	2008-2-80-026


Date:	24/08/12
Start time/End time	8:00 AM - 4:00 PM
Location:	APSEL
Mentor:	Mohammad Shahid Ullah

**General Instructions:**

- It is the intern's duty to make sure that all his/her daily activity reports are appropriately signed by both the mentor and the academic supervisor.
- The daily report should be a brief narration of the activities during the internship period in the eyes of the intern and should be completed and submitted by every intern irrespective of the number of partners s/he might have for the presentation and final report writing purpose.
- The report should not be a compilation of lectures notes taken during the internship, rather it should depict what the intern has learned on a particular day.
- In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

Signature of the mentor with date  
Name: Mohammad Shahid Ullah  
Designation: Asst. Prof. (S/S)  
Contact Phone #: 01820158376

Signature of academic supervisor with date  
Name:  
Designation:

 Department of Electrical and Electronic Engineering  
East West University

Address the following points briefly (Use additional page if necessary)

1. What was the objective of the day's activities? (If applicable, list multiple objectives)

The main objective of the day was to introduce us with the whole power station and also introduce us with the substation specially.

2. List the day's activities according to the order of objectives listed in 1. Mention the specifications of the equipments used/visited. Comment on how these activities fulfill your objectives.


- At first we saw the 3 types of generation system which is gas turbine, steam turbine and combined cycle.
- After that we visited the substation.
- Our instructor gave us a theoretical explanation of the substation (single line diagram).
- We also got introduced with component of substation.

3. Relate your practical activity with the theoretical knowledge you gained in the respective academic course.

We ~~learn~~ studied the components of substation in EEE 301, EEE 304 and EEE 442 courses.

Md. Shahid Ullah  
24/8/12  
Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sr. Engr. (S/S)  
Contact Phone #: 01820138376

Amir Aziz  
17/09/12  
Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering  
 East West University  
 EEE 499  
 Industrial Training  
 Daily Activity Report

Separate Daily Activity Report should be completed by each intern for every day of work and should be signed by the mentor from the company and the academic advisor. Copy of all the reports should be attached to the final internship report.

Name of the company:	APSCCL
Name of the student:	Md. Anisur Rahman
ID:	2008-2-80-026

Date:	25.09-12
Start time/End time	8:00 AM - 4:00 PM
Location:	Substation
Mentor:	Mohammad Shahid Bllah

**General Instructions:**

- It is the intern's duty to make sure that all his/her daily activity reports are appropriately signed by both the mentor and the academic supervisor.
- The daily report should be a brief narration of the activities during the internship period in the eyes of the intern and should be completed and submitted by every intern irrespective of the number of partners s/he might have for the presentation and final report writing purpose.
- The report should not be a compilation of lectures notes taken during the internship, rather it should depict what the intern has learned on a particular day.
- In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

Signature of the mentor with date  
 Name: Md. Shahid Bllah  
 Designation: Sr. Engr. (E/S)  
 Contact Phone #: 01920138326

Signature of academic supervisor with date  
 Name:  
 Designation:



Department of Electrical and Electronic Engineering  
East West University

Address the following points briefly (Use additional page if necessary)

1. What was the objective of the day's activities? (If applicable, list multiple objectives)

The main objective of the day was to familiar with Current Transformer (CT) and to observe the characteristics of the Current transformer. We also saw the two type of CT (132 KV, 230 KV) and the high Voltage Megger test of a brand new CT.

2. List the day's activities according to the order of objectives listed in 1. Mention the specifications of the equipments used/visited. Comment on how these activities fulfill your objectives.

i) At first our instructor showed us the theoretical background of CT. And also briefed us about the high Voltage Megger test and the reason behind the testing.

ii) Then we visited the switch yard and saw CT and it's Panel board and it's operation.

iii) After that we watched the high Voltage Megger test of two brand new CT.

iv) The specification of CT is given behind this report.

3. Relate your practical activity with the theoretical knowledge you gained in the respective academic course.

We learn about current transformer (CT) in Electrical Machine-I (EEE 301) and Switchgear protection (EEE442).

Md. Shahid Ullah  
25/9/12

Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sr. Engr. (S/S)  
Contact Phone #: 01820138376

Amir Azim  
17/09/12

Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering  
 East West University  
 EEE 499  
 Industrial Training  
 Daily Activity Report

Separate Daily Activity Report should be completed by each intern for every day of work and should be signed by the mentor from the company and the academic advisor. Copy of all the reports should be attached to the final internship report.

Name of the company:	APSCCL
Name of the student:	Md. Anisur Rahman
ID:	2008-2-80-026
Date:	26/08/12
Start time/End time	8:00 AM - 4:00 PM
Location:	Switchyard, Substation
Mentor:	Mohammad Shahid Ullah

General Instructions:

- It is the intern's duty to make sure that all his/her daily activity reports are appropriately signed by both the mentor and the academic supervisor.
- The daily report should be a brief narration of the activities during the internship period in the eyes of the intern and should be completed and submitted by every intern irrespective of the number of partners s/he might have for the presentation and final report writing purpose.
- The report should not be a compilation of lectures notes taken during the internship, rather it should depict what the intern has learned on a particular day.
- In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

Signature of the mentor with date  
 Name: Md. Shahid Ullah  
 Designation: Sr. Engg. (S/S)  
 Contact Phone #: 018 80138576

Signature of academic supervisor with date  
 Name:  
 Designation:





Department of Electrical and Electronic Engineering  
East West University

Address the following points briefly (Use additional page if necessary)

1. What was the objective of the day's activities? (If applicable, list multiple objectives)

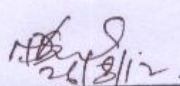
The objective of the day was to learn about Feders Energize and deenergize process

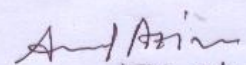
2. List the day's activities according to the order of objectives listed in 1. Mention the specifications of the equipments used/visited. Comment on how these activities fulfill your objectives.

1. At first our instructor gave us a brief theoretical discussion about mentioned objective
2. Then we went to substation and watched practically the energize and deenergize process.
3. The process is mentioned behind this report

3. Relate your practical activity with the theoretical knowledge you gained in the respective academic course.

We learnt about this process in EEE442 course.

  
26/8/12  
Signature of the mentor with date  
Name: M. Shahid Ullah  
Designation: Sr. Engr. (S/S)  
Contact Phone #: 01820138376

  
17/09/12  
Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering  
East West University

EEE 499

Industrial Training  
Daily Activity Report

Separate Daily Activity Report should be completed by each intern for every day of work and should be signed by the mentor from the company and the academic advisor. Copy of all the reports should be attached to the final internship report.

Name of the company:	APSCCL
Name of the student:	Md. Anisur Rahman
ID:	2008-2-80-026
Date:	27/08/12
Start time/End time	8:00 AM - 4:00 PM
Location:	Substation
Mentor:	Mohammad Shahid Ullah

General Instructions:

- It is the intern's duty to make sure that all his/her daily activity reports are appropriately signed by both the mentor and the academic supervisor.
- The daily report should be a brief narration of the activities during the internship period in the eyes of the intern and should be completed and submitted by every intern irrespective of the number of partners s/he might have for the presentation and final report writing purpose.
- The report should not be a compilation of lectures notes taken during the internship, rather it should depict what the intern has learned on a particular day.
- In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

Signature of the mentor with date

Name: Md. Shahid Ullah  
Designation: Sr. Engr. (E/S)  
Contact Phone #: 0192013030

Signature of academic supervisor with date

Name:  
Designation:



Department of Electrical and Electronic Engineering  
East West University

Address the following points briefly (Use additional page if necessary)

1. What was the objective of the day's activities? (If applicable, list multiple objectives)

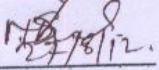
The main objective of the day was to observe the battery room and see their uses and perform the battery maintenance practically.

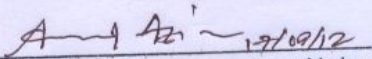
2. List the day's activities according to the order of objectives listed in 1. Mention the specifications of the equipments used/visited. Comment on how these activities fulfill your objectives.


- i) At first our instructor gave us a brief description about the battery and battery room.
- ii) Then we observed the battery maintenance
- iii) First they checked the gravity and then they checked the voltage.
- iv) If any faulty battery cell occurs then they repair it.

3. Relate your practical activity with the theoretical knowledge you gained in the respective academic course.

We learn a small idea about ~~batter~~ backup battery from switchgear protection course but we don't learn this thing theoretically.

  
Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sr. engr. (C/S)  
Contact Phone #: 01820138376

  
Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering  
East West University  
EEE 499

Industrial Training  
Daily Activity Report

Separate Daily Activity Report should be completed by each intern for every day of work and should be signed by the mentor from the company and the academic advisor. Copy of all the reports should be attached to the final internship report.

Name of the company:	APSCCL
Name of the student:	Md. Anisur Rahman
ID:	2008-2-80-026

Date:	28/08/12
Start time/End time	8:00AM - 4:00PM
Location:	Substation
Mentor:	Mohammad Shahid Ullah

**General Instructions:**

- It is the intern's duty to make sure that all his/her daily activity reports are appropriately signed by both the mentor and the academic supervisor.
- The daily report should be a brief narration of the activities during the internship period in the eyes of the intern and should be completed and submitted by every intern irrespective of the number of partners s/he might have for the presentation and final report writing purpose.
- The report should not be a compilation of lectures notes taken during the internship, rather it should depict what the intern has learned on a particular day.
- In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sr. Asst. (EE)  
Contact Phone #: 01820198376

Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering  
East West University

Address the following points briefly (Use additional page if necessary)

1. What was the objective of the day's activities? (If applicable, list multiple objectives)

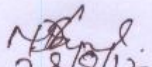
The objective of the day was to observe the operation of Bus coupler and we also observed load shifting from bus-2 to bus-1 without turn off the coupler.

2. List the day's activities according to the order of objectives listed in 1. Mention the specifications of the equipments used/visited. Comment on how these activities fulfill your objectives.

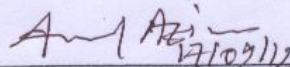
1. At first our instructor gave us some theoretical instruction about coupler about bus coupler.
2. Then we went to switch yard and observed its operation.
3. After that we observed load shifting and then our instructor gave us ~~the~~ a diagram of load shifting.
4. The components of bus coupler are
  - Circuit breaker between bus1 and bus 2
  - Isolator in both side of CB.

3. Relate your practical activity with the theoretical knowledge you gained in the respective academic course.

We ~~learn~~ studied about bus ~~coupler~~ coupler in EEE442 course.

  
28/9/12

Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sr. engg. (CS/S)  
Contact Phone #: 01820138376

  
17/09/12

Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering  
East West University

EEE 499

Industrial Training  
Daily Activity Report

Separate Daily Activity Report should be completed by each intern for every day of work and should be signed by the mentor from the company and the academic advisor. Copy of all the reports should be attached to the final internship report.

Name of the company:	APSEL
Name of the student:	Md. Anisur Rahman
ID:	2008-2-80-026

Date:	29/08/12
Start time/End time	8:00 AM - 4:00 PM
Location:	substation
Mentor:	Mohammad Shahid Ullah

General Instructions:

- It is the intern's duty to make sure that all his/her daily activity reports are appropriately signed by both the mentor and the academic supervisor.
- The daily report should be a brief narration of the activities during the internship period in the eyes of the intern and should be completed and submitted by every intern irrespective of the number of partners s/he might have for the presentation and final report writing purpose.
- The report should not be a compilation of lectures notes taken during the internship, rather it should depict what the intern has learned on a particular day.
- In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sr. engg (SR)  
Contact Phone #: 01820135324

Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering  
East West University

Address the following points briefly (Use additional page if necessary)

1. What was the objective of the day's activities? (If applicable, list multiple objectives)

The main objective of the day was to observe the CT (Current transformer) Testing by using primary current injection process.

2. List the day's activities according to the order of objectives listed in 1. Mention the specifications of the equipments used/visited. Comment on how these activities fulfill your objectives.

i) At first our instructor gave us a theoretical instruction about CT testing in current injection process.  
ii) Then we went to switch yard and observe the CT testing process.

3. Relate your practical activity with the theoretical knowledge you gained in the respective academic course.

We studied the CT in switchgear protection (EEE442) course.

Signature of the mentor with date

Name: Md. Shahid Ullah  
Designation: Sr. engs. (S/S)  
Contact Phone #: 01820138376

Signature of academic supervisor with date

Name:  
Designation:



Department of Electrical and Electronic Engineering  
 East West University  
 EEE 499  
 Industrial Training  
 Daily Activity Report

Separate Daily Activity Report should be completed by each intern for every day of work and should be signed by the mentor from the company and the academic advisor. Copy of all the reports should be attached to the final internship report.

Name of the company:	APSCCL
Name of the student:	Md. Anisur Rahman
ID:	2008-2-80-026

Date:	30/8/12
Start time/End time	8:00 AM - 4:00 PM
Location:	Substation
Mentor:	Mohammad Shahid Ullah

General Instructions:

- It is the intern's duty to make sure that all his/her daily activity reports are appropriately signed by both the mentor and the academic supervisor.
- The daily report should be a brief narration of the activities during the internship period in the eyes of the intern and should be completed and submitted by every intern irrespective of the number of partners s/he might have for the presentation and final report writing purpose.
- The report should not be a compilation of lectures notes taken during the internship, rather it should depict what the intern has learned on a particular day.
- In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

Signature of the mentor with date

Name: Md. Shahid Ullah  
 Designation: Sr. Engg (40)  
 Contact phone: 0120135376

Signature of academic supervisor with date

Name:  
 Designation:





Department of Electrical and Electronic Engineering  
East West University

Address the following points briefly (Use additional page if necessary)

1. What was the objective of the day's activities? (If applicable, list multiple objectives)

The main objective of the day was to familiarize and observe with the potential transformer (PT) and earthing transformer.

2. List the day's activities according to the order of objectives listed in 1. Mention the specifications of the equipments used/visited. Comment on how these activities fulfill your objectives.

1. At first our instructor showed us the theoretical background of PT and earthing transformer.

2. Then we visited the switch yard and observed the two <sup>voltage levels</sup> ~~types~~ of PT (132 kV and 230 kV).

3. Then we visited and observed the earthing transformer.

4. The specification of PT's and earthing transformer is given behind this report.

3. Relate your practical activity with the theoretical knowledge you gained in the respective academic course.

We studied these things in electrical machine - I (EEE 301) and switchgear and protective relay (EEE 442)

30/8/12

Signature of the mentor with date  
Name: Md. Sherhid Ullah  
Designation: Sr. engg. (S/S)  
Contact Phone #: 01820138376

7/09/12

Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering  
 East West University  
 EEE 499  
 Industrial Training  
 Daily Activity Report

Separate Daily Activity Report should be completed by each intern for every day of work and should be signed by the mentor from the company and the academic advisor. Copy of all the reports should be attached to the final internship report.

Name of the company:	APSEL
Name of the student:	Md. Anisur Rahman
ID:	2008-2-80-026

Date:	31/08/12
Start time/End time	8:00 AM - 4:00 PM
Location:	Substation
Mentor:	Mohammad Shahid Ullah

General Instructions:

- It is the intern's duty to make sure that all his/her daily activity reports are appropriately signed by both the mentor and the academic supervisor.
- The daily report should be a brief narration of the activities during the internship period in the eyes of the intern and should be completed and submitted by every intern irrespective of the number of partners s/he might have for the presentation and final report writing purpose.
- The report should not be a compilation of lectures notes taken during the internship, rather it should depict what the intern has learned on a particular day.
- In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

Signature of the mentor with date  
 Name: Md. Shahid Ullah  
 Designation: Sr. Engt (EE)  
 Contact Phone #: 9820138376

Signature of academic supervisor with date  
 Name:  
 Designation:



Department of Electrical and Electronic Engineering  
East West University

Address the following points briefly (Use additional page if necessary)

1. What was the objective of the day's activities? (If applicable, list multiple objectives)

The main objective of the day was to  
- familiarize us with the Isolator  
- to observe the maintenance of Isolator  
- the disconnecting and connecting process required for maintenance.

2. List the day's activities according to the order of objectives listed in 1. Mention the specifications of the equipments used/visited. Comment on how these activities fulfill your objectives.

- i) At first our instructor gave us a theoretical introduction about isolator and types of isolator.
- ii) Then we went to switch yard for watching isolator maintenance.
- iii) For maintenance at first turnoff the circuit breaker (CB) the open the isolator.
- iv) Then we made sure that the ground was connected.
- v) The specification of Isolator is given behind the report.

3. Relate your practical activity with the theoretical knowledge you gained in the respective academic course.

We studied about the Isolator in EEE442 course.

31/8/12

Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sr. engr (SES)  
Contact Phone #: 01820138376

17/09/12

Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering  
 East West University  
 EEE 499  
 Industrial Training  
 Daily Activity Report

Separate Daily Activity Report should be completed by each intern for every day of work and should be signed by the mentor from the company and the academic advisor. Copy of all the reports should be attached to the final internship report.

Name of the company:	APSC
Name of the student:	Abd. Anisur Rahman
ID:	2008-2-80-026
Date:	1/9/12
Start time/End time	8:00 AM - 4:00 PM
Location:	Substation
Mentor:	Mohammad Shahid Ullah

General Instructions:

- It is the intern's duty to make sure that all his/her daily activity reports are appropriately signed by both the mentor and the academic supervisor.
- The daily report should be a brief narration of the activities during the internship period in the eyes of the intern and should be completed and submitted by every intern irrespective of the number of partners s/he might have for the presentation and final report writing purpose.
- The report should not be a compilation of lectures notes taken during the internship, rather it should depict what the intern has learned on a particular day.
- In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

Signature of the mentor with date  
 Name: Abd. Anisur Rahman  
 Designation: Sr. Engg (EE)  
 Contact Phone #: 01830133376


Signature of academic supervisor with date  
 Name:  
 Designation:

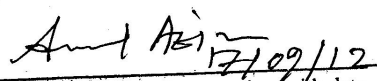



Department of Electrical and Electronic Engineering  
East West University

Address the following points briefly (Use additional page if necessary)

1. What was the objective of the day's activities? (If applicable, list multiple objectives)  
The main objective of the day was to familiarize and observe the single phase transformer.
  
2. List the day's activities according to the order of objectives listed in 1. Mention the specifications of the equipments used/visited. Comment on how these activities fulfill your objectives.
  - i) At first our instructor gave us a theoretical instruction about single phase transformer.
  - ii) Then we visited the transformer and observed its different parts.
  - iii) Then we observed the protection of transformer and the self auxiliary transformer.
  - iv) The specification of transformer is given behind the report.
  
3. Relate your practical activity with the theoretical knowledge you gained in the respective academic course.  
We studied the transformer and transformer protection in EEE 301, ~~EEE 304~~ and EEE 442.

  
Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sr. engg (S/S)  
Contact Phone #: 01820138376

  
Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering  
 East West University  
 EEE 499  
 Industrial Training  
 Daily Activity Report

Separate Daily Activity Report should be completed by each intern for every day of work and should be signed by the mentor from the company and the academic advisor. Copy of all the reports should be attached to the final internship report.

Name of the company:	APSCl
Name of the student:	Md. Anisur Rahman
ID:	2008-2-80-026


Date:	02/09/12
Start time/End time	8:00 AM - 4:00 PM
Location:	Switchyard, Substation
Mentor:	Mohammad Shahid Ullah

**General Instructions:**

- a. It is the intern's duty to make sure that all his/her daily activity reports are appropriately signed by both the mentor and the academic supervisor.
- b. The daily report should be a brief narration of the activities during the internship period in the eyes of the intern and should be completed and submitted by every intern irrespective of the number of partners s/he might have for the presentation and final report writing purpose.
- c. The report should not be a compilation of lectures notes taken during the internship, rather it should depict what the intern has learned on a particular day.
- d. In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

Signature of the mentor with date  
 Name: Md. Shahid Ullah  
 Designation: Sr. Asst. (S/S)  
 Contact Phone #: 01820138376

Signature of academic supervisor with date  
 Name:  
 Designation:

 Department of Electrical and Electronic Engineering  
East West University

Address the following points briefly (Use additional page if necessary)

1. What was the objective of the day's activities? (If applicable, list multiple objectives)

The main objective of the day was to familiarize us with different types of ~~CB~~ circuit Breaker (CB) and we also see the maintenance of SF<sub>6</sub> CB.

2. List the day's activities according to the order of objectives listed in 1. Mention the specifications of the equipments used/visited. Comment on how these activities fulfill your objectives.


- (i) At first our instructor gave us the theoretical explanation about the circuit Breaker (CB).
- (ii) Then went to the switch yard and saw the SF<sub>6</sub> CB for 230 kV bus and ~~CB~~ CB for 132 kV bus.
- (iii) Then we observed the maintenance of CB like opening and closing ~~of~~ operation of CB.
- (iv) Then we saw the gas filling of SF<sub>6</sub> CB.
- (v) Specification of oil CB and SF<sub>6</sub> CB is given behind this report.

3. Relate your practical activity with the theoretical knowledge you gained in the respective academic course.

We studied the circuit breakers in EEE442 course.

Md. Shahid Ullah  
2/9/12  
Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sp. engs (S/S)  
Contact Phone #: 01820138376

Amir Azim  
17/09/12  
Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering  
East West University  
EEE 499  
Industrial Training  
Daily Activity Report

Separate Daily Activity Report should be completed by each intern for every day of work and should be signed by the mentor from the company and the academic advisor. Copy of all the reports should be attached to the final internship report.

Name of the company:	APSEL
Name of the student:	Md. Anisur Rahman
ID:	2008-2-80-026

Date:	03/09/12
Start time/End time	8:00 AM - 4:00 PM
Location:	Substation
Mentor:	Mohammad Shahid Ullah

**General Instructions:**

- a. It is the intern's duty to make sure that all his/her daily activity reports are appropriately signed by both the mentor and the academic supervisor.
- b. The daily report should be a brief narration of the activities during the internship period in the eyes of the intern and should be completed and submitted by every intern irrespective of the number of partners s/he might have for the presentation and final report writing purpose.
- c. The report should not be a compilation of lectures notes taken during the internship, rather it should depict what the intern has learned on a particular day.
- d. In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sr. engg (EE)  
Contact Phone #: 2220758376

Signature of academic supervisor with date  
Name:  
Designation:





Department of Electrical and Electronic Engineering  
East West University

Address the following points briefly (Use additional page if necessary)

1. What was the objective of the day's activities? (If applicable, list multiple objectives)

The objective of the day is about coupling transformer and its operation.

2. List the day's activities according to the order of objectives listed in 1. Mention the specifications of the equipments used/visited. Comment on how these activities fulfill your objectives.

1. At first our instructor gave us a brief discussion about coupling transformer
2. It is used between 230kV bus and 132kV bus to transfer power one bus to another bus.
3. After that we visited switchyard to see coupling transformer and its operation.
4. Then we observed the the turn off and turn on the coupling transformer

3. Relate your practical activity with the theoretical knowledge you gained in the respective academic course.

We studied the transformer in EEE 301 and EEE 442 courses.

Md. Shahid Ullah  
3/2/12  
Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sr. engg (S/S)  
Contact Phone #: 01820138376

A-1 Azim  
17/09/17  
Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering  
 East West University  
 EEE 499  
 Industrial Training  
 Daily Activity Report

Separate Daily Activity Report should be completed by each intern for every day of work and should be signed by the mentor from the company and the academic advisor. Copy of all the reports should be attached to the final internship report.

Name of the company:	APSCCL
Name of the student:	Md. Anisur Rahman
ID:	2008-2-80-026

Date:	04/09/12
Start time/End time	8:00 AM - 4:00 PM
Location:	Switchyard, substation
Mentor:	Mohammad Shahid Ullah

General Instructions:

- It is the intern's duty to make sure that all his/her daily activity reports are appropriately signed by both the mentor and the academic supervisor.
- The daily report should be a brief narration of the activities during the internship period in the eyes of the intern and should be completed and submitted by every intern irrespective of the number of partners s/he might have for the presentation and final report writing purpose.
- The report should not be a compilation of lectures notes taken during the internship, rather it should depict what the intern has learned on a particular day.
- In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

Signature of the mentor with date

Name: Md. Shahid Ullah  
 Designation: Sr. Engr (EE)  
 Contact Phone: 01822138375

Signature of academic supervisor with date

Name:  
 Designation:



Department of Electrical and Electronic Engineering  
East West University

Address the following points briefly (Use additional page if necessary)

1. What was the objective of the day's activities? (If applicable, list multiple objectives)

The main objective of the day was to familiarize and observe with the Lighting Arrester, Sky wire, Wave Tray, Earth Switch, Support Insulator and Bus Bar.

Name of the company: APSZ

Name of the student: Md. Shahid Ullah

2. List the day's activities according to the order of objectives listed in 1. Mention the specifications of the equipments used/visited. Comment on how these activities fulfill your objectives.

i) At first our instructor gave us a theoretical explanation of these components. Then we visited the switch yard and saw these components.

- Lighting arresters
- Sky wire
- Wave tray
- Earth switch
- Support insulator
- Bus Bar
- Double line bay.

3. Relate your practical activity with the theoretical knowledge you gained in the respective academic course.

We studied these things in Switchgear protection and protective relay (EEE442) course.

Md. Shahid Ullah  
4/9/12

Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sr. Engr (S/S)  
Contact Phone #: 01820138376

Amir Aziz  
12/09/12

Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering  
 East West University  
 EEE 499  
 Industrial Training  
 Daily Activity Report

Separate Daily Activity Report should be completed by each intern for every day of work and should be signed by the mentor from the company and the academic advisor. Copy of all the reports should be attached to the final internship report.


Name of the company:	APSCCL
Name of the student:	md. Amisur Rahman
ID:	2008-2-80-026
Date:	05/09/12
Start time/End time	8:00AM - 4:00 PM
Location:	Substation
Mentor:	Mohammad Shahid Ullah

General Instructions:

- It is the intern's duty to make sure that all his/her daily activity reports are appropriately signed by both the mentor and the academic supervisor.
- The daily report should be a brief narration of the activities during the internship period in the eyes of the intern and should be completed and submitted by every intern irrespective of the number of partners s/he might have for the presentation and final report writing purpose.
- The report should not be a compilation of lectures notes taken during the internship, rather it should depict what the intern has learned on a particular day.
- In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

Signature of the mentor with date  
 Name: Md. Shahid Ullah  
 Designation: Sr. Engg (SES)  
 Contact Phone #: 01820133376

Signature of academic supervisor with date  
 Name:  
 Designation:

  
Department of Electrical and Electronic Engineering  
East West University

Address the following points briefly (Use additional page if necessary)

1. What was the objective of the day's activities? (If applicable, list multiple objectives)

The objective of the day was to ~~know~~ see the oil changing of CB and silica gel changing of transformer and also visited auxiliary transformer and its application.

2. List the day's activities according to the order of objectives listed in 1. Mention the specifications of the equipments used/visited. Comment on how these activities fulfill your objectives.

1. At first our instructor gave us some idea of importance of changing oil and silica gel. Then we saw the oil and silica gel.

2. The we visited the auxiliary transformer and we also saw the application of this.

3. The specification of the auxiliary transformer is mentioned behind the report

3. Relate your practical activity with the theoretical knowledge you gained in the respective academic course.

We studied about the auxiliary transformer in EEE 442 course.

Md. Shahid Ullah  
5/9/12  
Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sr. engs (S/S)  
Contact Phone #: 01820138376

Amir Azim  
17/09/12  
Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering  
East West University  
EEE 499  
Industrial Training  
Daily Activity Report

Separate Daily Activity Report should be completed by each intern for every day of work and should be signed by the mentor from the company and the academic advisor. Copy of all the reports should be attached to the final internship report.

Name of the company:	APSEL
Name of the student:	md. Anisur Rahman
ID:	2008-2-80-026
Date:	06/09/12
Start time/End time	8:00AM - 4:00PM
Location:	control room, substation.
Mentor:	Mohammad Shahid Ullah

General Instructions:

- It is the intern's duty to make sure that all his/her daily activity reports are appropriately signed by both the mentor and the academic supervisor.
- The daily report should be a brief narration of the activities during the internship period in the eyes of the intern and should be completed and submitted by every intern irrespective of the number of partners s/he might have for the presentation and final report writing purpose.
- The report should not be a compilation of lectures notes taken during the internship, rather it should depict what the intern has learned on a particular day.
- In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sr. Supervisor  
Contact No: 01822182226

Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering  
East West University

Address the following points briefly (Use additional page if necessary)

1. What was the objective of the day's activities? (If applicable, list multiple objectives)

The main objective of the day is to visit the control room of the substation and gain knowledge about the operation of control room.

2. List the day's activities according to the order of objectives listed in 1. Mention the specifications of the equipments used/visited. Comment on how these activities fulfill your objectives.

1. At first our instructor gave us some discussion about the control room.
2. Then we visited the control room.
3. Our instructor showed us all the operation of the control room.
4. We also saw -
  - the 132KV bus diagram
  - 230 KV bus diagram
  - Bus coupler
  - operation of the control room
  - different types of protective relay.

3. Relate your practical activity with the theoretical knowledge you gained in the respective academic course.

The control room operation depends on single line diagram and we learn about single line diagram in EEE 442 and EEE 304 course.

2/9/12

Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sr. Engr (S/S)  
Contact Phone #: 01820138376

17/09/12

Signature of academic supervisor with date  
Name:  
Designation:



Department of Electrical and Electronic Engineering

East West University

EEE 499

Industrial Training

Daily Activity Report

Separate Daily Activity Report should be completed by each intern for every day of work and should be signed by the mentor from the company and the academic advisor. Copy of all the reports should be attached to the final internship report.

Name of the company:	APSCCL
Name of the student:	Md. Anisur Rahman
ID:	2008-2-80-026

Date:	07/09/12
Start time/End time	8:00AM - 4:00PM
Location:	Control room, substation
Mentor:	Mohammad Shahid Ollah

General Instructions:

- It is the intern's duty to make sure that all his/her daily activity reports are appropriately signed by both the mentor and the academic supervisor.
- The daily report should be a brief narration of the activities during the internship period in the eyes of the intern and should be completed and submitted by every intern irrespective of the number of partners s/he might have for the presentation and final report writing purpose.
- The report should not be a compilation of lectures notes taken during the internship, rather it should depict what the intern has learned on a particular day.
- In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

Signature of the mentor with date

Name: Md. Shahid Ollah

Designation: Sr. engt (SE)

Contact Phone #: 0220132396

Signature of academic supervisor with date

Name:

Designation:





Department of Electrical and Electronic Engineering  
East West University

Address the following points briefly (Use additional page if necessary)

1. What was the objective of the day's activities? (If applicable, list multiple objectives)

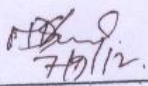
- The objective of the day's activities was
- to observe different types of relay
  - to know about their operation
  - to observe the testing of a new relay named REB500.

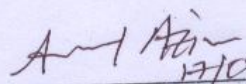
2. List the day's activities according to the order of objectives listed in 1. Mention the specifications of the equipments used/visited. Comment on how these activities fulfill your objectives.

1. At first we went to the relay room and watched the relay's and our instructor gave us a discussion about Relays.
2. After that we saw REB500 relay.
3. Then we went to the switch yard and observed the testing process of REB500.
4. Different types of relays are mentioned behind the report.

3. Relate your practical activity with the theoretical knowledge you gained in the respective academic course.

We studied about relay in switchgear protection (EEEE412) course.

  
7/9/12.  
Signature of the mentor with date  
Name: Md. Shahid Ullah  
Designation: Sr. engg (SIS)  
Contact Phone #: 01820138376

  
17/09/12  
Signature of academic supervisor with date  
Name:  
Designation: