Internship Report
On
Power Generation, Transmission and Distribution of
Ashuganj Power Station Company Limited

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, 2012]

Approved By

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Academic Advisor	**Academic Advisor**
Tahseen Kamal	**Dr. Khairul Alam**

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Department Chairperson
Dr. Khairul Alam

Approval Letter

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

CIRIFICATION FOR INDUSTRIAL ATTACHMENT TRAINING PROGRAMME

Certified that Khandoker Md. Ashiqur Rahman, Student. ID No- 2008-1-80-009 of Electrical & Electronic Engineering Département of East- West University, Dhaka, has participated the Industrial Attachment Training Program from 26-12-2011 to 11-01-2012 and successfully completed the course.

11-01-2012

Course Coordinator
&
Manager (HRD)
Ashuganj Power Station Company Ltd.
Ashuganj, B-Baria.

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Acknowledgement

Our heartfelt thanks go to Engr. Nurul Alam, Managing Director of Ashuganj Power Station Company Limited (APSCL) for allowing us to do the Internship and to Mr. Lutfar Rahaman, Manager, Training Division of APSCL for making arrangements and assigning us group wise to Engineers who provides us the training with their immense knowledge.

We would also like to thank our advisor Tahseen Kamal, Senior Lecturer and Dr. Khairul Alam, Associate Professor and chairperson, Department of Electrical and Electronic Engineering, East West University Bangladesh.

We would also like to thank all our teachers, family and friends for giving us the support during this period of Industrial Training. However, special thanks go to Engr. Md. Anwar Hossain, (Manager- Operation), Engr. Bikas Ranjan Roy, (Manager- Instrumentation and Control), Engr. Mostafizur Rahman, (Manager- Combined Cycle Power Plant), Engr. Noor Mohammad, (Manager- Substation) and Senior Engr. Mohammad Kamruzzaman, (Generator and Protection Division) for giving us their precious time for our training and for our acknowledgement of how a Power Station of such magnitude works.

Not to mention that our thanks go to Almighty Allah for giving us the chance to fulfill our Industrial Training smoothly.

Executive Summary

The objective of our internship was to get familiarized with the planning, generation and distribution on the practical field of power sector. The objective was to gain firsthand knowledge on the operations. During internship we got the opportunity to as a member of the engineering team which was involved in Generation, Transformation, Transmission and the CCPP. We came to know about the main principle to set up a power plant and that is Protection, Monitoring and Vision. Among them protection is the most vital and crucial part of a power station. A power station expends a huge part of their earnings behind the protection scheme.

Ashuganj Power Station Company Limited (APSCL) holds the second largest power generation in Bangladesh. With its 3 plants comprising of 8 units with an installed capacity of 724 MW providing 15% power to the National Grid. However, it is not producing 724MW power due to technical difficulties. The present de-rated capacity of the plant is 440 MW due to overhauling phase of plant 1's unit 1, plant 3s unit 3 and one GT of 54MW of the combined cycle power plant.

Training Schedule

The following table shows the daily training schedule.

Day and Date	Starting time- Ending Time	Training Objectives	Instructors	Total Working Hour/Day
26/12/2011 to 28/12/2011	8.00 AM to 4.00 PM	Operational Procedure of Thermal Power Plants	Md. Anwar Hossain (Manager-Operation)	8 Hours
29/12/2011 to 01/01/2012	8.00 AM to 4.00 PM	Instrumentation and Control/Valve Control/Transducers	Bikas Ranjan Roy (Manager-Instrumentation & Control)	8 Hours
02/01/2012 To 04/01/2012	8.00 AM to 4.00 PM	Combined Cycle power Plant(Operation, maintenance and Control)	Md. Mizanur Rahman (Manager-CCPP)	8 Hours
05/01/2012 To 08/01/2012	8.00 AM to 4.00 PM	Sub-Station(Power Transformers- Maintenance and Operation)/ Incoming BUS line Controls	Noor Mohammad (Manager-Substation)	8 Hours
09/12/2012 To 11/01/2012	8.00 AM to 4.00 PM	Generator and Protection	Mohammad Kamruzzaman (Senior Engineer-Generator and Protection Division)	8 Hours

Contents

CHAPTER 1

1. Introduction

Ashuganj Power Station Company Limited is the second largest power station in Bangladesh providing 15% of the total power to National Grid. The installed capacity by its 8 units is 746 MW. Due to recent technical difficulties and overhauling, the recent de-rated capacity is 440 MW.

1.1 Company Overview

- Company Name: Ashuganj Power Station Company Limited
- Date of Incorporation: 28th June 2000.
- Location: 90km west of Dhaka on the left bank of river Meghna.
- Land: 311.22 Acres
- Installed Capacity: 724 MW
- No of Plants: 3
- No of Units: 8

1.2 Plant Orientation:

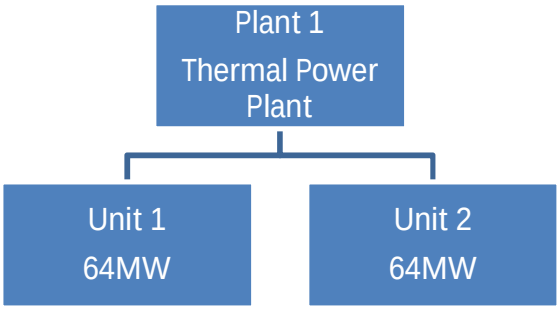

Figure 1.1 (a): Orientation of Thermal Power Station 64MW

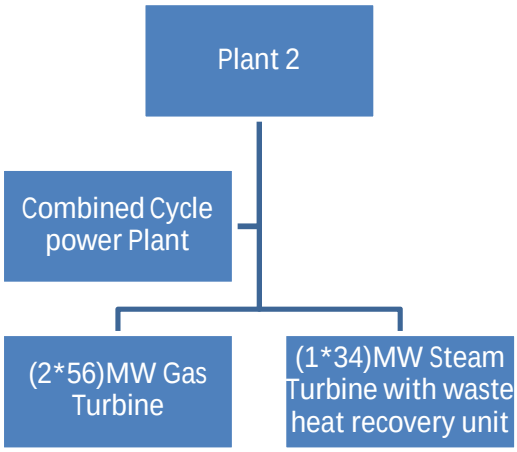

Figure 1.1(b): Orientation of Combined Cycle Power Plants

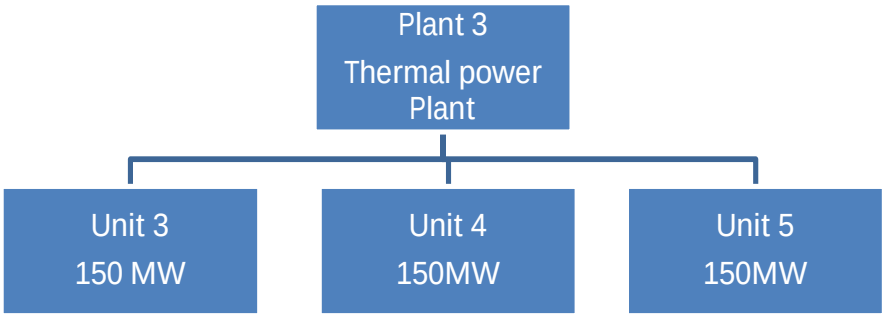

Figure 1.1(c): Orientation of Thermal Power Station 150MW

Fig 1.1: The orientation of APSCL Power Plants

1.3 Gas Scenario of APSCL

Strategically APSCL is situated in a good location of gas transmission and generation. All the pipelines of the station is tied up with TITAS gas distribution and Gas Transmission Company Limited (GTCL) installation. It has an gas allotment of 160 MSCFD (Million Standard Cubic Feet per day).

1.4 Objective of Internship

The main purpose of this internship is to complete the requirment of ou EEE undergraduate programme. In this report we tried to give an overview of one of the most importatnt power

station of Bangladesh. We tried to cover its operation generation and protection schemes. The main objectives are as follows

- Understanding the company management.
- Understanding the generation process.
- Understanding the Protection system.
- Understanding the Control system.
- Understanding the troubleshooting incase of emergency.
- Understanding the sunstation and incoming feeder lines.

1.5 Scope and Methodology

This internship report based on the facts that we gathered during the training period where we experienced and reviewed basic process of Ashuganj Power Station. This report also focuses on organizational structures, background and objectives, generation process and generation strategy of Ashuganj Power Station. Mainly this report emphasized on the generation process, protection scheme, maintenance, control and evacuation techniques of Ashuganj Power Station Company Limited.

This report has been produced with the aid of primary information that has been provided by APSCL's employee and secondary information procured from the company website.

CHAPTER 2

2. Power Generation

The conversion of energy available in different forms in nature into electrical energy is known as generation of electrical energy. In Ashuganj power station, Steam Turbine Power Plant, Gas Turbine Power Plant and Combined Cycle Power Plant is comissioned to generate electricity.
Centralized power generation became possible when it is discovered that AC power lines can carry a large amount of power at long distance at a very low cost and by the techniques of lowering or increasing the amount of power using Power transformer.

2.1 Generators

Generators are electromechanical devices that converts mechanical energy into electrical energy hence works as a power source for other machines. Electrical generators that we found in APSCL are basically combustion engines, water turbines and. There are two types of generators that can be found in Ashuganj Power Station power station:

a) **AC Generator** that generates alternating current which is also known as an alternator.
b) **DC Generator** which generates DC current.

In APSCL, both the above mentioned generators are used. Basically there are five generators in steam turbine plants and three in combined cycle. All the generators are AC generators.

Table 1: Information's of APSCL's generators and its ratings

The below mentioned table shows the detailed information of APSCLS's generators

Category	Steam power plant section		Combined cycle power plant section	
	Unit 1,2	Unit 3,4,5	Gas turbine 1 & 2	Steam turbine
Name of the maker company	BBC,Germany	ABB,Germany	GEC,UK	GEC,UK
Rated terminal output	64 MW	150 MW	55.67 MW	34.33 MW
Rated terminal voltage	11 KV	15.75 KV	38.8 KV	13.8 KV
Rated power factor	0.8	0.8	0.8	0.8
Rated current	4200/4690 A	6965 A	2911 A	1799 A
Rated frequency	50 Hz	50 Hz	50 Hz	50 Hz
Number of poles	2	2	2	2

2.1.1 AC Generators:

AC generators are electromechanical devices that convert mechanical energy into alternating current. In APSCL, the generators are constructed consisting the below mentioned parts.

a) **Field**: Consists coils of conductors that receive voltage from a source called exciter and produce magnetic flux. This fluxes cut the armature in order to produce voltage. This voltage is the terminal output of the generator.

b) **Armature:** This is the part where the voltage is produced. Armature consist many coils that are large enough to carry out full-load current of a generator.

c) **Rotor:** The rotating component of an AC generator is known as the rotor which is driven by the prime mover (steam engine, gas engine). Depending on the type of generator this can be the armature or the field. If the output voltage is induced here then it is the armature. If external source is applied here then it works as a field. In APSCL, the rotor is used as field exciter.

d) **Stator:** Stator is the part which is stationery. It also follows the same principle of being an armature or field. In APSCL, stator is used as armature.
e) **Slip Rings:** Slip rings are tube like rings which is circular in shape, connected to the armature and rotate with it. It is usually made of nonferrous materials like bronze or copper.
f) **Brushes:** Brushes are connected to slip rings and resistive load. Their job is to conduct electricity to load from the slip rings.
g) **Armature Windings:** These are first windings in form of flat rectangular coils which are pulled into their proper shape by a coil puller. The coils are insulated from each other. The coils are placed in such a way in form a line that is insulated with tough material.
h) **Field Poles:** The pole cores are made of solid steel castings. At the air gap poles usually fan out into what is known as pole head. This is done to reduce the reluctance of the air gap. The field coils are placed on the poles and then the whole assembly is mounted on yoke.
i) **Yoke:** It's a circular steel ring that supports the field poles mechanically and provides magnetic path between the poles. The yoke can be laminated or solid.

2.1.2 Working Principle of an AC Generator

The operation of electric generators is based on the phenomenon of electromagnetic induction. Whenever a conductor moves relative to a magnetic field, voltage is induced in the conductor. If a magnet is spinning inside a coil, AC voltage is induced in the coil. The induced voltage which is known as electromagnetic force or EMF will create current through an external circuit connected to the coil, resulting in energy being delivered to the load. Thus the kinetic energy that spins the source of the magnetic field is converted into electricity. The current flowing through an external load in turn creates a magnetic field that oppose the change in the flux of the coil, so the coil opposes the motion, The higher the current, the larger the force that must be applied to the magnet to keep it from slowing down.

2.1.3 Excitation System of a Generator

Exciter or Excitation is the father of generator control system. It is the source of power that induces DC magnetizing current to the field windings of a synchronous generator. As a result the magnetizing current induces AC voltage and current in the generator armature.

There are four types of excitation system in a generator:

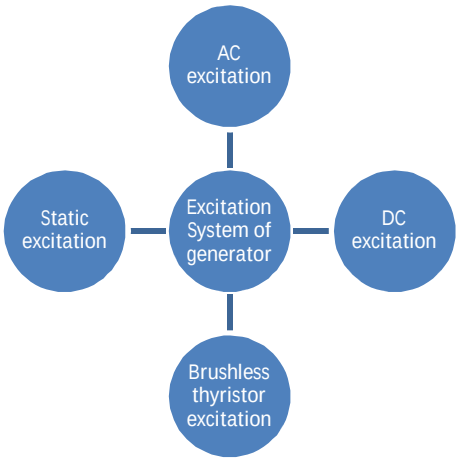

Figure 2.1: Classification of Generator excitation

2.1.3.1 AC excitation

AC excitation system is used widely. In APSCL unit1 and unit2 uses AC excitation system. This system consists of a sub- pilot exciter of a permanent magnet type, pilot exciter and the main AC exciter which is all coupled to the main generator along the same shaft. The permanent magnet type generator is a single phase generator where the field is produced by permanent magnet. The single phase supply from the armature is converted to dc by using a rectifier and the dc supplies the field of the pilot and main exciter. The pilot exciter and the main exciter are three phase machines. The potential transformer supplies the voltage proportional to generator voltage to magnetic amplifier.

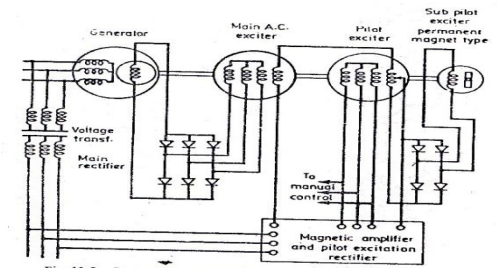

Figure 2.2: Single Line diagram of an AC excitation system

2.1.3.2 Brushless Thyristor Excitation System

This system is used to excite gas turbine generators in APSCL.

A brushless diode excitation system consists of an exciter having stationary field system and a rotating armature diode rectifier assembled in such a way that is coupled solidly to the main generator rotor. In this system the most commonly used rectifier configuration is the three phase bridge. If silicon diodes are replaced by thyristors and suitable arrangements are made to apply firing pulses to their gates with firing angle under control then it is possible to change the excitation voltage over the range of 10 milliseconds or less. The input voltage of thyristor converter has a constant value equivalent to the excitation voltage required by the generator. The thyristor converter performs dual function. The functions are rectification and control of the voltage supplied to the generator field.

2.1.4 Synchronization of generator

Synchronizing a generator on the grid is one of the most important tasks in power generation. Synched generator means the generator is working equally with the nationwide generators. Synchronization is basically the process of connecting a three phases synchronous or AC generator to another generator or to a power grid. However, to synchronize a generator four conditions must be met beforehand.

- **Frequency**

The generator must be driven by the prime mover at such a speed that the generated power frequency is equal to the grid's frequency.

- **Voltage**

The stator line voltage or the output voltage of a generator must be equal to grid's voltage. The stator line voltage is maintained by controlling the rotor current.

- **Phase sequence**

Phase sequence of the generator must be equal to the phase sequence of the grid. If the grid sequence is R-Y-B then the generator sequence must be also R-Y-B.

- **Phase Angle**

The phase angle of a generator and the phase angle of a grid must be equal. By adjusting the field current the stator angle can be controlled.

2.2 Steam Turbine Power Plant(Operation and Orientation)

2.2.1 Steam Turbine

Turbine is a device that spins in the presence of a moving fluid. In this device, kinetic energy of a dynamic fluid is converted into mechanical power by the impulse or reaction of a fluid with a series of buckets, paddles, blades arrayed about the circumference of a wheel or cylinder.

There are nine types of turbine that are used worldwide.

- Steam Turbine
- Gas Turbine
- Water turbine
- Wind Turbine
- Transonic Turbine
- Ceramic Turbine
- Stator less turbine
- Blade less Turbine
- Soundless Turbine

Ashuganj Power Station uses steam and gas turbine for power generation.

2.2.2 Steam Turbine

Steam turbine converts heat energy fed from coal or natural gas into mechanical energy thus producing electricity. In APSCL, there are three steam turbine power plants.

2.2.3 Types of Steam turbine

In APSCL, according to their working principle, steam turbine can be classified into two types

a) Impulse Turbine
b) Reaction Turbine

2.2.3.1 Impulse Turbine:

In this system the whole pressure of water is converted into kinetic energy in a nozzle and the velocity of the jets drive the wheel. It consists a wheel fitted with elliptical buckets along its periphery. The force of water jet striking the buckets on the wheel drives the turbine. The quantity of water jet falling on the turbine is controlled by means of needle or spear placed at the top of the nozzle. The movement of the needle is controlled by a governor. If the load on turbine decreases the governor pushes the needle into the nozzle, reducing the quantity of water striking the bucket.

Unit 1-5 of APSCL uses turbines of impulse type.

2.2.3.2 Reaction Turbine :

It consists of an outer ring of stationery guide blades fixed to the turbine casing and an inner ring of rotating blades forming the runner. The guide blades control the flow of water to the turbine. Water flows radially inwards and changes to a downward direction while passing through the runner. As the water passes over the rotating blades of t he runner, both pressure and velocity of water are reduced. This causes a reaction force that drives the turbine.

2.2.4 Steam Turbine orientation in APSCL

The steam turbines used in APSCL can be divided into three parts or chambers. The size and characteristics of these turbines are different from each other. The three parts of steam turbines are

a) High pressure turbine(HP turbine)
b) Intermediate turbine(IP turbine)
c) Low pressure turbine(LP turbine)

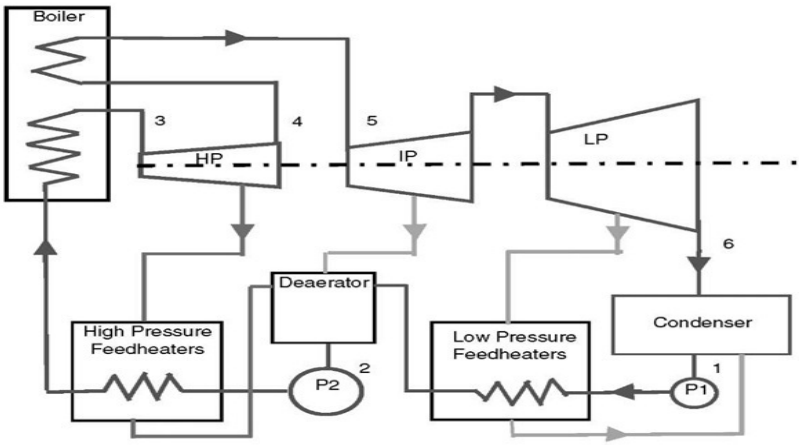

Figure 2.3: Arrangements of three turbine section

2.2.4.1 High Pressure Turbine

The high speed steam incoming from super heater enter the high pressure turbine chamber first. The blades of this turbine are smallest of all turbine blades. This is because to balance the thrust of the incoming high energy of steam which has also low volume. The blades are fixed to a shaft and the steam hits the blades causes the rotation of the shaft.

2.2.4.2 Intermediate Turbine

The steam enters the intermediate pressure turbine from boiler re-heater. The volume of steam expands and losses energy when entering this part. Therefore the turbine blades are bigger than HP turbine. From this part the steam goes to the low pressure turbine.

2.2.4.3 Low Pressure Turbine

From IP turbine steam enters here and continues to expand. The blades of this turbine are much larger than the previous two but the energy of steam is much lesser.

2.3 Steam Generation

The main ingredient to generate steam is water and this water has to pass through a series of mechanical systems to achieve the desired steam that rotates the turbines thus generating power.

The processes are as follows:

2.3.1 Boiler

The equipment used for producing steam is called boiler.

There are two types of boiler that are in use at APSCL. They are

a) Water tube boiler
b) Fire tube boiler

2.3.1.1 Water tube boiler:

In this type, the water tubes are arranged inside a furnace in a number of possible configurations often the water tubes connect large drums, the lower ones containing water and the upper ones, steam and water; in other cases, such as a mono tube boiler, water is circulated by a pump.

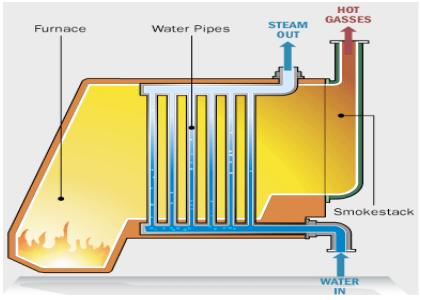

Figure 2.4: Water tube boiler

This type generally gives high steam production rates, but less storage capacity than the above. Water tube boilers can be designed to exploit any heat source and are generally preferred in high pressure applications since the high pressure water/steam is contained within small diameter pipes which can withstand the pressure with a thinner wall.

2.3.1.2 Fire Tube boiler

Water partially fills a boiler barrel with a small volume left above to accommodate the steam (steam space). This is the type of boiler used in nearly all steam locomotives. The heat source is inside a furnace or firebox that has to be kept permanently surrounded by the water in order to maintain the temperature of the heating surface just below boiling point.

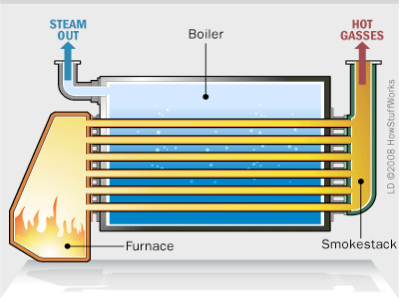

Figure 2.5: Fire tube boiler

The furnace can be situated at one end of a fire-tube which lengthens the path of the hot gases, thus augmenting the heating surface which can be further increased by making the gases reverse direction through a second parallel tube or a bundle of multiple tubes (two-pass or return flue boiler); alternatively the gases may be taken along the sides and then beneath the boiler through flues (3-pass boiler). In the case of a locomotive-type boiler, a boiler barrel extends from the firebox and the hot gases pass through a bundle of fire tubes inside the barrel which greatly increase the heating surface compared to a single tube and further improve heat transfer. Fire-tube boilers usually have a comparatively low rate of steam production, but high steam storage capacity. Fire-tube boilers mostly burn solid fuels, but are readily adaptable to those of the liquid or gas variety.

2.3.2 Burner

Burner also known as furnace is the chamber where the water is transformed into steam. Here natural gas or coal is burner with the presence of air for producing heated gas or flue gas. APSCL use natural gas for generating steam. In APSCL each furnace chamber has nine burners in total.

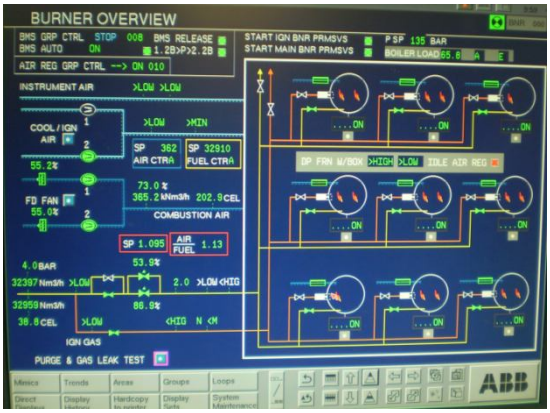

Figure 2.6: Burner arrangement for unit-5

The temperature inside the burner is 1200-1500℃. The water after being treated passes the economizer enters the furnace through tubes and the flue gas produced inside the furnace passes through the tubes. Flue gas releases heat to the water and the water becomes saturated steam whose temperature is 260℃.

2.3.3 Boiler Drum

This is the reserved drum where the steam coming from furnaces are reserved. The steam pressure is controlled by maintaining the upper and lower level of steam. Any anomalies like going off the limits (upper and lower) will trip the plant. Its is very important to control the saturated steam level. From the boiler drum the saturated steam is transferred to super heater.

2.3.4 Super Heater (SH)

In this part, saturated steam is converted into super heated steam. It is a part insode the burner. In super heated steam there will be no water particles. In fact it transforms the saturated steam into dry saturated steam. The temperature of the super heated steam is approximately 523℃ and it is supplied to the HP turbine with a pressure of 132 Bar.

2.3.5 Flue Gas

It is the heated gas which was produced inside the furnace with the mixture of natural gas and air. The operating principle of this flue gas is to release heat to the water in order to generate steam and after that it is released into air through stack or chimney.

2.3.6 Re-heater (RH)

Re-heater is a part where the steam is re-heated that comes from the high pressure turbine. At this stage the steam is known as exhaust gas.

APSCL has two re-heaters inside the boiler in which RH2 produces steam of about 522℃ and 29.4 Bar of pressure. From re-heater the exhaust gas goes inside the intermediate turbine.

The difference between a super heater and re-heater is super heater can increase the temperature and pressure of steam but a re-heater can only reheat the steam.

2.3.7 Condenser

Condenser is a device that condenses the steam coming from the turbine exhaust for re using. Condenser serves two important functions. It creates a very low pressure at the exhaust of the turbine causing the expansion of the steam in the prime mover at a very low pressure. The steam then transforms its heat energy to

Figure 2.7: Condenser of unit -4

mechanical energy in the prime mover. It also can be used as feed water to the boiler. According to their working principle boilers can be divided into two types:

a) Jet condenser
b) Surface condenser

2.3.7.1 Jet Condenser

In this condenser cooling water and steam are mixed together.

Advantages:

a) Low cost
b) Less floor area required
c) Less cooling water required
d) Low maintenance charge

Disadvantages:

a) Condensate is wasted
b) High power required for pumping

2.3.7.2 Surface condenser

APSCL uses surface condenser in Unit 1-5.

A surface condenser is a commonly used term for a water-cooled shell and tube heat exchanger installed on the exhaust steam from a steam turbine in thermal power stations. In this condenser there is no direct contact between cooling water and exhaust steam. The cooling water flows through the tubes and the exhaust steam over the surface of the tubes. The steam transfers the heat to the water and condensate.

The purpose of using the surface condenser is because the steam turbine itself is a device to convert the heat in steam to mechanical power. The difference between the heat of steam per unit mass at the inlet to the turbine and the heat of steam per unit mass at the outlet to the turbine represents the heat which is converted to mechanical power. Therefore, the more the conversion of heat per pound or kilogram of steam to mechanical power in the turbine, the better is its efficiency. By condensing the exhaust steam of a turbine at a pressure below atmospheric pressure, the steam pressure drop between the inlet and exhaust of the turbine is increased, which increases the amount of heat available for conversion to mechanical power. Most of the heat liberated due to condensation of the exhaust steam is carried away by the cooling medium (water or air) used by the surface condenser.

Advantages:

a) Condensed can be used as feed water.
b) Less power for pumping is required.

Disadvantages

a) High initial cost.
b) Requires large floor area.
c) High maintenance cost.

2.3.8 Hotwell

After the steam turned into water in surface condenser, it is kept in reserve into hot-well. From the hot-well the water is supplied to low pressure heater (LP heater) by condensate extension pump (CEP). Make up water from the water treatment plant is supplied to hot-well if the water level decreases.

2.3.9 Feed Water

Feed water is the water that comes from condenser. In other words feed water is the condensate water that feeds the boiler. The feed water is heated by heaters and economizer while going into the boiler and helps the overall efficiency of the plant. During the process some water might be lost so it has to make up the lost water that comes from water treatment plant. This water is called make-up water.

2.3.10 Feed water Heater

It is a water heater that pre- heats water before going into the boiler. Pre-heating reduces the irreversibility involved in steam generation thus improving the thermodynamic efficiency of the system. This feed water comes from HP, LP turbine through steam extraction line.

There are two types of water heater in APSCL.

a) Low pressure heater(LP heater)
b) High pressure heater(HP heater)

2.3.10.1 Low Pressure Heater (LP Heater)

LP heater heats the steam that comes out of the exhaust of IP and LP turbine. Feed water is then pumped into the LP heater from hot well by condensate extension pump (CEP). The temperature of feed water coming out of the LP heater is 127℃ in unit-5.

Figure 2.8: LP heater of unit-3

The temperature of the exhaust steam coming out of LP and IP turbines is 222℃ and 91.2℃ respectively. The steam releases heat by flowing over the tubes carrying feed water. There are two LP heaters in unit-5 for the exhaust steam coming out of LP and IP turbine separately.

2.3.10.2 High Pressure heater (HP Heater)

Unlike LP heaters, high pressure heater (HP heater) also increases heat before it enters the boiler system. The steam coming out of the exhaust lines of HP and IP turbines heat up the feed water. Feed water is pumped into the HP heaters by boiler feed pump (BFP). Like the process followed in LP heater, the steam is flowed over the tube of feed water and the water absorbs heat from the steam. There are also two HP heaters for HP and IP exhaust steam separately.

2.3.11 Feed water tank

Feed water tank is the reservoir for the feed water coming from LP heater. From feed water tank, feed water goes into HP heater. For the transfer, boiler feed pump (BFP) is used.

Figure 2.9: Feed Water Tank unit-3

2.3.12 Economizer

Economizer is a mechanical device intended to reduce energy consumption, or to perform another useful function such as preheating a fluid. The term economizer is used for other purposes as well. Boiler, power plant, and heating, ventilating, and air-conditioning (HVAC) uses are discussed in this article. In simple terms, an economizer is a heat exchanger. It also helps to recover the heat carrying out by flue gases. This recovered heat is used in increasing temperature of feed water.

2.3.13 Deaerator

A Deaerator is a device that is widely used for the removal of oxygen and other dissolved gases from the feed water to steam-generating boilers.

In particular, dissolved oxygen in boiler feed waters will cause serious corrosion damage in steam systems by attaching to the walls of metal piping and other metallic equipment and forming oxides (rust). Water also combines with any dissolved carbon dioxide to form carbonic that causes further corrosion. Most Deaerator are designed to remove oxygen down to levels of 7 ppb by weight (0.005 cm^3/L) or less.

There are two types of Deaerator used in steam power stations. They are:

2.3.13.1 Tray type

Tray type which is also known as cascade type deaerator includes a vertical domed deaeration section mounted on top of a horizontal cylindrical vessel which serves as the deaerated boiler feed water storage tank.

2.3.13.2 Spray type

The spray-type consists only of a horizontal (or vertical) cylindrical vessel which serves as both the deaeration section and the boiler feed water storage tank.

In APSCL, spray type Deaerator is used.

2.3.14 Air pre-heater

An air pre-heater (APH) is a general term to describe any device designed to heat air before another process (for example, combustion in a boiler) with the primary objective of increasing the thermal efficiency of the process. They may be used alone or to replace a recuperative heat system or to replace a steam coil.

The purpose of the air pre-heater is to recover the heat from the boiler flue gas which increases the thermal efficiency of the boiler by reducing the useful heat lost in the flue gas. As a consequence, the flue gases are also sent to the flue gas stack (or chimney) at a lower temperature, allowing simplified design of the ducting and the flue gas stack. It also allows control over the temperature of gases leaving the stack.

2.3.15 Stack/Chimney

A flue-gas stack is a type of chimney, a vertical pipe, channel or similar structure through which combustion product gases called flue gases are exhausted to the outside air. Flue gases are produced when coal, oil, natural gas, wood or any other fuel is combusted in an industrial furnace, a plant's steam-generating boiler, or other large combustion device.

Figure 2.10: Stack/Chimney of unit-2

Flue gas is usually composed of carbon dioxide (CO_2) and water vapor as well as nitrogen and excess oxygen remaining from the intake combustion air. It also contains a small percentage of pollutants such as particulate matter, carbon monoxide, nitrogen oxides and sulfur oxides. The flue gas stacks are often quite tall, up to 400 meters (1300 feet) or more, so as to disperse the exhaust pollutants over a greater area and thereby reduce the concentration of the pollutants.

2.3.16 Water treatment plant

The source of water required for steam generation usually comes from river containing dissolved gas and other particles that could be harmful for boiler and other components. Boiler requires clean and soft water for longevity and better efficiency. Therefore, the water is needed to be purified before in taking for the steam generation. Water treatment plant of a power station does the above work. The process includes sedimentation, coagulation and filtration to remove the impurities. Dissolved gases are removed by aeration. At last, the pure and soft water is fed to the boiler.

The water is supplied using the following pumps in APSCL.

2.3.17 River water suction pump (RSP)

The pumps are used for sucking river water into the reservoir for circulation into the power station after going through treatment procedure. Majority of the pumps used for circulation or transferring uses 6.6KV voltage.

2.3.18 Condensate Extension Pump (CEP)

This pump is used to transfer condensate water of hot-well to the low pressure heater. There are two condensate pumps used in APSCL for each boiler. One is operational and one is standby.

2.3.19 Boiler feed pump (BFP)

Boiler feed pump is used for transferring feed water to HP heater from feed water tank. It pumps feed water to high pressure heater and then through economizer. Unlike CEP, there are two BFP where one is operational and the other is standby.

2.3.20 Forced Draught fan (FD fan)

This is the main air intake fan that feeds air into the boiler from the nature and acts as a boiler combustion air source. Each unit has two FD fan both working simultaneously.

Figure 2.11: Force Draught Fan unit-3

The amount of air intakes inside the boiler depends on the air pressure inside. Forced draught fan actuator is used to control the air pressure inside the boiler.

2.3.21 Forced draught fan actuator

FD fan actuator is basically a three phase dc motor with a lever attached to a damper inside the fan.

Figure 2.12: Forced Draught fan actuator unit-3

When the air pressure inside the boiler drops, the actuator moves clockwise and opens the damper for the fan to suck in more air and decreases the intake air by moving counter-clockwise.

2.3.22 Circulating water pump (CW pump)

CW pump usually used to circulate cooling water to the condenser. Depending on the source of water there are two types.

2.3.22.1 Vertical types

Usually used while in- taking water direct from sea or river. In APSCL, vertical CW pump is used as it takes in water from the river Meghna.

2.3.22.2 Horizontal types

Horizontal type is used while taking water from the cooling tower. This type of CW pumps has controllable movable impeller or lever which is called variable pitch vane type.

CHAPTER 3

Combined Cycle Power Plant

3. Combined Cycle Power Plant (CCPP):

As per our schedule we were assigned to visit CCPP (Combined Cycle Power Plant) unit from 2nd to 4th January. When we visited Combined Cycle Power Plant, at first our instructor gave us a little discussion about it. It is a different type of power generation plant from all others in Ashuganj Power Station. It produces power from gas turbine initially and then produces more power from exhausted gas again. The secondary generator is a steam generator. It takes energy from the heat of exhausted gas which has a temperature of about 450-650℃. It was made to make a power generator more efficient. Normal gas turbine fuel efficiency is usually 50%. The remaining heat from combustion is generally wasted. Combining two or more thermodynamic cycle's results in an improved overall efficiency and reduction in fuel costs.

Combined cycle power plant consists of two sections. These are:

a) Gas turbine section.
b) Steam turbine section.

Table 3.1: Information of combined cycle power plant of APSCL

Category	Combined cycle power plant section	
	Gas turbine 1 & 2	Steam turbine
Name of the maker company	GEC,UK	GEC,UK
Rated terminal output	55.67 MW	34.33 MW
Live steam pressure(Pabs)	Flue gas	39 bar
Live steam temperature	1010°C	490°C
Number of stages	-	17
Rated speed	3000rpm	3000rpm
Direction of rotation	Clockwise	Clockwise

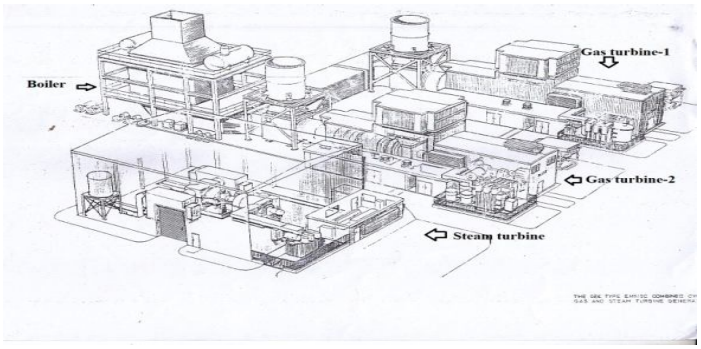

Figure 3.1: Top view of combined cycle power plant of APSCL

3.1 CCPP in APSCL:

In APSCL there are two gas turbine generators for CCPP named gas station 1&2. Though both are coupled with steam turbine, only one is used for combined cycle at a time now. Each generates approximately 45 MW and the coupled steam turbine generates almost 23 MW.

3.2 Gas Turbine Section:

Then we have visited the gas turbine section, learn about different parts of it and saw how they work. Some of them are discussed below:

3.2.1 Compressor:

Compressor is a device in the gas turbine section which is used to compress the air which is needed to expand by the help of combustion of fuel to create mechanical energy to rotate the turbine. In gas turbine section of APSCL centrifugal compressor is used.

Figure 3.2: Centrifugal compressor used in APSCL

3.2.2 Combustion Chamber:

The combustion chamber consists of a vessel into which pressurized air and pressurized fuel (oil, natural gas) are fed in appropriate proportions, finally mixed, ignited and fed into the turbine at correct turbine entry temperature. The pressure in the combustion chamber is decided by the outlet pressure of the compressor, which feeds air directly to the chamber. About 30% of the main flow of air passes into the burner area as primary air. The air fuel ratio in the area is maintained at about 15:1.

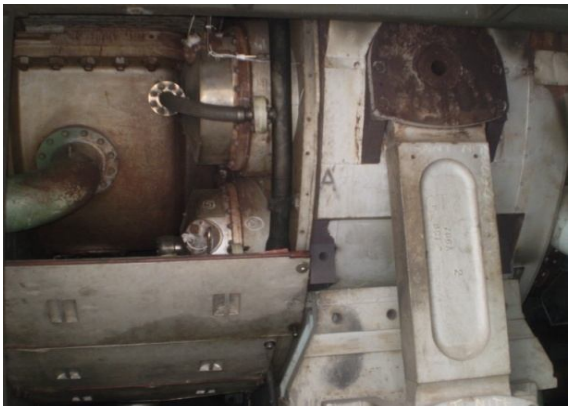

Figure 3.3: Combustion Chamber of Gas Turbine Plant of APSCL

3.2.3 Gas Turbine:

It is the most important part of the gas turbine section. The products of combustion consisting of a mixture of gases at high temperature and pressure are passed to the gas turbine. These gases in passing over the turbine blades expand and thus do the mechanical work. In gas turbine section of APSCL shaft type gas turbine is used.

Figure 3.4: Gas turbine of APSCL

3.3 Diesel Engine:

It is a very essential part in gas turbine power plant. The gas turbine is not a self exciting machine. The turbine only can be rotated if fuel and air is burned inside the combustion chamber. But before the turbine starts the air cannot be sucked by the compressor automatically because the compressor is coupled with the turbine.

So a diesel engine is coupled with the turbine to rotate the turbine at the beginning for helping to suck air by the compressor. At first the diesel engine starts. When the turbine starts to move by the diesel engine at a rated speed which makes the compressor to suck air by itself then the diesel engine is turned off.

Figure 3.5: Diesel engine use in the gas turbine

3.4 Steam Turbine Section:

After that we have visited the Steam turbine section. In combined cycle power plant the exhaust gas which comes out from the gas turbine is used to produce steam and run a steam turbine. The exhaust gas has very high temperature which can be used to create steam by using several equipments.

The main difference between the steam turbine section of combined cycle power plant to the steam turbine section of steam power plant is in the steam power plant there is a furnace which produce the heat or flue gas but in the combined cycle there is no furnace, steam is produced by the heat of exhaust gas.

In combined cycle power plant of APSCL there is one steam turbine section which runs by the exhaust gas of gas turbine-1 & 2.

3.4.1 Steam Generation Process:

In steam generation process several equipments are used. In combined cycle power plant of APSCL following equipments are used.

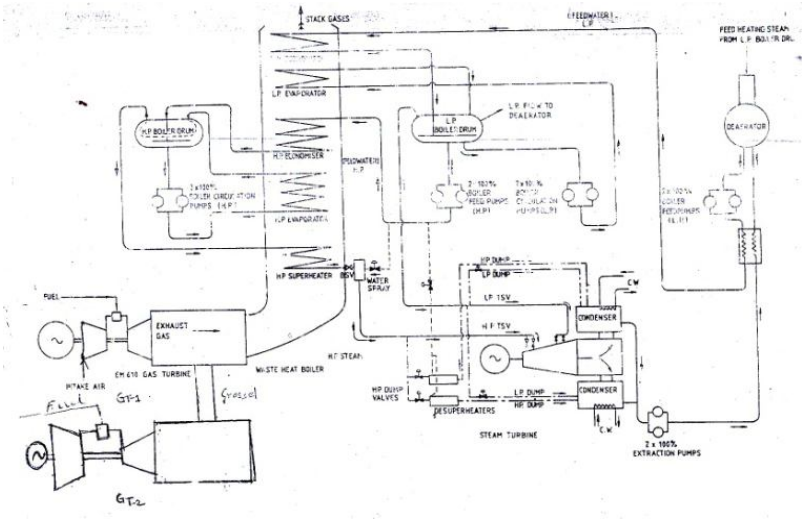

Figure 3.6: Single line diagram of steam generation system of combined cycle power plant of APSCL

3.4.2 Different parts of steam turbine:

a) Deaerator:

A Deaerator is a device that is widely used for the removal of air and other dissolved gases from the feed water to steam-generating boilers.

b) Low Pressure Economizer (LP Economizer):

This part is at the top of the boiler where the temperature of exhaust gas becomes relatively low. From the LP economizer the feed water goes to the LP boiler drum.

c) Low Pressure Boiler Drum:

The feed water is reserved into this drum after it passes through the LP economizer. The feed water is pumped from the LP boiler drum to the low pressure evaporator.

d) Low Pressure Evaporator:

At the low pressure evaporator the feed water is heated at low pressure. It is placed below the LP economizer. Feed water flows through the tubes and exhaust gas is flowed over the tubes.

e) High Pressure Economizer (HP Economizer):

At high pressure economizer the temperature of feed water raises higher. Then the feed water is supplied to the high pressure boiler drum. Boiler feed pump is used to flow the water from LP boiler drum to HP boiler drum. When feed water passes through the HP economizer the temperature raises up to 220°C.

f) High Pressure Boiler Drum:

The feed water is reserved into this drum after it passes through the HP economizer. The feed water is pumped from the HP boiler drum to the high pressure evaporator.

g) High Pressure Evaporator:

From the HP boiler drum feed water is transferred to the high pressure evaporator where the feed water becomes saturated steam by the help of the heat of exhaust gas. From the HP boiler drum the steam is then flowed to the super heater.

h) Super Heater:

This part is at the bottom of the boiler where the temperature of the exhaust gas is highest. At this part the saturated steam becomes super heated steam. Exhaust gas is flowed over the bundle of tubes which carry the steam. At the super heater the temperature of the exhaust gas that comes from the gas turbine is about 500°C. From the super heater the super heated steam goes to the high pressure turbine at a temperature of 400°C and pressure of 40 bar.

3.4.3 Condenser:

A condenser is a device which condenses the steam at the exhaust of turbine. It serves two important functions. Firstly, it creates a very low pressure at the exhaust of turbine, thus permitting expansion of the steam in the prime mover to a very low pressure.

This helps in

Figure 3.7: Condenser used in steam turbine section of combined cycle power plant (APSCL)

converting heat energy of steam into mechanical energy in the prime mover. Secondly, the condensed steam can be used as feed water to the boiler.

In combined cycle power plant of APSCL there are two condensers.

3.5 Valves used in Combined Cycle Power Plant:

Valves are of two kinds. These are:

3.5.1 Isolation Valve:

It is an on/off valve that typically operates in two positions; the fully open and fully closed position.

3.5.2 Control Valve:

It can be controlled. This valve can regulate the fluid flow in a piping system.

In combined cycle power plant there are various types of vales. These are:

3.5.3 Manual Valve:

Manual valves are those valves that operate through a manual operator (such as a hand wheel or hand lever), which are primarily used to stop and start flow (block or on–off valves), although some designs can be used for basic throttling.It is an isolation valve. Only on/off operation is possible by this.

3.5.4 Pneumatic Valve:

It is a valve in which the force of compressed air against a diaphragm is opposed by the force of a spring to control the area of the opening for a fluid stream.

Figure 3.8: Pneumatic valve

In APSCL control room sends electrical signals of 4-20 mA to field where I/P converter convert these electrical signals into pneumatic signals. Actuators use these signals to operate the valve. Actuators move the and down depending upon input signals and control the valve opening.

3.5.5 Hydraulic Valve:

It is a valve which is used for regulating the distribution of water in the cylinders of hydraulic elevators, cranes, etc.

3.5.6 Motorized Valve:

Valves which are controlled by motor are called motorized valve. By running the motor clockwise and anti clockwise a motorized valve can be opened or closed. It is a control valve. The speed of the motor controls how fast or slow the valve is opening and closing. If it is an emergency opening or closing then the motor will run fast by increasing the field current with the help of electronic mechanism.

3.5.7 Electro-hydraulic Valve:

Electro-hydraulic valves use Electro-hydraulic actuators which convert fluid pressure into motion in response to a signal. They use an outside power source and receive signals that are measured in amperes, volts, or pressure.

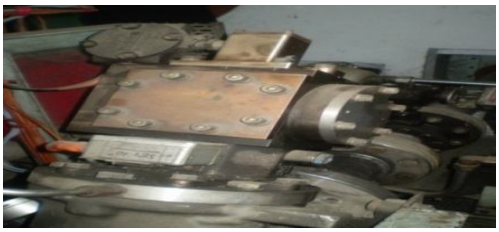

Figure 3.9 : Electro-hydraulic valve

3.5.8 Servo Valve:

The servo valve is a kind of valve that uses a torque motor type coil to control a small stream of fluid. Direction of the fluid stream is used to position a large spool. Therefore a low level power signal may provide precise spool position.

Figure 3.10: Servo valve

CHAPTER 4
Substation

4. Substation:

As per our schedule we were assigned to visit the Substation of APSCL from 5th to 8th January. We had a walk with our instructor through the switch yard and saw different parts of it. A substation is a part of an electrical generation, transmission, and distribution system. We saw different parts of substation when visited there and learnt they work.

Figure 4.3: Part of a Substation of APSCL

4.1 Different parts of a substation which we have seen in APSCL:

4.1.1 Potential Transformer (PT):

A potential Transformer is usually used to transform voltage from one level to another. It is also known as voltage transformer. A transformer can be a step up transformer or a step down transformer.

Figure 4.4: Potential Transformer

a) Step up transformer:

A Step up transformer is usually used to increase the voltage for long transmission line.

b) Step down transformer:

A step down transformer is usually used to reduce the voltage from the transmission line to the consumers.

4.1.2 Current transformer (CT):

A current transformer is used for measurement of electrical currents. Current transformers, together with voltage transformers, are known as instrument transformers. When current in a circuit is too high to directly apply to the measuring instruments, a current transformer reduces the current to a proportion to the high current which can be measured very easily.

Figure 4.3: Current Transformer

4.1.3 Intermediate Potential transformer:

There are two different type of voltage level transmission line in APSCL. One is 132 KV and another is 230 KV. Some time the load varies in each line. An intermediate potential transformer make up the gap between available supply and the load by transforming voltage from 132 to 230 KV or from 230 to 132 KV as per need. It is a both way transformer.

Figure 4.4: Intermediate Transformer

4.2 Protecting relays of substation:

A protecting relay is used to protect the PTs & CTs from over rated supply which can be harmful for them. It sense the current and voltage and when it gets a higher current or voltage than the rated one it charges the tripping coil and switched of the circuits to protect them. There are three types of relays in APSCL:

a) Electronics relay:

Now this type of relays is enormously used. The relay uses a micro-chip and therefore, it is small in a size. This relay is very fast and effective to trip the circuit. In APSCL this type of relays are used in unit 3, 4 and 5.

Figure 4.5: Electronics relay.

b) Electrical relay:

Electrical relay is used in APSCL for the protection of unit 1 and 2. This is large size in size. This type of relays is now rarely used in the power plant. In this relay we need to adjust the tripping condition manually.

Suppose we want to trip the system in 1 second at 5 ampere fault current. We have to adjust the time 1s and current 5A.

Figure 4.6: Electrical relay

c) Fabricated relay:

In this type of relay there will be relay board. In this board there will be different types of protecting device like fuel pump relay, main power relay, circuit breaker, fuse, injector ballast resistor etc. by connecting these all equipment form fabricated relay. This type of relays is also used in APSCL.

Figure 4.7: Fabricated Relay

4.3 Bus bar:

A bus bar is a copper or aluminum alloy that conducts electricity within a substation. The size of the bus bar determines the maximum amount of current that can be safely carried. There are two types of Bus Bar and they are:

a) **Single bus bar.**
b) **Double bus bar.**

In APSCL there were double Bus bars through the substation.

4.4 Lightning arrester:

Lightning arrester is used to protect the substation from a excessively high voltage coming from a sudden fall of lightning. It arrests the lightning voltage and passes it to the ground to protect all the instruments of the substation.

4.5 Transmission Line:

There is multiple numbers of transmission lines in APSCL substation to transmit power to another station and to the consumers. Those were copper made bear wire transmission lines in APSCL.

Figure 5.8: Transmission Line

4.6 Isolator:

An isolator switch is used to make sure that an electrical circuit can be completely de-energized for service or maintenance.

Figure 4.9: Isolators

4.7 Circuit Breakers:

Circuit breaker is an automatic switch that stops the flow of electric current in a suddenly overload otherwise abnormality stressed electric circuit. In other word a circuit breaker is an automatically operated electrical switch design to protect an electrical circuit. From damage caused by over load or short circuit.

a) Oil Circuit Breaker

In oil circuit breakers insulating oil is used as an arc quenching medium. The contacts are opened under oil and an arc is struck between them, heat of the arc evaporates the surrounding oil and produce hydrogen at high pressure. The oil is pushed away from the arc region and the gas bubble occupies adjacent portions of the contact. The arc extinction is facilitated mainly by two processes. Firstly the hydrogen gas has high heat conductivity and cools the arc, thus aiding the deionization of the medium between the contacts. Secondly the gas sets up turbulence in the oil and forces it into the space between contacts thus eliminating the arcing products from the arc path resulting in arc extinction and interruption of current.

Figure 4.10: Oil Circuit Breaker

b) SF6 Circuit Breaker

In this circuit breaker, sulphur hexafluoride (SF6) gas is used as the arc quenching medium. The SF6 gas is an electro negative gas and has a strong tendency to absorb free electrons. The contacts of the breaker are opened in a high pressure flow of SF6 gas and an arc is struck between them. The conducting free electrons in the arc are rapidly captured by the gas to form relatively immobile negative ions. This loss of conducting electrons in the arc quickly builds up enough insulation strength to extinguish the arc. This circuit breaker is very effective for high power and high voltage service.

Figure 4.11: SF6 Circuit Breaker

c) Air blast circuit Breaker:

Air circuit breakers can be used both as circuit-breakers for general protection and as protection circuit breakers of electrical machines. It is available from 400A to 6400A. “Under Voltage Release” mechanism is used in this circuit breaker. This mechanism will be active when there will be low voltage supply or zero voltage supply. Here also magnetic tripping mechanism for short circuit.

Figure 4.12: Air blast circuit Breaker

4.8 Cable:

a) Underground Cables:

An underground cable essentially consists of one or more conductors covered with suitable insulation and surrounded by a protecting cover.

Figure 4.13: Underground Cable for 132kv Line

b) Coaxial Cable:

It is an electrical cable with an inner conductor surrounded by a flexible, tubular insulating layer, surrounded by a tubular conducting shield.

Figure 4.14: Coaxial Cable

4.9 Tower:

Tower is a tall structure, which is used to support overhead electricity conductors for electric power transmission. Many different type of tower is used in substation and distribution area for transmitting the electricity. This different type of tower depends on the power range. In the substation of APSCL steel tower is used because they transmit high voltage.

Figure 4.16: High Voltage Tower

4.10 Feeder:

In APSCL three type of feeder is used for power transmitting and receiving purpose

a) 230KV incoming and outgoing feeder

b) 132KV outgoing feeder

c) A 6.6 KV incoming Bus is also present in APSCL for internal back-up system.

4.11 AC and DC auxiliary system for Substation:

DC power supply is heart of the substation. Without a DC supply the substation is fully unprotected. DC auxiliary system is also called Back-up system. In the backup system DC supply is used. It is needed to run the Relay, Circuit breakers and control System when Fault occurs. In APSCL Nickel Cadmium batteries are used because its efficiency is very high. Each cell is 1.2 volt and 750 amp-h. Total battery section output is 220 volt. To get 22o volt, the batteries are connected in series. These batteries are cleaned regularly to prevent it from flashing. To check the performance of the batteries, some tests are also done twice on a month. These tests are:

a) Acid level test: This test is performed visually.
b) Cell voltage Test: Here voltage level of each batteries are checked
c) Total Output: Here total output of back up section is checked whether it is 220V or not.
d) Gravity test: This test is performed by using a testing tube.

Conclusion

In case of power generation, APSCL is the combination of steam, gas and combined cycle plant. We visited steam power plant at the very fast of our internship program. In steam power plant we observed how water is collected, purified and then boiled to produce steam. There are several switch gear and control rooms to control the overall system of producing steam and power generation. Various types of relays are used for protective purposes that are also controlled in control room. Next we visited gas turbine of APSCL. There we have seen how fresh air and natural gas supplied by TITAS GAS are used as fuel to burn. After burning, the produced hot gas is used to rotate the turbine. For protective measures relays are also used. After gas turbine, we visited combined cycle power plant (CCPP). Here the exhausted hot gas is being used to boil water for producing steam. At last we visited the distribution section of APSCL. In sub-station, stepped up or down of voltages is being done using transformers and power is distributed. Different types of isolators are being used for maintenance purpose of transmission lines. Breakers are also used for transmission line protection. To meet the present demand there's no other option instead of increasing power generation. In APSCL distribution system is good as we have seen. But it may be possible to increase power generation of steam, gas and combined cycle plant by replacing and adding some equipment. Overall budget should increase for that. Industrial training provided by APSCL has enriched our practical knowledge. It has opened our eyes about practical operation of different equipments. It has widened our knowledge about Power Generation and Power Plants of Bangladesh.

Appendix

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:	Ashuganj Power Station Company Limited.
Name of the student:	TARIK REZA
ID:	2008-1-80-007

Date:	26·12·2011
Start time/End time	08·00 -4·00 Clock 1-2)
Location:	Ashuganj Power Plant
Mentor:	Achinto Kumar Sarker

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.

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)

. History and development of Ashuganj power station

. visiting plant for overview and site orientation.

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.

* In 1966 decision taken to setup APSCL. First two units 1 and 2 are commissioned in 1970 with help of German govt. The installed capacity was 128 MW each comprising 64 MW. Now it has 8 units & CCPP (GT-1, GT-2, ST) Equipments used in APSCL are mostly BBC, IHI, KDC, GEC and PCC. It became a joint stock company on 28th June, 2000.

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

Rough overview has been gained about APSCL, its history and operation.

06.11.2017
Signature of the mentor with date
Name: Achinta Kumer Sarker
Designation: DGM (MM)
Contact Phone #: 01711-425460

19.01.2018
Signature of academic supervisor with date
Name: Mahreen Kamal
Designation:

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

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Name of the company:	Ashuganj Power station Company Limited
Name of the student:	TARIK REZA
ID:	2008-1-80-007

Date:	27·12·2011
Start time/End time	08·00 - 1·00 (Lunch 1-2)
Location:	Unit 1-5 (Thermal plant)
Mentor:	Anwar Hossain (Manager Operation)

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.
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d. In case of any confusion, interns are strongly recommended to consult their respective academic supervisors.

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)

• objective was to gain practical knowledge on operation and working principle of a thermal power plant.

• objective was also to see the production and regeneration of steam and demin water.

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.

• In a thermal plant, water after the treatment goes into feed water tank. From there, through boiler tube and burner it turns into steam. Through super heater (need to heat and de-moisture) it enters HP turbine with pressure 135 bar and temp 522°C. The steam then goes through the condenser and re-heat to start the cycle again.

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

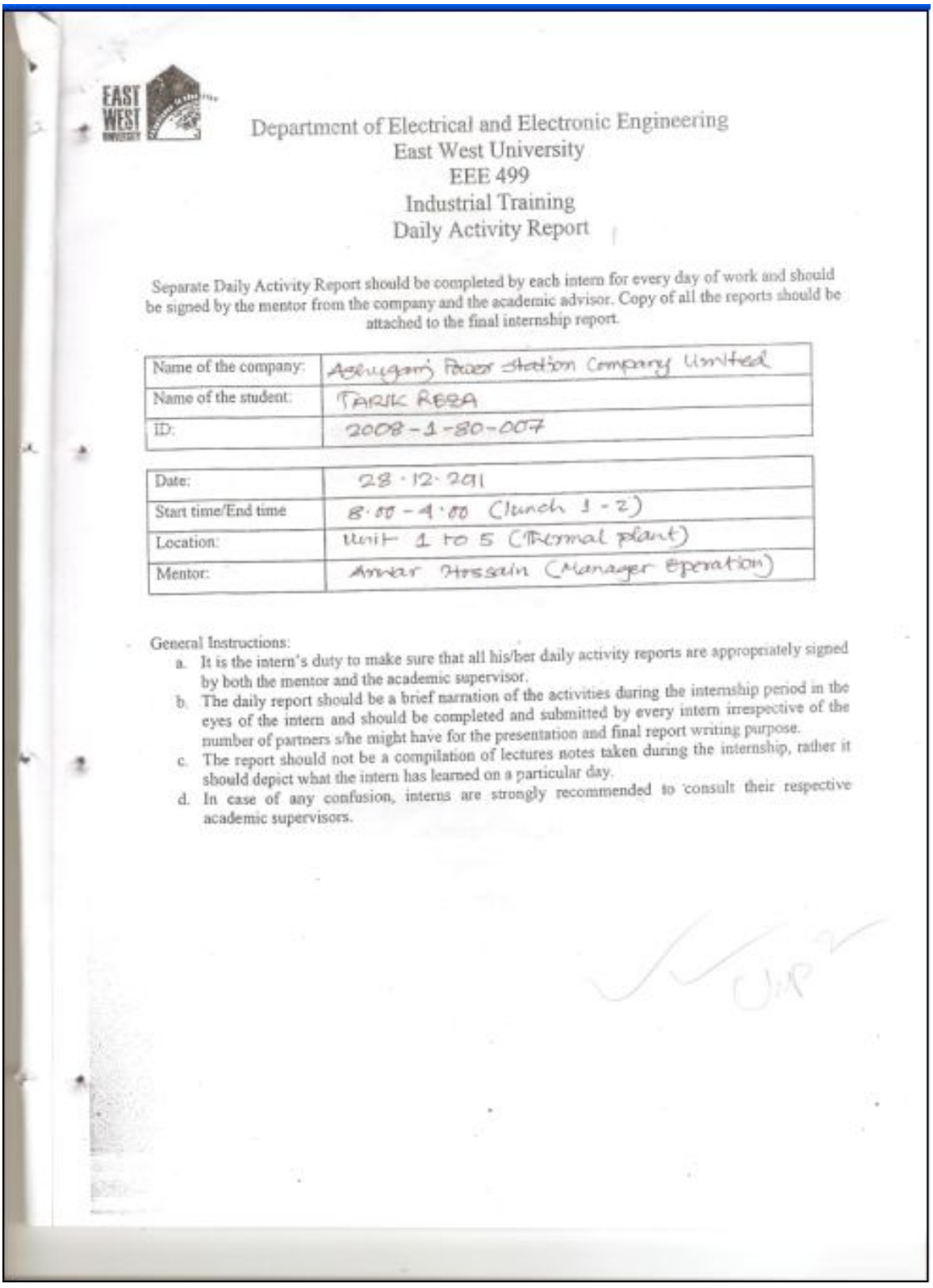
we came to know about the equipments and flow cycle of the plant that we learned about in theory.

27/12/11

Signature of the mentor with date
Name: Anwar Hossain
Designation: Manager (operation)
Contact Phone #:

Yasmeen Kamal 19.01.2012

Signature of academic supervisor with date
Name:
Designation:



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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:	Ashuganj Power Station Company Limited
Name of the student:	FARIK REZA
ID:	2008-1-80-007

Date:	28·12·201
Start time/End time	8·00 - 4·00 (lunch 1 - 2)
Location:	Unit 1 to 5 (Thermal plant)
Mentor:	Anwar Hossain (Manager Operation)

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.

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)

• Objective was to get knowledge on the equipments used for operation in thermal plant.

• Also to know about different cycles of operation of the plant.

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 Force Draught Fan
② Water flow tubes
③ Down Comer Head
④ Burners
⑤ Condensate storage tank
⑥ Boiler feed pump
⑦ Feed water tank
⑧ Deaerator
⑨ Boiler Drum
⑩ Super heater Section
⑪ Re-heater Section
⑫ Reservoir

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

We practically came to know about the equipments and control system of the plant. We also know about the Rejno cycle which is the main cycle for the operation of the plant.

28/12/11

Signature of the mentor with date
Name: Anwar Hossain
Designation: Manager (Operation)
Contact Phone #:

Yaheen Kamal 19.01.2012

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:	Ashuganj Power Station Company Limited.
Name of the student:	TARIK REZA
ID:	2008 - 1 - 80 - 007

Date:	29/12/2011
Start time/End time	08:00 - 4:00 (lunch 1 - 2)
Location:	Instrumentation and control
Mentor:	Bikash Ranjan Roy

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.

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)

- To know about the instrumentation and control system of unit 1 and 2 of thermal power station. The objective was to get familiar with various inter-connections and values of air, water and gas.

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.

- Force draught fans air-inlet actuators.
- Tacho-generator
- Air flow and Pressure transmitter.
- Gas safety valves
- Solenoid value
- Air flow controller

that automatically controls air flow in the boiler. The tacho-generator to measure the r.p.m of the F.D fan. The transmitters relay signals to control room for monitoring and protection. The valves are used to create control flow of gas, water and air for combustion and also to create isolation for abnormal condition. We also come to know about oxygen meters and relay control rooms of control room of unit 2.

By visiting the plant we came to know about force draft fans actuators.

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

We learned about the working principle of power station equipments and control system. During this internship we came to know about the mechanical work of this equipment. We also see how this equipment work with like the data flow of transmitters to the control room.

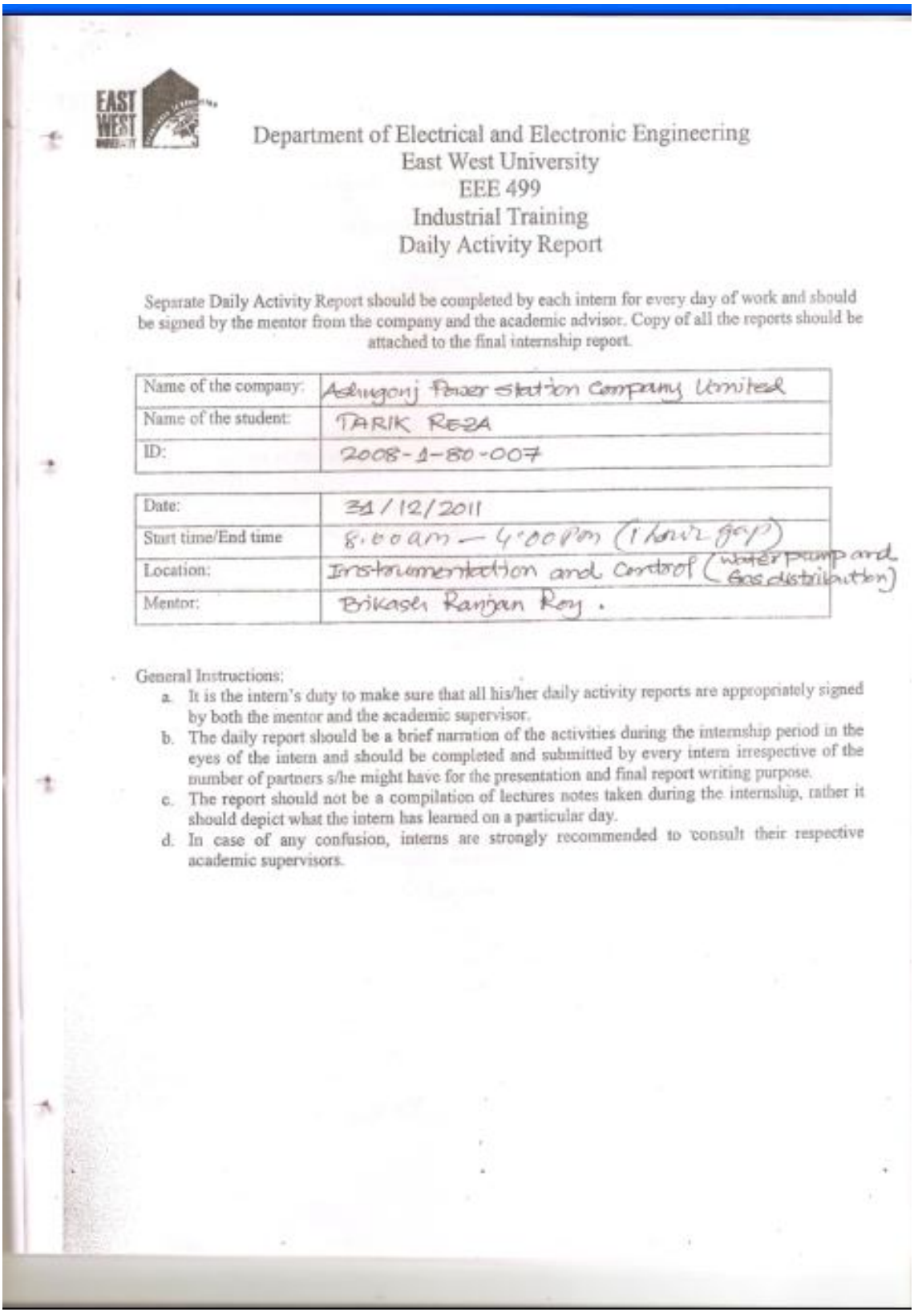
Jahiea Kamal 2017

Signature of the mentor with date
Name: Bikash Ranjan Roy.
Designation: Manager
Contact Phone #: 01712 887349

Signature of academic supervisor with date
Name:
Designation:

Boiler and Turbine

Likewise the protection system of the elements, we came to know about the boiler water measurement system and how it is used to trip the boiler during low-low or high-high signal.



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:	Ashugonj Power Station Company Limited
Name of the student:	TARIK REZA
ID:	2008-1-80-007

Date:	31/12/2011
Start time/End time	8.00am – 4.00Pm (1 hour gap)
Location:	Instrumentation and Control (water pump and Gas distribution)
Mentor:	Brikash Ranjan Roy.

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.

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)

- To know about how water is feed to the condenser coolers with circulating water pumps (CWP).
- To know about the gas distribution system of the plant.

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.

- visited the water pump that sucks water from river. The activity includes the acknowledgment of the working principles of pump valve, discharge valve, annunciator for control panel.
- In the Gas distribution we came to know about the use of mechanical valve and Junction box. The Gas flow meter and pressure sensor to measure the amount of gas flowing in the plant. we also came to know about the tripping mechanism of boiler regarding the water level.

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

Academic Course provides us with the theoretical knowledge of the working principles of various equipments of the plant. Here we are gaining knowledge first hand by field trip. like the pneumatic valves used for protection we came to know about the diaphrams and pressure inlet.

09-01-12.

Signature of the mentor with date
Name: Bikash Ranjan Roy.
Designation: Manager (I&C).
Contact Phone #: 01712887349

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:	Ashuganj Power station Company Limited
Name of the student:	TARIK REZA.
ID:	2008-3-80-009

Date:	03/01/2012
Start time/End time	8:00 AM to 4:00 PM (7 hours 30')
Location:	Boiler Feed Pump, Condenser, Water Circulating System, Air Preheater
Mentor:	Bikash Ranjan Roy.

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.

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)

- To know about the ~~feeding~~ process of steam, water and air into the ~~turbine~~ Boiler.
- Acknowledging control room 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.

The equipments that are used to feed water and air into ~~turbines~~ and boilers:

- Feed water pump
- water recirculation valve
- Pneumatic control valve
- Make up water flow transmitter
- Air removal Pump
- Air compressor plant
- Condensate control pump
- Hot well
- LP heaters

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

In our academic course we learned about this valves theoretically. Now we are relating this theory with our practical experience. In the field we have to know about these valves first hand. We studied

09-01-2012
Signature of the mentor with date
Name: Bikash Ranjan Roy
Designation: Manager (Tech).
Contact Phone #: 01712887349

Yasmeen Kamal
Signature of academic supervisor with date
Name:
Designation:

working principles about these valves but in the fie
we learned about how we can operate and trouble
about this equipments. The training also includes
electronic data recording attachments and automat
control systems of RFP, turbines and control val
we came to know about how the datas are rela
through this panel to the control room.

Department of Electrical and Electronic Engineering
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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:	Khandoker Md. Anhiqur Rahman
ID:	2008-1-80-009

Date:	02/01/2012
Start time/End time	08 AM to 04 PM.
Location:	CCPP
Mentor:	Mizanur Rahman

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.

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 gas turbine plant equipment and learning the function of the combined cycle power plant 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.

We have observed:

(i) Fuel system for prime mover and the gas turbine.
(ii) Gas Filter.
(iii) Fuel valve package.
(iv) Lube oil system.
(v) Cooling system.
(vi) Turbine air inlet system.
(vii) generator system.
(viii) Control unit system.

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

Gas turbine power plant was a theory part of our power station course. It was a brief theory discussion which we have practically observed here.

2.1.2012

Signature of the mentor with date
Name: Mizanur Rahman
Designation: Manager- CCPP
Contact Phone #: 01958540027

Alam 12/1/2012

Signature of academic supervisor with date
Name: Khairul Alam
Designation: Asstt. Prof.

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:	Khandoker Md. Ashiqur Rahman.
ID:	2008-1-80-009

Date:	03/01/2012
Start time/End time	08 AM. to 04 PM.
Location:	CCPP
Mentor:	Mizanur Rahman

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.

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 steam turbine part of the combined cycle power plant.

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.

We have observed:

(i) Steam turbine of CCPP.
(ii) Generation capacity.
(iii) Heat absorbing system, coolants, super heater, HP evaporation, forced flow section, LP evaporation.
(iv) Feed water down.
(v) Steam storage down.
(vi) Condenser
(vii) Circulating water pump.
(viii) Circulating valve and make up water bank.

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

We have already learned about steam turbine operation when we were study at 4th year. 1,2,3,4 & 5. Theoritically we have learned these in our power station course.

21.1.2012

Signature of the mentor with date
Name: Mizanur Rahman
Designation: Manager CCPP
Contact Phone #: 01558540027

Alam 21/1/2012

Signature of academic supervisor with date
Name: Khairul Alam
Designation: Assoc. Prof.

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:	Khondoker Md. Ashiqur Rahman.
ID:	2008-1-80-009

Date:	04/01/2012
Start time/End time	08AM. to 04 PM.
Location:	CCPP
Mentor:	Mizanur Rahman

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.

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 combined cycle process and the maintenance process of ~~acpp~~ combined cycle power plant.

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.

We have observed:

(i) Exhaust panel of gas turbine.
(ii) Damper.
(iii) Chimney.
(iv) Inlet panel for thermal absorbtion of steam turbine.
(v) Emergency valve.
(vi) Cooling system.
(vii) Cooling fan for gas turbine.
(viii) Different types of relay and transducer.
(ix) protection system.

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

The terms we have observed was related with power station course facilitygear and protection is also related a little with the protection system we have observed.

1/11/2017
Signature of the mentor with date
Name: Mizanur Rahman
Designation: Manager c-pp
Contact Phone #: 01558540029

10/11/2017
Signature of academic supervisor with date
Name: Khairul Alam
Designation: Assoc. Prof.

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:	Khandoker Md. Ashiqur Rahman
ID:	2008-1-80-009

Date:	05-01-2012
Start time/End time	08AM. to 04 P.M.
Location:	Sub-Station
Mentor:	Noor-Muhammad

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.
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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)

Objectives:

① Learning about different equipments of Sub-Stations and specification.

② Practically learned about the circuit breakers and protection devices.

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.

There are two different voltages supplying to the grid fr the station. They are 132 KV and 230 KV. We learned the generation capacity of different unit is different.

We have also learned about potential transformer, curre transformer. Circuit Breaker, Lightning Arester, isolator Earth switch etc.

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

Here all we learn practically which we have theoretic experienced in out switchgear and protection course.

5/11/2012

Signature of the mentor with date
Name: Noor Muhammad
Designation: Manager substation
Contact Phone #: 01712191603

Alam 19/11/2012

Signature of academic supervisor with date
Name: Khairul Alam
Designation: Assoc. Prof.

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:	Khandoker Md. Ashiqur Rahman
ID:	2008-1-20-009

Date:	07/01/2012
Start time/End time	08AM to 04 PM.
Location:	Sub-Station
Mentor:	Noor Muhammad

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.

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)

* To know about the step up transformer (transmission xformer
* Transformer safety.
* Metering in 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.

Bogals relay : It used in transmision transformer for safety.
Radiator : It is for circulate cooling oil.
Cooling type : oil natural, Air natural, Force cooling.
Oil temperature meter : Indicates the temperature of oil.
Winding temperature meter : Indicates the temperatures of windings.
Silicon gel breather : It is used as purifier the breathing air.
Gasket tap.

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

We have learned a lot today all about the transformer which we have already theoritically gained from our electrical machine, switchgear and protection course.

7/11/2012
Signature of the mentor with date
Name: Noor Muhammad
Designation: Manager Sub station
Contact Phone #: 01712 191903

19/11/2012
Signature of academic supervisor with date
Name: Khairul Alam
Designation: Assoc. Prof.

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:	Khandoker Md. Ashiqur Rahman
ID:	2008-1-80-009

Date:	08/01/12
Start time/End time	08 AM. to 04 PM.
Location:	Sub-Station
Mentor:	Noor Muhammad.

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.

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)

* knowing different parts of switchyard.
* watching transformer maintenance.
* Watching switchyard 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.

List of activities:

* P.T. → Potential transformer
* C.T – current transformer

we have also seen different type of protective element

* SF_6 circuit breaker, oil circuit breaker, insulator, lightning arrester.
* We have also had a great opertunity to see the maintenance process of a transformer. There were some leakage in the bushing of the transformer. we have been watching the changing process.

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

We have learned a lot about the production system of a substation in our switchgear and protection course. Here we got a chance to practically observed there.

8/11/2012
Signature of the mentor with date
Name: Noor Muhammad
Designation: Manager Sub-station
Contact Phone #: 01712 191804

19/11/2012
Signature of academic supervisor with date
Name: Khairul Alam
Designation: Asstt. Prof.

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 week 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:	Ashuganj Power Station Company Limited
Name of the student:	TARIK REZA
ID:	2008-1-80-007

Date:	09-05-2012
Start time/End time	0800 – 4:00 Clock (8:00 – 2:00)
Location:	Generator and Protection Division
Mentor:	Mohammad Kamruzzaman

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.

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 todays activity is to know about classification of generators, its working principle and protection scheme of the generators.

• Also includes generators maintenance and work.

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.

Depending on construction principle, generator can be classified into different sections. According to o/p power: ① AC generator ② DC generator. According to rotor type: ① Salient Pole ② non-salient Pole. According to maintenance: ① Carbon brush checking ② Air filter checking ③ Shaft voltage inspection ④ Dehumidifier checking. According to cooling system, generators are cooled by ① Air ② Hydrogen. According to protection scheme, there are 16 types of protection. ① over current protection ② over current with under voltage protection ③ over voltage protection ④ over speed protection ⑤ under frequency protection.

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

We came to know about the working principal and protection scheme of the generator as we learned in switchgear and protection course. We learned about when and how over voltage fault occurs and how it is managed in order to protect the system.

Signature of the mentor with date
Name: Mohammad Kamruzzaman
Designation: Senior Engineer
Contact Phone #: 16.01.12

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:	Ashuganj Power Station Company Limited
Name of the student:	TARIK REZA
ID:	2008 – 1 – 80 – 007

Date:	30 · 05 · 2012
Start time/End time	08 :00 – 4:00 (Lunch 1 – 2)
Location:	Generator and Protection Division
Mentor:	Mohammad [redacted] Kamruzzaman

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.

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 today's activity is to know about relay protection system of generators and how the fault is handled.

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.

Today's activity includes :

- Negative Phase Sequence
- Minimum Impedance
- Loss of Excitation
- Winding Differential Protection
- Stator Earth fault protection
- Rotor Earth fault protection
- Distant protection
- unit transformer protection
- unit auxilary transformer protection
- Gas protection

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

The practical knowledge completes the whole idea of protection scheme that we learned in theoretical course.

Signature of the mentor with date
Name: Mohammad Kamruzzaman
Designation: Senior Engineer
Contact Phone #:

Jahseen Kamal 10.01.2012
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:	Ashuganj Power Station Company Limited
Name of the student:	Tanvir Reza
ID:	2008-1-80-007

Date:	11-01-2012
Start time/End time	08:00 - 4:00 (lunch 1-2)
Location:	Generation and Protection Division
Mentor:	Mohammad Kamruzzaman

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.

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)

- Todays objective is to gain knowledge about the protection system (cont.) and control room orientation and relay board.

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.

The activity was to understand how rotor, stator and grid earth fault occurs and how we can overcome the fault. Distance relay works as vector. It analyze both side fault and generates trip command according to danger priority. Lightning or earthing on grid line work on 30° angle on both side. To cover the whole transmission line earthing need 45° cover angle to cover the whole line.

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

We came to know about protection system and relay functions by visual inspection. We also came to know about control unit equipments on our final day of internship.

Signature of the mentor with date
Name: Mohammad Kamruzzaman
Designation: Senior Engineer
Contact Phone #:

Signature of academic supervisor with date
Name: Tahseen Kamal
Designation: Senior Lecturer