EAST WEST UNIVERSITY

INTERNSHIP REPORT

ON

COMBINED CYCLE POWER PLANT and SUBSTATION

OF

ASHUGANJ POWER STATION COMPANY LIMITED (APSCL)

By

Jenifer Jue Chisim

2007-3-80-008

Shafin Akter

2008-1-80-072

Nasrin Akter

2008-2-86-009

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)

Fall 2012

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ASHUGANJ POWER STATION COMPANY LTD. (APSCL)

(An Enterprise of Bangladesh Power Development Board)

Certificate

For

Industrial Attachment Training Program

This is to certify that Miss. Jenifer Jue Chisim , ID No. 2007-3-80-008 ,the Student of B.Sc in Electrical and Electronic Engineering from East-West University , Dhaka has successfully completed the Industrial Attachment Training Program held from 24-08-2012 to 07-09-2012. During the training period, she paid due attention to the practical work .

I wish her every success in life.

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

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Jenifer Jue Chisim	Shafin Akter	Nasrin Akter

Acknowledgment

We would like to express our gratitude to all those who gave us the opportunity to complete the internship program at Ashuganj Power Station Company Limited (APSCL). First of all, we would like to thank the people at Ashuganj Power Station Company Limited (APSCL) for giving us continuous support and encouragement to conclude successfully this internship at their company. We also want to thank the Manager (HRD) of Ashuganj Power Station Company Ltd (APSCL), Md. Lutfar Rahman, who gave and confirmed this permission and encouraged us by providing constant support and guidance. It would be difficult to complete our internship program successfully without the assistance from the people at APSCL. Especially, we are obliged to Engr. Golam Rabbani who had helped us to complete our training work, and to collect and use departmental data in our internship report.

We are deeply indebted to our supervisors Ms. Tahseen Kamal, Senior Lecturer and Ms. Sohana Tanzeem, Lecturer and Mr. Anwarul Azim, Lecturer, Department of Electrical and Electronic Engineering, East West University for their stipulating suggestion and encouragement to do the internship and to organize the internship report on Ashuganj Power Station Company Ltd (APSCL).

At the end, we would like to thank God almighty for giving us the ability to complete both of the internship programs and report successfully.

Executive Summary

As a part of the requirement of B.Sc in Electrical Electronic and Engineering, we went through the procedure of electricity production, distribution and transmission system of Bangladesh in the following internship report.

During our internship program, we have visited the second largest power station in Bangladesh that is Ashuganj Power Station Company Ltd and cultured several important features about APSCL. For instance, there are 9 units with installed capacity of 777 MW. Approximately 15% of the total demand for power (electricity) is met by APSCL.

This internship program has opened a window of opportunity for us, as student of EEE department at East West University to validate, our theoretical knowledge with the field experience. We have observed different equipments and have learned different procedures of maintaining power station to run them efficiently and safely. This includes generator, boiler, water treatment plant, steam turbine, gas turbine, compressor, backup system. In addition we have also observed substation equipments such as power transformers, current transformer, potential transformer, protective relays, circuit breakers, insulator, lightning arrester and other key equipments. With the aid of this report, we primarily focus on the details of Combined Cycle Power Plant by incorporating the knowledge about power generation, transmission, maintenance and distribution system at Ashuganj Power Station Company Ltd.

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Chapter 1: Introduction

1.1 Company Profile:

- Name : Ashuganj Power Station Company Ltd. (APSCL)
- Location: 90 km North-East of Dhaka on the left bank of the river Meghna.
- Registration No. : C-40630 (2328)/2000
- Registration Date : 28 June 2000
- Number of Generation Units: 9
- Number of plants: 3
- Installed Capacity : 777 MW
- Land : 263.55 Acres
- Power: 517 (Regular employee) [1].

1.1.1 Power Generation

APSCL has three major power plants, two Thermal Plants and one Combined Cycle Power Plant. The first one is Thermal Power Plant that was established in 1970. It has two steam units, Unit 1 and Unit 2, each produces 64MW. The second one is Combined Cycle Power Plant established in 1986. It has two gas turbine units, GT1 and GT2 and one steam turbine ST that produces 146MW. The third one is a Thermal Power Plant that has another three steam units, Unit 3, Unit 4 and Unit 5, established in 1987, 1988 and 1989 respectively. In total these three units produce 450 MW of electricity [1].

1.1.2 Vision

APSCL is the second largest Power generating station in the country and they are generating enormous amount of electricity efficiently. The vision of APSCL is to generate more power for the country and become number one power generation company of the Bangladesh.

1.1.3 Mission

The mission of the company is to generate more than they are generating now and some plants of the company are in progress. Target of APSCL Company is to increase power generation capacity to 1500 MW by 2014. The recent project at APSCL is a Combined Cycle Power Plant with a capacity of 225 MW [1].

1.1.4 Future Plan of APSCL

The goal of APSCL is to deliver continuous electricity supply to the people of Bangladesh. To achieve this goal, APSCL has taken several steps. For instance APSCL is going to establish three Combined Cycle Power Plants in near future to generate more power. The planned power plant is sponsored by the following company [1].

- Ashuganj 150 MW Combined Cycle Power Plant Project,
- Ashuganj 450MW Combined Cycle Power Plant (North Side of plant),
- Ashuganj 450MW Combined Cycle Power Plant (South Side of plant).

1.2 Objective of the Internship

The main objective of the internship is to fulfill the Bachelor of Science degree requirement. It is also the key requirement of the course namely, EEE 499, Industrial Training program. We went Ashuganj on the day of 23rd August. We started our internship program from 24th August. Every day we used to go to the power plant at 8 am. We had to stay there from 8am to 4pm. We got one hour break from 1pm – 2pm. We were taken from one place to another inside the power plant by our instructors. Sometimes they gave lectures to us about different subjects relevant to power plants. We finished our internship program on the day of 7th September. Throughout the training at APSCL, we came to learn the procedure of maintaining the power station, controlling the entire system, management process, procedure of generating electricity and safety issues of the power station. This Internship report illustrates the aspects that we observed in Ashuganj Power Station Company Ltd from our perspective.

1.3 Scope and Methodology

The entire internship report is based on the experience that we have gained through the training at power plant. We observed the company strategy and how employees work to maintain the entire power plant, their procedure of solving any problem that occurs in the power plant. In this report we collected information from the document that APSCL provided us and also from the APSCL website. In addition, this report highlights the company strategy, generation process, maintenance strategy, and technique and control system of APSCL that we observed on site and obtained through the document provided by APSCL.

1.4 Introduction about Combined Cycle Power Plant

We visited Combined Cycle Power Plant for most of the time of our internship period. Actually we were assigned by the authority of APSCL only to learn about Combined Cycle Power Plant. At APSCL we saw that how exhaust gas of Gas engine power plant is used as a source of fuel for boiling water with an objective to produce steam in the Steam Turbine power plant and extracts more useful energy. Gas Turbine burn fuel and produce high temperature heat (450-650°C) called waste heat. The section where waste heat used to process steam is called Waste Heat Recovery Unit. This steam is used to generate electricity in Steam Turbine. Figure 1.1 shows the total Combined Cycle Power Plant is given below. Table 1.1 shows some information of Combined Cycle Power Plant of APSCL.

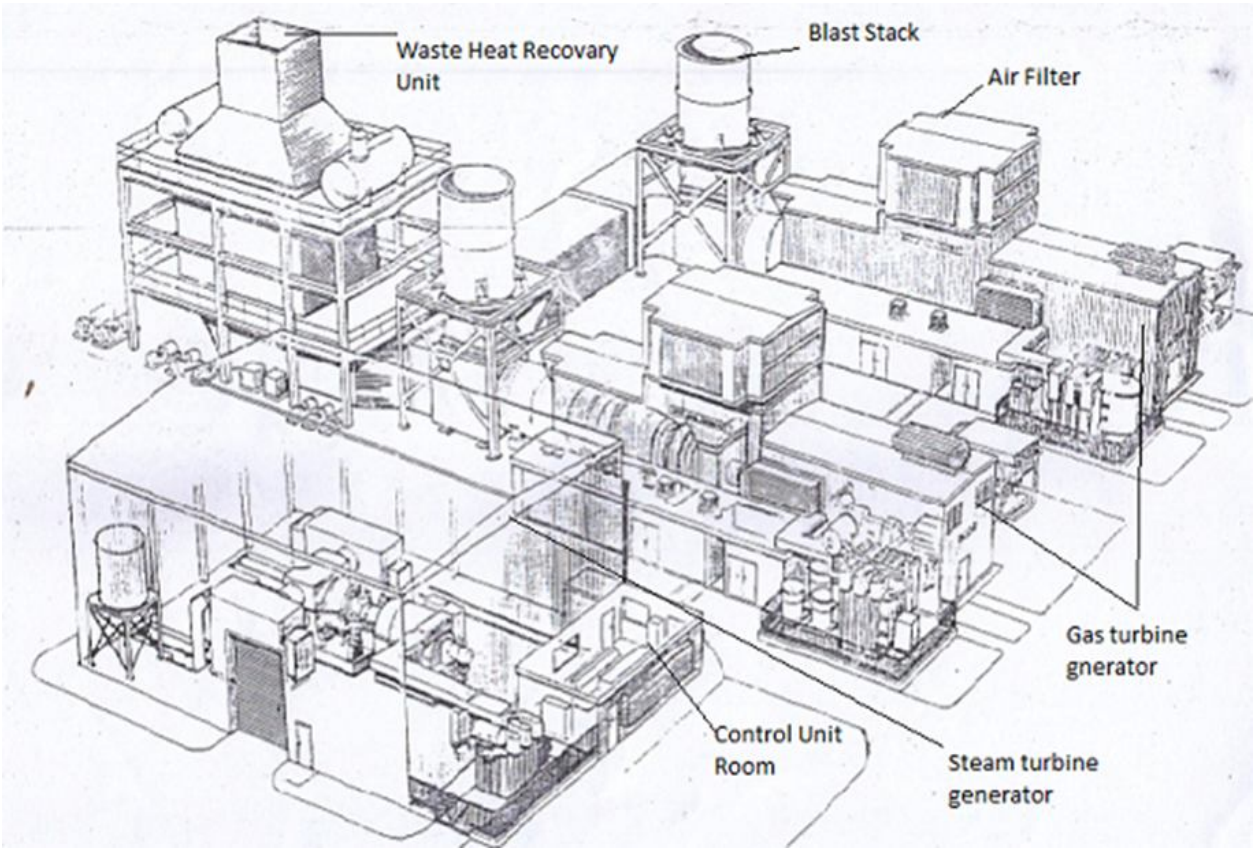

Figure 1.1: Total plant of Combined Cycle Power (provided sheet by APSCL).

Table 1.1: 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 temperature	1010°C	490°C
Exhaust pressure	-	-0.8 bar-g
Number of stages	-	17
Rated speed	3000rpm	3000rpm
Direction of rotation	Clockwise	Clockwise

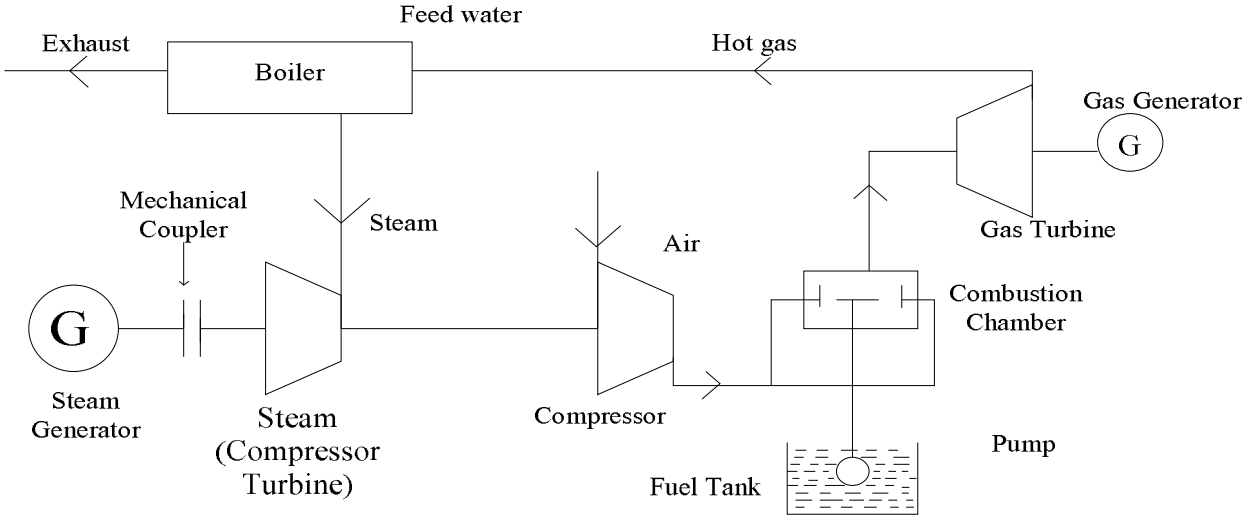

Figure 1.2: Working Procedure of the Combined Cycle Plant (provided sheet by APSCL).

Figure 1.2 shows the working procedure of the Combined Cycle Plant. In Combined Cycle Power Plant gas is used to generate electricity in Gas Turbine and exhaust gas is produced. By using this exhaust gas we produce electricity is produced in Steam Turbine, therefore in Steam Turbine there is no need of extra fuel. These results a reduction in fuel cost for the entire system. In the mean time, feed water goes through boiler and produce hot steam. Then this hot steam passes through Steam turbine and is sent to steam generator to produce electricity. At the same time, in compressor, air and hot steam mix up to purify the air from dust and sent to Combustion Chamber. The entire process improves the overall efficiency.

Chapter 2: Gas Turbine

2.1 Introduction

Gas Turbine Section is the most important part of Combined Cycle Power Plant (CCPP). In order to produce electricity, CCPP uses gas as fuel that is supplied by Titas. In this process, air is used as a raw material, obtains chemical energy from fuel and converts into mechanical energy. At first compressor sucks air from atmosphere. Then the air is filtered in three stages: it is filtered in air intake filter initially, next it is filtered in hot water tube and finally it is filtered in knocked pot. Then drives it into combustion chamber and completes combustion.

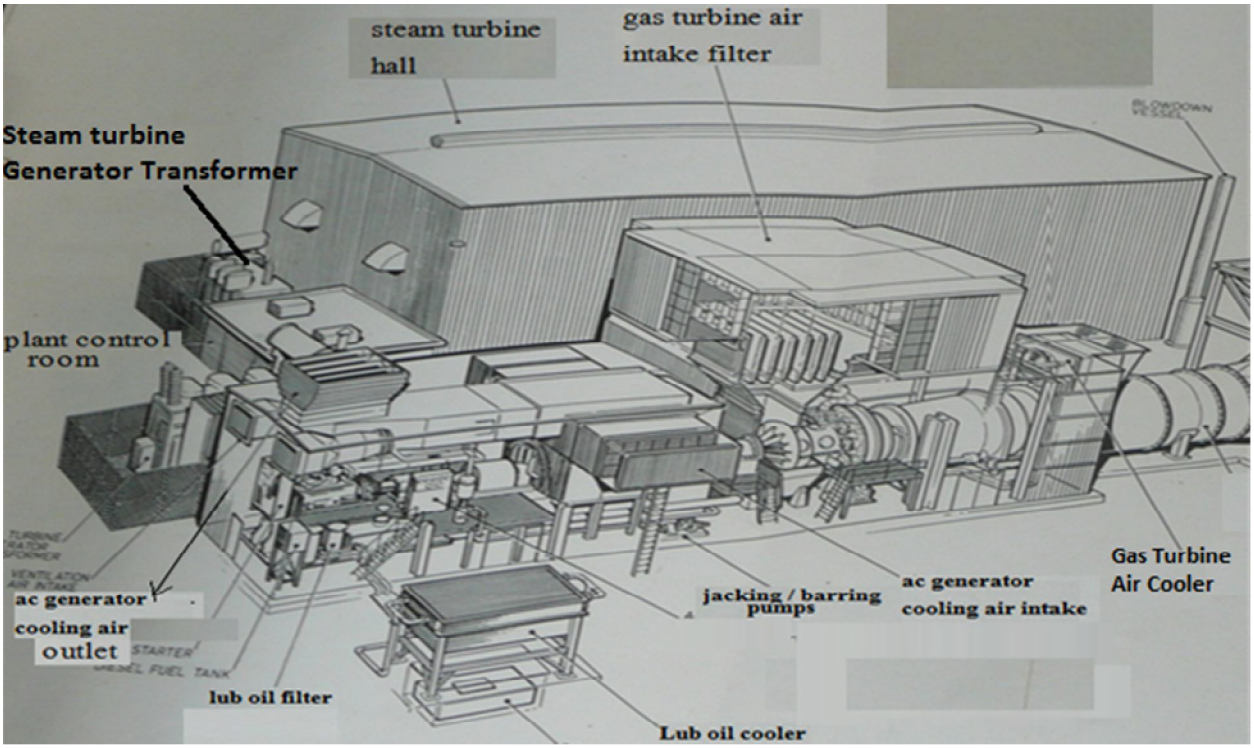

Figure 2.1: Gas Turbine Generator Section (taken from sheet).

Figure 2.1 shows the Gas Turbine Generator Section including Steam Turbine Generator Transformer, Gas Turbine Air Intake Filter, Gas Turbine Air Cooler, AC Generator Cooling Air Intake, Jacking/Barring Pumps, AC Generator Cooling Air Outlet, Lube Oil Filter, Lube Oil Cooler, Plant Control room.

2.2 Working Principle of Gas Turbine

A Gas Turbine plant consists of compressor, combustion chamber and a turbine. In a Gas Turbine plant LP, HP, Intercooler is also used. The compressor draws air from the atmosphere through the Air Intake Filter. Gas is used as fuel which is next sent to combustion chamber and burnt there. Once combustion is started it runs automatically because it is self-continued. Hot gas produced from the combustion chamber, passes through the turbine and rotates it and produces mechanical power. Through this power, compressor and other rotating part of generator are also able to rotate. The turbine, combustion chamber and compressor are connected to a shaft which also rotates and an output power is produced. Table 2.1 shows the starting procedure of Gas Turbine.

Table 2.1: Starting Procedure of Gas Turbine.

RPM of Turbine (GT-1,2)	Situation
0 rpm	Diesel start
750 rpm	Ignition inside combustion Chamber
1800 rpm	Diesel off
2300 rpm	Excitation on
3000 rpm	At no load condition

2.3 Equipment of Gas Turbine

In Gas Turbine Power Plant, we saw that several types of equipments are used, but we came to know details of some equipment that are described below:

- Air intake filter,
- Compressor,
- Combustion chamber,
- Diesel Engine,
- Gas Generator,
- Diffuser,
- Black Stack,
- Exciter,
- Gear Box.

2.3.1 Air Intake Filter

At first we saw Air intake filter which is a modern technology at APSCL. Air intake filter was used to purify the atmospheric air from the dust and all kinds of impurities in the environment. The filter is manufactured by substances named polyester and cellulose.

2.3.2 Compressor

Next we saw the device named Compressor which was used to compress air from the atmosphere through the three stage air filter. The air was then expanded by ignition of fuel to create mechanical power. The compressor we saw at APSCL is a rotator type. Rotator type blades suck air and push the air between itself and the stationery blades to raise pressure.

2.3.3 Combustion Chamber

After compressor we saw the combustion chamber which was immediately connected to compressor. The combustion chamber is also called combustor. We saw the mixture of fuel or gas coming from air flow to the combustion chamber and burnt. The heat produced from it was fed into turbine. The ratio at which air and fuel were mixed is 15:1. Figure 2.2 represents Combustion Chamber which is connected to compressor.

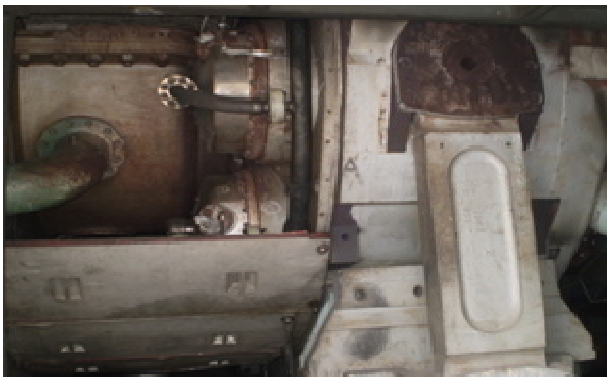

Figure 2.2: Combustion Chamber Combusted Gas and Fresh Air [11].

2.3.4 Diesel Engine

We saw the Diesel Engine in Gas Turbine Power Plant, which is very important part because Gas Turbine is not a self-started machine. Gas Turbine needs to be coupled with Diesel Engine to rotate the turbine when fuel and air are burnt in Combustion Chamber. Figure 2.3 represents Diesel Engine to rotate the turbine. Table 2.2 shows the state of the Gas Turbine with respect to the turbine speed.

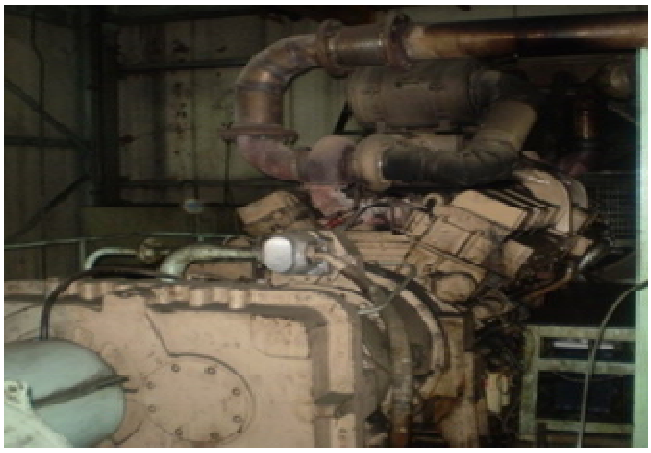

Figure 2.3: Diesel engine use in the gas turbine [11].

Table 2.2: The state of the gas turbine with respect to the turbine speed.

RPM of Turbine	Situation
0 rpm	Diesel start
750 rpm	Fire or ignition inside combustion chamber
1800 rpm	Diesel off
2300 rpm	Excitation on
3000 rpm	At no load condition

2.3.5 Gas Generator

Next we saw Gas Generator which is an electromechanical device that uses gas as fuel and convert mechanical energy into electrical energy. The generator of 3-phase had output voltage of 13.8KV. Figure 2.4 shows the 3-phase Gas Generator.

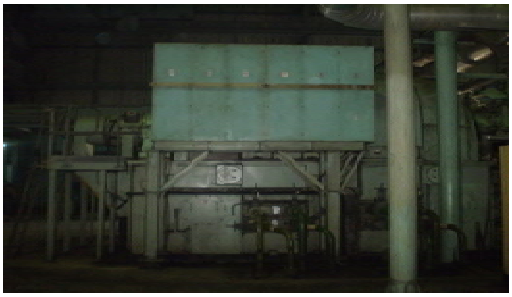

Figure 2.4: Generator to Generate Electricity by Ignited Gas [11].

2.3.6 Diffuser

Next we saw Diffuser which is a part of gas turbine plant, made of aluminum. We observed it to be used for passing the waste heat as an output from the turbine.

2.3.7 Black Stack

After diffuser Blast stack which is used to drain waste heat from the diffuser section.

2.3.8 Exciter

Then was the equipment called Exciter which is a separate source used to obtain the DC current. At APSCL we observed rotating type exciter to be used. The rotating exciters are two types: Brush and Brushless.

2.3.9 Gear Box

Next was the Gearbox which is a mechanical device used for connecting or disconnecting the diesel engine with the turbine shaft.

2.4 Systems of Gas Turbine

In Gas Turbine, for maintenance and the generation of power, we observed five major systems which are given below:

- Fuel system,
- Lube oil system,
- Cooling system,
- Turbine air intake system,
- Barring or jacking system.

2.4.1 Fuel System

Fuel system visited by us is the most important part of the system. In this system gas was used as a fuel. Before using gas into the plant it was purified into few steps. It was passed through the hot water tube in order to be free from unwanted particles and entering into the pot named knocked pot to be free from moisture. At last we saw the gas entering into the two stage filter. An equipment named fuel valve governor was used to control the gas pressure. Figure 2.5 represents Fuel System of combined cycle power plant.

Figure 2.5: Fuel system of combined cycle power plant [11].

2.4.2 Lube Oil System

We visited Lube Oil System in gas turbine power plant that delivers lube oil for keeping cooled and running smoothly for any device. The shaft of turbine was supported by four bearings which are always running into a chamber. Due to the reason there is always friction and consequently excessive heat is produced. We observed that the chamber was filed with lube oil to remove the heat, keep the bearings cool and help them to run smoothly. Figure 2.6 represents Lub Oil Cooling Plant of combined cycle power plant.

Figure 2.6: Lube Oil cooling plant [11].

2.4.3 Cooling System

After Lube Oil System we visited Cooling System whose name explains that this is used for cooling purpose. Here we saw 3 types of Cooling System: Lube Oil Cooling System, Turbine Cooling System, and Generator Cooling System.

2.4.4 Turbine Air intake System

Then we saw Turbine Air Intake System that receives air from the atmosphere and filters it. These systems actually make the air eligible for using as a raw material.

2.4.5 Jacking System

At last we saw Jacking System which is used for closing the plant. If there is an emergency to shutdown the plant immediately, the system shut off with excessive amount of heat. This process has a side effect. Due to the sudden end of shaft rotation, the shaft might bend due to overheating. In order to avoid this problem Jacking System is used to help the shaft to move slowly until it become cool.

2.5 Chimney

Chimney refers to a configuration that passes away hot waste gases or smoke from a boiler, stove, furnace or fireplace to the outside atmosphere. We saw a chimney at gas turbine power plant that vents the waste gases of the plant. The waste gases from the boiler first enter into precipitors to be separated from solid dust particles. After cooling fly ash at these precipitors, the waste gases are ventilated through the chimney to the atmosphere [2]. Figure 2.7 represents Chimney of Waste heat recovery unit.

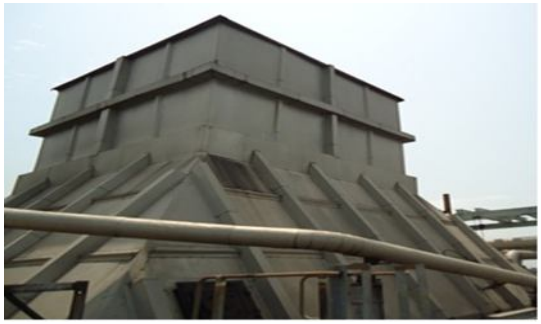

Figure 2.7: Chimney of Waste heat recovery unit in combined cycle plant [11].

2.6 Piping system

We visited Piping System at gas turbine power plant of APSCL which is an arrangement of pipes used to pass on feed water, waste water, steam, air, oil, vapor, chemical and cooling fluid, heating fluid etc from one place to another. Figure 2.8 represents a part of the piping system of combined cycle power plant.

Figure 2.8: Piping System of the combined cycle power plant [11].

2.7 Different Test and protection

types of tests are used for the protection of machines. The tests and protection systems used at the CCPP are:

- Bearing test,
- Winding temperature excessiveness test,
- Protection against vibration,
- Cooling air protection,
- Pressure level test of gas, liquid and steam,
- Meggar test.

Chapter 3: Steam Turbine Power plant

3.1 Introduction

Steam turbine power plant refers to the place where steam is first produced in an enclosed chamber and then used to rotate a turbine with an objective to perform mechanical work which is later converted to electrical energy. We spent seven days to visit steam turbine power plant at APSCL. There are six steam turbine plants. Among them units 1 and 2 have the capacity of providing 64 MW power each. These two units were commissioned in 1970. Units 3, 4 and 5 have the ability to provide 150 MW each. Steam turbine of combined cycle plant produces 34 MW of electricity. Table 3.1 shows the total steam turbine power generation.

Table 3.1: Total steam turbine power generation.

Steam Turbine unit	Plant	Installed Capacity
Unit – 1	1	64 MW
Unit – 2	1	64 MW
Unit – 3	3	150 MW
Unit – 4	3	150 MW
Unit – 5	3	150 MW
Steam turbine of Combined cycle unit	2	34 MW

3.2 Steam Supply System

During the time of visiting steam turbine power plant at first we got an overall view of the steam supply system. The raw material for steam production is water stored in a vessel. The supplied water is also known as feed water and the vessel is called storage vessel which we saw being mounted on Waste Heat Recovery Unit (WHRU). From the storage vessel the steam goes to steam drum. In steam drum the flooded steam and water is separated and passed to the superheated section of WHRU. Then steam goes to an attemporator unit which is used to control the upper limit of steam temperature to the inlet of main stream stop valve. From the attemporator the steam goes to rotate the turbine. The used steam is then passed to condenser and after cooling it becomes water again. The water then returns to the deaerator.

3.3 Components Used and Their Functions

Steam engine comprises of the following parts which are employed in combination to produce electricity with the help of steam supply. They are described in the following sections.

3.3.1 Steam Turbine

Turbine is a circular array of blades which rotates with the help of steam, wind, and gas or water flow. In APSCL, we saw steam turbines of massive size that was rotating with the flow of produced steam. The mechanical energy produced by this device was in fact contributing to the generation of electricity. Figure 3.1 represents a steam turbine at APSCL which is attached to a rotor shaft.

Figure 3.1: Steam Turbine [11].

3.3.2 Boiler/WHRU

Boiler refers to a closed chamber where water is heated at a high temperature and steam is produced with an objective to rotate the turbine. At APSCL, we saw the boilers they use are manufactured by The Babcock & Wilcox Company (B&W). We heard that boiler from this company is efficient enough to produce large quantity of steam. The boiler was divided in four sections: L.P. evaporator, Forced flow section, H.P. evaporator and super heater. In L.P. evaporator section water from deaerator is circulated in low pressure in order to raise steam for deaerating process. The feed water is pumped via the forced flow section of the boiler to the system steam drum. In H.P. evaporator section water from steam drum is circulated in high pressure to produce steam for the super heater. In super heater, the wet steam is superheated and transformed into dry steam. This part of the boiler ensured maximum dryness of steam going to turbine as wet steam which can cause damage to turbine blades. Figure 3.2 represents a boiler tower where steam is produced.

Figure 3.2: A boiler of APSCL [11].

3.3.3 Furnace

A Furnace is a source of heat situated underneath of a boiler. This is the chamber where fire is produced by burning fuel as a result of which water inside the boiler starts to boil. At APSCL, we have seen that exhaust gas from the gas engine is used for boiling water in order to produce steam. There were nine furnaces in a furnace chamber. We could see the fire inside the furnace through a hole. It was something more than we could even imagine. Our instructor told us that the temperature inside the furnace is 1200-1500°C.

3.3.4 Safety Valve

Safety valve is an important part of boiler. It is actually used to avoid damage of boiler shell from over pressure and any sort of explosion. At APSCL various safety valves were present in the boiler that only open at a particular pressure named "set pressure." If the system pressure reaches at the level of set pressure, the valve opens or leaks.

3.3.5 Condenser

Next we visited the device named condenser which is situated underneath the turbine. After used by turbine, the exhaust steam enters into condenser. It condensed the steam transforming it into water and that water was used as feed water. The exhaust steam is condensed by flowing cooled water on the steam. Figure 3.3 shows us a condenser that helps steam to release heat and change its state.

Figure 3.3: Condenser [11].

3.3.6 Lubricating Oil System

Then we visited lubricating oil system that supplies lubricating oil for different devices to run smoothly. If lubricating oil is not supplied, there would be friction from device to device resulting corrosion of device. So lubricating oil saves the device from corrosion. In APSCL, at first we saw the main lubricating oil pump driven by AC motor during normal operation. Then there was a back up lubricating oil pump driven by AC motor that supplies oil when main pump fail. Finally the system had an emergency oil pump run by DC motor that operates when both the main and back up pump fails. Figure 3.4 represents a lube oil pump that provides lube oil for different equipments.

Figure 3.4: Lube Oil pump in the generator of steam turbine [11].

3.3.7 Generator

After that we visited generator which is the most vital part of electricity generation. It generally works according to Faraday's Law. The main two parts of the generator is rotor and stator. Rotor is connected with the turbine by a shaft. So the turbine rotates allowing the rotor to spin and the mechanical energy is converted to electrical energy. The stator always remains static. At APSCL,

we observed a two pole generator running at a speed 3600 rpm and the frequency was 50 Hz. The power factor is 0.8 and the field current is 1500 A. Each generator at APSCL is capable of producing 150 MW of power. Figure 3.5 shows us a generator of APSCL along with its necessary components.

Figure 3.5: AC generator [11].

3.3.8 Deaerator

Next we visited water storage type equipment named deaerator that stores feed water for steam production. The water that comes from condenser was heated and contained air was removed from it. Deaerator was attached to a vertical deaerator head which was supplied with a mixture of steam and water. We saw the water falling to the base of the deaerator and any residual steam or air present in the deaerator was rising to the top. Then the steam was going to a vent condenser where condensed water was sprayed by a nozzle to transform the steam into water.

3.3.9 Steam Drum

We discovered a pressure vessel placed at the back of WHRU which is known as steam drum. It was receiving the feed water and delivering dry steam to the super heater section of WHRU. Steam drum is related to some equipment which is described in the following sections.

I. Cyclones

Cyclone is actually a steam/water separator. We saw 14 cyclones placed in a chamber and another 8 cyclones on the opposite side connected by intersect ducts. Cyclone does not allow water to go to super heater section. A whirlpool was produced in the mixture of steam/water as a result of which the water was separated from the steam.

II. Steam Scrubbers

Next there was a medium of wavy plates on the top of each cyclone in which further steam separation takes place. There was also a system of secondary steam scrubbers that are similar in the construction to the primary steam scrubber. They were placed in a bank at the top of the steam drum. They are used in order to ensure the maximum dryness of the steam as it passes to the super heater section.

III. Feed water Regulating Valves

The feed water was being pumped via a valve which is known as regulating valve to the steam drum and water level in the steam drum controlling the valve operation.

IV. Drum Level Rundown Valve

Then there was another valve known as drum level rundown valve that maintains the water level in a steam drum releasing excess water to blow down vessel. The valve opens automatically when water level becomes high in steam drum.

V. Continuous Blow-Down Valve

Next we came to know about continuous blow-down valve which opens in order to remove if there is mud in the water of steam drum.

3.3.10 LP Circulating Pumps

After steam drum we saw LP circulating pumps which were used to circulate feed water through the LP evaporator section of WHRU with an objective to produce steam for deaerator. It consisted of three water pumping sets that were installed closest to the WHRU. One of them was reserved for back up if one of the other two fails. There was a set of differential pressure switches across the pump inlet and outlet ports to monitor pumping operation.

3.3.11 HP Circulating Pump

Then we saw HP circulating pumps circulating feed water through the HP evaporator section of the WHRU with an objective to produce steam for the super heater. Just like the LP circulating pump this pump also consisted of three water pumping sets located near the WHRU and followed the same monitoring and back up procedure of LP circulating pumps.

3.3.12 Feed Pumps

The two feed pumps were employed to bring feed water from the deaerator and pump it via forced flow section to steam drum. One of the two pumps was chosen for back up. There were also ways for draining and releasing entrapped air from feed pumps.

3.3.13 Pump Cooling Water System

After feed pumps we observed a closed circuit system consisting of one make up tank, two water pumping sets and a plate type heat exchanger. This was actually pump cooling water system. It supplied de-mineralized cooling water for HP circulating pump and feed pump bearings and glands. The cooling water supply for heat exchanger was taken from the steam turbine secondary cooling water system.

3.3.14 Water Conditioning Equipment

There are some problems such as deposits, scale formation and corrosion that might occur in the WHRU unit, feed lines, feed heaters, economizers, super heater and prime movers. In order to avoid those problems the feed water is needed to be chemically treated. The water conditioning equipment in the plant was used for this purpose. It conditioned the water by injecting chemicals and chemical dosing of feed water before entering the system. There were three sets of chemical dosing in which each one consisted of a solution mixing tank, an electric motor driven blender and an injecting pump.

3.3.15 Steam and Water Sampling Equipment

Later we visited steam and water sampling equipment that consists of a panel and some necessary pipe works and valves mounted on that panel. For this system both steam and water coolers were provided and the cooling water for this purpose was taken from the feed pump gland cooling water system.

Figure 3.6 represents the block diagram that indicates how water is purified and used for steam turbine plant at APSCL. At first the river water (Meghna) entered into the water filter house where it was filtered in two stages. Then it goes to water treatment tank for chemical conditioning. After chemical treatment it went to desuperheater and from desuperheater it goes to feed water pump. From the feed pump it goes to boiler where it was converted into steam. This

steam then used by turbine which goes to condenser where was cooled and transformed into water again. This water then returned to feed water pump.

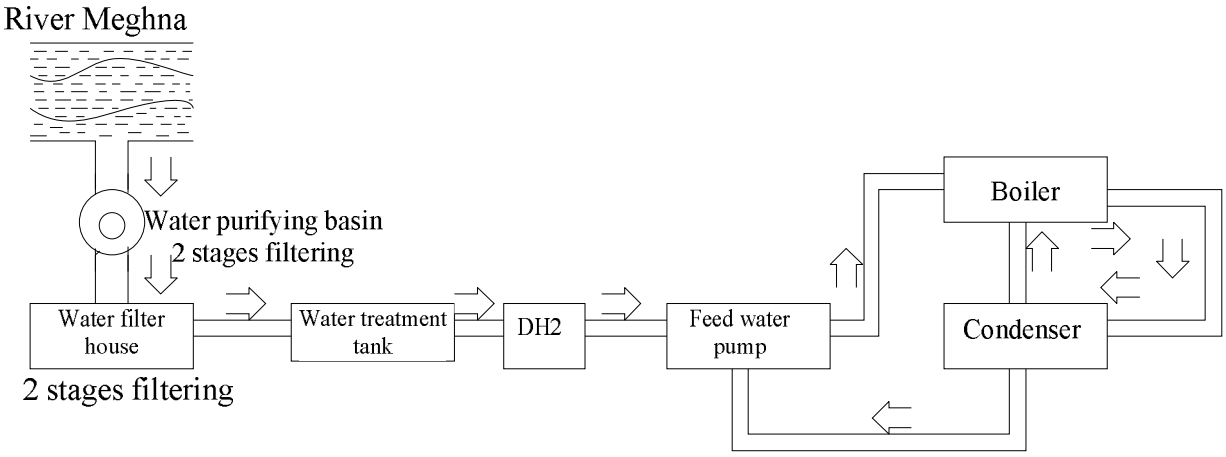

Figure 3.6: Water Purification and Using Process of APSCL (provided by sheet).

3.3.16 Steam Attemporator

After that we observed a device named attemporator that was mounted vertically in the pipe work between the super heater section of the WHRU and the main stream stop valve. An attemporator does not allow the temperature of the steam supplied to the turbine to exceed 500°C. It was doing so by spraying cooled water on the steam. The spray water got mixed with the steam and resulted temperature decrease at the outlet. Attemporator consists of a pressure vessel with a floating plug and seal assembly.

3.3.17 Blow Down Drain Vessel

Coming to an end of visiting steam turbine power plant, there was a vessel located outside the northern corner of the steam turbine hall. This is known as down drain vessel. It consisted of a vertically positioned cylindrical shape drain and vent assembly. We observed the vessel receiving the drains coming from different portions of steam turbine power plant.

Chapter 4: Substation

4.1 Introduction

On 26th of August, 2012 we visited substation of APSCL. A substation is a part of an electrical generation, transmission, and distribution system. Substations transform voltage from high to low, or low to high and perform any other important functions. According to the line to line voltage, the substation has three parts- 33 KV, 132 KV and 230 KV. Transmission line has gone from this substation to Bramhnbaria, Ghorashal, Shahjibazar, Comilla, Kishoregonj and Shirajgonj. Figure 4.1 shows a part of the Substation of APSCL.

Figure 4.1: Part of a substation of APSCL [11].

4.2 Outdoor Components of Substation in APSCL

There were different outdoor components of Substation as described in the following sections.

4.2.1 Transformer

A transformer is a device that changes AC electrical power at one voltage level to another voltage level done by the action of a magnetic field. It consists of two or more coils which are connected with a common magnetic flux present within the core. One of the transformer winding is primary winding connected to a source of AC electrical power and another is secondary winding which supplies electrical power to loads. Figure 4.2 represents a transformer located at APSCL substation [4].

Figure 4.2: Transformer [11].

4.2.2 Autotransformer

A small amount of voltage level change can be made by voltage drops that occur in power systems, but two full windings with same rated voltage is very much expensive. To avoid this problem autotransformer is used, which is an electrical transformer with only one winding. One winding can perform the job of both primary and secondary.

4.2.3 Current Transformer

Current transformer is an instrument transformer used in connection with ammeters, over current relays etc. It steps down current from high value to low value. The phase angle error of current transformer is in limit and for given range of primary current the current ratio is constant. Current transformer used in 132 KV substations at APSCL is single phase. It was made in India. Its rated frequency is 50 Hz and rated current is 1920 A. The ratio of current transformer is 800/1. Its burden is 30 VA. Figure 4.3 represents current transformer at APSCL.

Figure 4.3: Current transformer [11].

4.2.4 Potential Transformer

Potential transformer is just like current transformer which is also an instrument transformer which is commonly used for measurement and protection. It can be either single phase or three phase units and is needed for voltage, directional and distance protection. We observed P.T to have a large number of primary turns and a few number of secondary turns. The primary turns is connected to power circuit between phase and ground.

Figure 4.4: Potential transformer [11].

Figure 4.4 represents potential transformer at APSCL.

4.2.5 Bus-Bar

There were some conductors carrying heavy currents which were actually bus-bars. Its main objective is to conduct electricity. A bus bar is a bar of copper, brass or aluminum that conducts electricity within as switchboard, distribution board, substation, battery bank or other power-handling devices. Its cross-sectional size represents the highest current it can carry safely. At APSCL we saw copper material to be used for bus-bars [5]. Figure 4.5 represents system of bus-bars in APSCL.

Figure 4.5: The system of bus-bars in APSCL [11].

4.2.6 Insulator

Insulator used at APSCL is an electrical device to separate electrical conductors without carrying current through themselves. It is generally used for protection purpose. Insulation is the phenomenon of wrapping electrical cables or other equipment with an insulator. A perfect insulator does not exist, but the materials that are used as an insulator are glass, paper and Teflon. These materials are popular for their high resistivity and good insulating characteristics [6].

4.2.7 Radiator

It is actually a heat exchanger. This is used in the plant to transfer thermal energy from one medium to another. It can either be used for heating the environment or for cooling the fluid [7].

4.2.8 Circuit Breaker

A circuit breaker is an electrical switch which operates automatically. It is designed to protect an electrical circuit from damage when overload or short circuit occurs. The basic function of a circuit breaker is to detect a fault condition. When it senses any fault condition in the system, it discontinue the electrical flow by interrupting continuity.

A circuit breaker can be reset either manually or automatically and can be used many times. This is total opposite of a fuse, which must be replaced after it operates once. Circuit breakers can be classified into four types- Air circuit breaker, SF6 circuit breaker, vacuum circuit breaker and oil circuit breaker. We saw SF6 circuit breaker being widely used in APSCL [8]. Figure 4.6 represents one of the circuit breakers used in the substation.

Figure 4.6: Circuit Breaker [11].

4.2.9 Isolator:

An isolator is a part of an electrical circuit and at off load condition it electrically isolates the circuit that is connected to it. For safety and maintenance operation, high-voltage isolators are used in electrical substations such as circuit breakers, transformers and transmission lines. It is called “offload isolator” because it is open only after current has been interrupted by some other control device. The main purpose of isolator is maintenance and it is in series with CB. Figure 4.7 represents Isolator used at APSCL substation.

Figure 4.7: Isolator [11].

4.2.10 Cooling Fan

Cooling fan is used within a transformer for the purpose of forcefully cooling the air of transformer. Different numbers of fans are used for different MVA rating of transformer. Instead of starting at the same time, all fans start in pairs. Figure 4.8 represents cooling fan in transformer at APSCL.

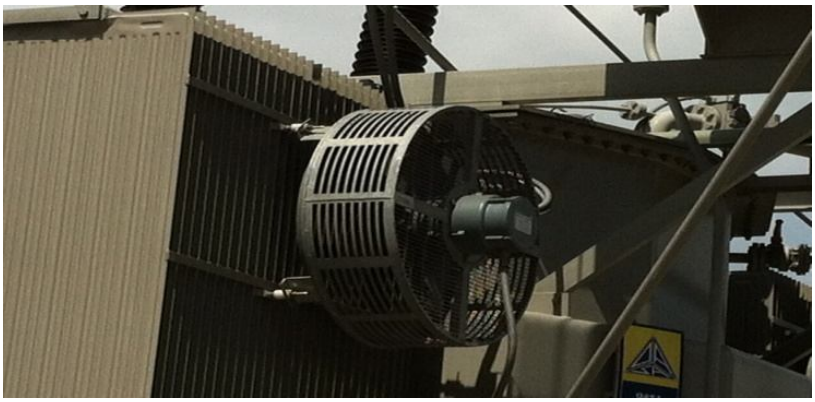

Figure 4.8: Cooling fan in transformer [11].

4.2.11 Lightening Arresters

We observed lightning arrester being connected between phases and ground in distribution system of APSCL. This was used in switchyard to protect different equipments from lightning surges and switching surges. It protects the equipment from damage by discharging the high voltage surge to ground. During discharging high voltage surge, the resistance of lightening arrester becomes low through the resister blocks in it. After the discharge is complete, the resistance becomes high and the arrester works as an open circuit.

4.2.12 Wave Trapper

Wave Trapper was used in power system for carrier communication. It traps the higher frequency above 50 Hz. We saw power plants and substations being connected by high voltage power transmission lines which transmit power typically at 50 or 60 Hz. These lines also carry communication and control signals for the operation of the grid. Wave trappers were used to separate the power and communication signals at every receiving end.

Figure 4.9: Wave trapper at APSCL [11].

Figure 4.9 represents wave trapper at APSCL.

4.2.13 Reason behind Using Stones in Switchyard

We observed that, the switchyard was covered by stones. The reasons of using stones in the switchyard are described in the following sections.

- Stone is conductive and has low resistance. When operating personnel touch electrical equipment at short circuit condition, fault current flows through the human body and the personnel might die. Stone protects this incident by reducing the step potential (the potential developed between the two feet on the ground of a man when short circuit

occurs and results flow of current in the body) and touch potential (the potential developed between the ground and the body of the equipment when a person touches the equipment during fault condition) when operators work on switch yard.

- Oil used in Power Transformers works as cooling and insulating medium. Stones are provided to protect from fire when oil spillage takes place during operation or changing the oil in the transformer.
- When grass grows, inside the switch yard it forms moisture, it causes damage to transmission lines and it also causes leakage current. Stones eliminate the growth of small plants inside the switch yard.

Figure 4.10: Cover of stones in switchyard [11].

Figure 4.10 represents cover of stones in the switchyard.

4.3 Indoor Components of Substation in APSCL

In the control room, we were introduced with indoor equipments of substation in APSCL which are used to control the current transmission and distribution and protect the components of switchyard. They are described in next sections.

4.3.1 Feeder

We saw substation having both incoming and outgoing feeder and had multiple reading meters to collect data and transfer it to control server. At APSCL, there were three types of feeder used for power transmitting and receiving purpose:

- 230 KV incoming and outgoing feeder
- 132 KV outgoing feeder
- A 6.6 KV incoming bus present at APSCL for internal back-up system.

4.3.2 Line Feeder

Electricity was fed from the unit to the grid through line feeder.

4.3.3 Differential Relay

The differential relay compares the current between the primary and the secondary side of a transformer. When there is a difference in the primary and the secondary side, it means there is a fault in the zone of protection. These devices are typically used to protect windings in generators or transformers.

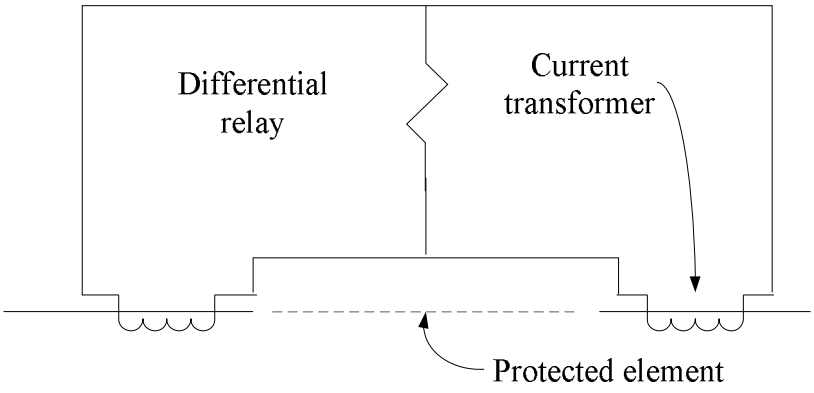

Figure 4.11: A simple differential-relay application.

Figure 4.11 represents a simple differential-relay application.

4.3.4 Distance Protection Relay

Distance relays are used for phase faults. It works by double action, which means one coil is energized by voltage and the other coil is energized by current. When fault occurs on a transmission line, the fault current increases and the voltage reduces. These relays respond to the distance between the relay location and the fault location, assuming constant impedance.

4.3.5 Over current Relay

Over current Relay is used for primary ground-fault protection on most transmission lines. It is connected to a current transformer and adjusts to operate at a specific current level. The relays do not need AC voltage source for operation.

4.3.6 Buchholz Relay

Buchholz Relay is a gas actuated relay. It will alarm on slow increase of gas and it will shut down the transformer if gas is produced rapidly in the transformer oil.

4.3.7 Reclosing Relay

Reclosing Relay is used for reclosing a circuit breaker. It automatically resets itself when the breaker remains closed for a predetermined adjustable time interval.

4.3.8 Bus Coupler

Bus Coupler is a device which is used to change from one bus to other without creating any disturbance in power supply and dangerous arcs. Changing can be done either in auto or manual mode [9].

4.3.9 Disturbance Recorder

Disturbance Recorder detects whether there is any disturbance or not in the electrical power systems. It is usually used for verifying the proper operation of protection relays and circuit breakers.

4.3.10 Optical Fiber

Optical Fiber is a flexible, transparent fiber made of glass or plastic which is slightly thicker than a human hair. It works as a waveguide to transmit light between the two ends of the fiber. In APSCL, they were trying to connect intelligent electronic devices by optical fiber [10].

Chapter 5: Problems and Recommendations

5.1 Problems

- Sometimes they did not approve us to take pictures inside the power plants.
- They did not allow us to touch any equipment as a simple mistake of us could shut down the whole machine.
- Some places inside the plant were slippery due to lube oil leaked from lube oil pump.

5.2 Recommendations

- Our internship was programmed only for 15 days which is too short to gain overall knowledge of large power plant like APSCL. It would be better if the internship was programmed for maximum three months, minimum one month.
- Everyone should complete major courses of Power Engineering such as Synchronous Machines & Power System Fundamentals, Power Station, Switchgear and Protective Relays, Renewable Energy, Power Electronics before taking internship course. This would help to learn something practically applying the theoretical knowledge.

5.3 Conclusion

APSCL is a combination of steam, gas and combined cycle power plants. The reason behind choosing the location of APSCL on the river bank is to get unlimited supply of water for steam turbine power plant and the natural gas supplied by nearby Titas Gas Transmission and Distribution Company Ltd. for gas turbine power plant. At earlier periods they used oil as resource for generating electricity. That is why we saw two giant sized oil tank there. APSCL being the second largest power plant has been fulfilling a large portion of demand for electricity in Bangladesh. We consider ourselves fortunate to get an opportunity to do our internship here. It has enriched our practical knowledge in Electrical power sector. We are so much grateful to the authority for allowing us to do internship here and the instructors who gave their valuable time to teach us. The amazing environment and the natural beauty of the neat and clean APSCL added a different stroke in our experience. We spent some remarkable days of learning, experiencing different engineering processes and technologies. We need to increase our practical knowledge for future job placements and our internship helped us a lot to increase that. We hereby wish

good luck to APSCL to continue good contribution in solving the load shedding problem of Bangladesh.

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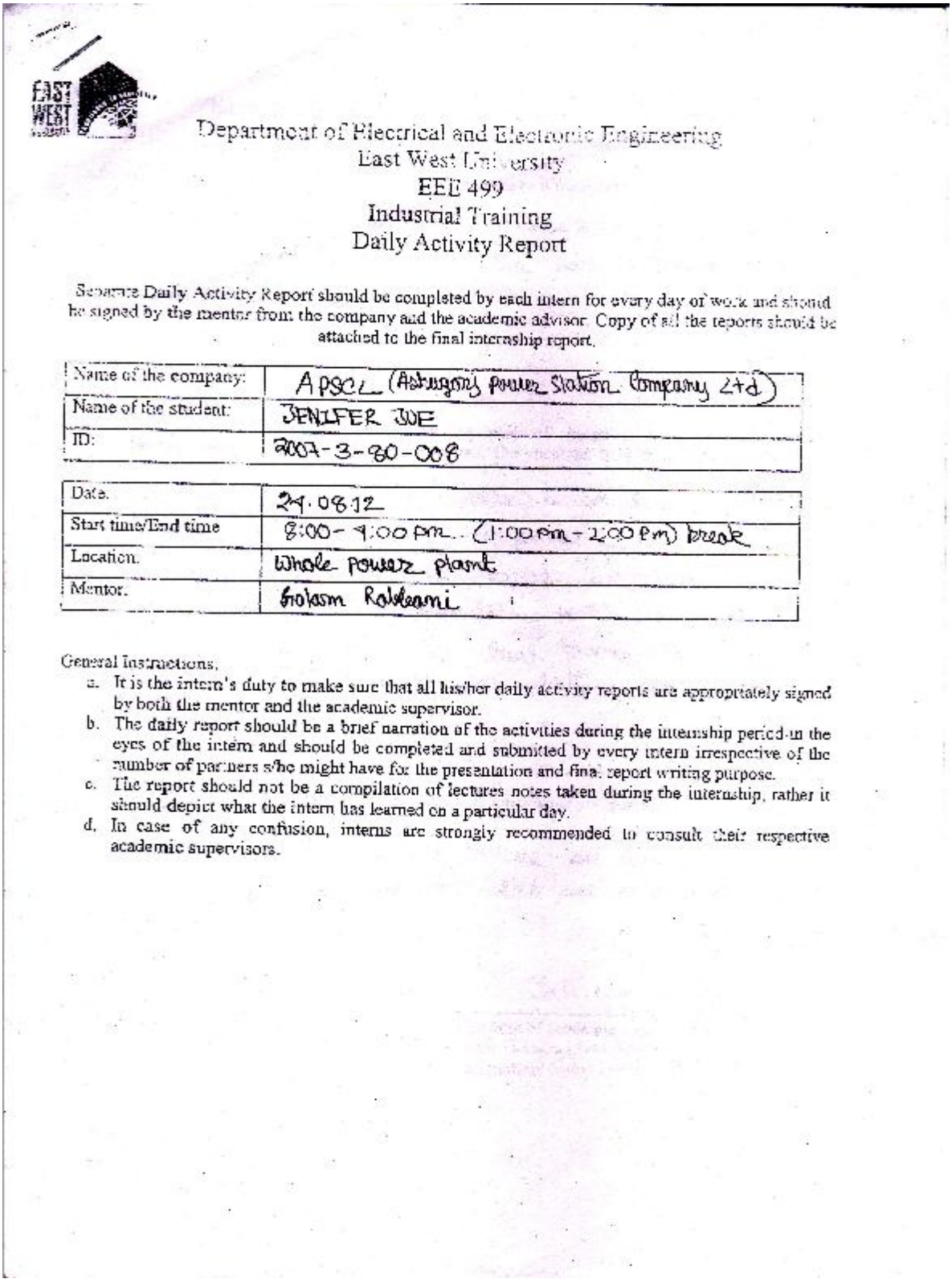
[8] “Circuit Breaker”, Wikipedia [Online]. http://en.wikipedia.org/wiki/Circuit_breaker. 7 Dec, 2012 [8 Dec, 2012].

[9] “Bus- Coupler”, Answer [online]. http://wiki.answers.com/Q/What_is_bus_coupler.

[10] “Optical Fiber”, Wikipedia [Online]. http://en.wikipedia.org/wiki/Optical_fiber. 10 Dec, 2012 [10 Dec, 2012].

[11] Photos taken by the authors at APSCL.

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:	APSCL (Ashuganj Power Station Company Ltd)
Name of the student:	JENIFER JOE
ID:	2007-3-80-008

Date.	24.08.12
Start time/End time	8:00 - 9:00 pm.. (1:00 pm - 2:00 pm) break
Location.	Whole power plant
Mentor.	Golam Rabbani

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's activities was to introduce ourselves with 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.

The equipments we visited were diesel generator, auxiliary gear box, exciter, generator, compressor, turbine, exhaust gases, motor cooling system, motor bearing, anemometer, micro ohm meter, 5 KV insulating tester, current injector tester, pressure transmitter, level transmitter, pressure switch. We learned that how electricity is produced in gas engine.

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

In our respective academic course we learned about generator operating principle which we could practically see here.

2418112

Signature of the mentor with date
Name:
Designation:
Contact Phone #:

Engr. Golam Rabbani
Assistant Engineer
Combined Cycle Power Plant
APSCL, Ashuganj
B-Baria

Yahreen Kamal
18.09.2012

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

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 (Ashuganj Power Station Company Ltd.)
Name of the student:	JENIFER JOE
ID:	2007-3-80-008

Date:	25.06.12
Start time/End time	8:00 am - 9:00 Pm break (1:00 Pm - 2.00 Pm)
Location:	Gas Engine
Mentor:	Golam Rabbani

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.

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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)

i) The objective of the day's activities was learning the gas engine operation.

ii) The equipment used in it.

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 we visited were turbocharger, turbine, 3 types of valve, generator driving sensor, load controller, turbocharger is actually the combination of compressor and turbine. We learned about individual operation of these equipment and got an overall knowledge of operating principle of gas engine.

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

In our respective academic course we learned that a prime-mover use to drive the ~~generator~~ generator's rotor. This prime mover is actually the gas engine, where gas is heated. Then heat energy is converted to mechanical energy and mechanical energy is converted to electrical energy. We read this in book and practically also none.

25/8/12

Signature of the mentor with date
Name:
Designation:
Contact Phone #:

Engr. Golam Rabbani
Assistant Engineer
Combined Cycle Power Plant
EPSCL, Ashuganj
8 Bays

Tahseen Kamal
19.09.2012

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

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 (Ashuganj Power Station Company Ltd.)
Name of the student:	JENIFER JOE
ID:	2007-3-80-008

Date:	26/06/12
Start time/End time	8:00 am – 4:00 pm break (1:00 pm – 2:00 pm)
Location:	Sub-Station
Mentor:	Golam Rabbani

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)

The objective of the day's activities were learning about substation and its protection.

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 substation is devided into 3parts. These 3 parts are for 33KV, 132KV & 230KV. Each of these parts has the equipments like step down transformer, SF6 circuit breaker, isolater, potential transaformer, current transformer, bus, radiator, cooling fan, lightening arrestor, ceramic plate, wave trapper, auto-transformer. In control room we visited transformer protection, feeder, line feeder, auxillary transformer, energy measuring panel, signaling pannel, bus coupler, <V control panel, line panel, telecommunication panel, differential relay, Buchholz relay, micrometal based relay, distance protection relay, bus bar differential relay, overcurrent relay, restricted relay. IN55 bus bar PNL.

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

In our respective academic course we learned about transformer, Potential transformer, current transformer, busbar etc. what is the definition of this equipments, their operation, application and their protection which we could practically see here.

26/8/12
Signature of the mentor with date
Name:
Designation:
Contact Phone #:

Engr. Golam Rabbani
Assistant Engineer
Combined Cycle Power Plant
APSCL, Ashuganj
S-Baria

Tahseen Kamal
18.09.2012
Signature of academic supervisor with date
Name: Tahseen Kamal
Designation: Senior Lecturer

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 (Ashuganj power Station Company Ltd.)
Name of the student:	JENIFER JUE
ID:	2007-3-80-008

Date.	27.08.12
Start time/End time	8 00am - 4:00Pm break (1:00Pm - 2:00Pm)
Location:	GT-1 & GT-2
Mentor:	Golam Rabbani

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)

- Starting mechanism of generator
- Load effect on generator
- Steps of DC motor check

Our object was to learn about these mechanism

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 equipment used are diesel starter, torque converter, gear box, auxiliary gear box, exciter, end shield bearing, alternator, turbine, control oil pump, main lube oil filter, generator, jacking oil pump, barring oil pump, hydraulic barring gear, emergency ~~lube~~ lube oil pump, engine governing pump, standby lube oil pump, air cooler, oil cooler, drame tank we learned individual function of this equipments and get the overload knowledge of generator operation

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

In our respective academic course we read about generator operating principle which we could practically observe here. The effect of load on generator, torque current rotation speed current rotation, generator's synchronization.

27/8/12

Signature of the mentor with date
Name:
Designation:
Contact Phone #:

Engr. Golam Rabbani
Electrical Engineer
Combined Cycle Power Plant
BPDB, Ashugang
Sylhet

Tahseen Kamal
19.09.2012

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

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:	JENIFER JUE
ID:	2007-3-80-008

Date:	28.08.12
Start time/End time	8:00 am - 4:00 Pm break (1:00 Pm - 2:00 Pm)
Location:	GT-1 & GT 2
Mentor:	Golam Rabbani

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.
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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)

The objective of the day's activities was gaining knowledge about
* fuel cycle
* water cycle
* cooling system
in gas engine.

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 was visited were water pressure vessel, alternator, engine, crank case ventilation filter, lub oil pump, gas control valve, linear control panel, exhaust outlet, 3 way control valve, cooling water pump, compressure, turbine, turbo-charge, safety valve for water, cylinder, lub oil filler, jacket water pump motor air & gas inlet, intercooler, sensor, scavenging fan, alternator terminal box, ventilation fan inlet, water tank, battery for starting motor.
There are 16 gas engine which are divided into two group each one with 8 engine and every engine has 20 cylinder. In switch gear there are transformer protection, transformer control and energy measuring panel.

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

In our respective academic courses we learned about fuel cycle where mixture of gas and air is burned and heated. In water cycle mixture is cooled in 2 stage by rejecting heat and coolent which is actually water gains heat from mixture. We could practically see here all of the phenomena.

23/8/12

Signature of the mentor with date
Name:
Designation:
Contact Phone #:

Engr. Golam Rabbani
Assistant Engineer
Combined Cycle Power Plant
APSCL, Ashuganj
S-Baria

Tahseen Kamal
18.09.2012

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

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 (Ashuganj Power Station Company Ltd)
Name of the student:	JENNIFER JOE
ID:	2007-3-80-008

Date:	29.08.12
Start time/End time	8.00 am - 4:00 Pm (break (1:00 pm - 2:00 Pm).
Location:	Steam turbine (ST)
Mentor:	Golam Kahkaasi

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's activities was to learn as well as introduced about steam turbine.

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.

Steam turbine (ST-1) consists of following sections :-

1) Condenser
2) Pump value
3) Turbine
4) Vacuum pump
5) condensate extraction pump
6) Deaerator
7) Deartor Storage vessel
8) Make up tank
9) LP evaporator
10) HP evaporator
11) Forced flow section
12) Super heater
13) steam drum
14) Fad pump
15) HP circulating pump

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

We ~~read~~ read about this in renewable energy course.

29/8/12

Signature of the mentor with date
Name:
Designation:
Contact Phone #:

Engr. Golam Rabbani
Assistant Engineer
Combined Cycle Power Plant
APSCL, Ashuganj
S-Barla

Yahseen Kamal
18.09.2012

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

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 (Ashuganj Power Station Company Ltd)
Name of the student:	JENIFER JUE
ID:	2009-3-80-008

Date:	30.08.12
Start time/End time	8.00am - 4.00 Pm break (1:00 Pm - 2:00 Pm)
Location:	GT-1 & GT-2
Mentor:	Golam Rabbani

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's activities was to introduce and learn about the main system of gas turbine.

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 main system of gas turbine includes

1) Starting system
2) fuel system
3) Exhaust system
4) Air inlet system
5) Lube oil system
6) Cooling system
7) auxiliary power system
8) control protection
9) Valves.

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

We read about this in renewable energy course.

30/8/12

Signature of the mentor with date
Name:
Designation:
Contact Phone #:

Engr. Golam Rabbani
Assistant Engineer
Combined Cycle Power Plant
APSCL, Ashugang
E-Barisa

Tahseen Kamal
18.09.2012

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

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:	ASPCL
Name of the student:	JENIFER JUE
ID:	2007-3-80-006

Date:	31.08.12
Start time/End time	8:00 am - 4:00 pm break (1:00pm - 2:00pm)
Location:	ccpp (Combined Cycle Power Plant)
Mentor:	Golam Rabbani

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's activities was to learn about process flow diagram in gas engine and steam engine

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 equipment visited were diesel engine, torque convertor, synchronous self shifting clutch, exciter, alternator, filter house, compressor, combustion chamber, gas turbine, exhaust gas outlet, steam drum bubble, LP evaporator, forced flow section HP evaporator, super heater, feed pump deaerator storage, vessel, desperheater, main steam stop valve, dump valve A, dump valve B, steam turbine, vacuum pump condenser, water spray. Each of these element has specific function. By knowing these functions we get the overall knowledge of process flow diagram. We also visited the control Unit of GT 1, GT 2, ST 1.

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

In our respective academic course we learned how gas turbine, steam turbine, exciter, alternator, compressor, torque convertor is used in electricity generation which we practically observe here.

31/8/12

Signature of the mentor with date
Name:
Designation:
Contact Phone #:

Engr. Golam Rabbani
Assistant Engineer
Combined Cycle Power Plant
APSCL, Ashuganj
S-Baria.

Tahseen Kamal
18.09.2012

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

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:	~~ASPEC~~ APSCL
Name of the student:	JENIFER JUE
ID:	2009-3-80-008

Date:	1.09.12
Start time/End time	8:00 am – 4:00 Pm break (1:00 Pm - 2:00 Pm)
Location:	Steam Turbine
Mentor:	Golam Rabbani

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)

i) The objective of the day's activities was to learn about starting procedure of steam turbine → cold start, warm & hot start.
ii) misalignment problem in turbine
iii) Bode plot.

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 equipment visited were isolating valve, actuator, turndown push button, run down valve, main isolator valve, drain valve, deaerator, condensor, dump valve, main secondary cooling pump, governor, pressure relief valve, dampe, nozzle valve / governor valve, CIES valve, sliding pressure controller, glane steam pressure controller, instrument air supply, air amplifying unit, glane steam reservoir, vacuum pump, CW pump, water tube pipe we gained knowledge about individual functions of these equipments.

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

In our respective academic course we learned about how steam turbine is utilized for electricity generation.

11/9/12

Signature of the mentor with date
Name:
Designation:
Contact Phone #:

Engr. Golam Rabbani
Assistant Engineer
Combined Cycle Power Plant
APSCL, Ashuganj
S-Baria

Yasmeen Kamal
18.09.2012

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

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

Seperate 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 (Ashugonj Power Station Company Ltd.)
Name of the student:	JENIFER JOE
ID:	2007-3-80-008

Date:	2-09-12
Start time/End time	8:00 am - 9:00 Pm blank (1:00 Pm - 2:00 Pm)
Location:	Unit-5, Generator
Mentor:	Golam Rabbani

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's activities was to visit the control room and site of unit 5, learn learn the arrangement and working activities of boiler.

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 total 5 boilers. These boiler produce the steam condensed to run the turbine — The main equipments of boiler are, i) Water filter house, ii) water treatment tank iii) Furnance iv) De-hydrogination v) water-tube vi) safety tank vii) economiser viii) Condenser ix) Burner Unit 5 operated by computer. It is pos operated linux based operating system.

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

we also read about this switch gear course

2/9/12

Signature of the mentor with date
Name:
Designation:
Contact Phone #:

Engr. Golam Rabbani
Assistant Engineer
Combined Cycle Power Plant
APSCL, Ashuganj
B-Baria

Tahseen Kamal
18.09.2012

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

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 Ltd (APSCL)
Name of the student:	JENIFER SUE
ID:	2007-3-80-008

Date:	3.09.12
Start time/End time	8:00am - 4:00pm break (1:00pm - 2:00pm)
Location:	CCPP (Combined Cycle Power Plant)
Mentor:	Golam Rabbani

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's activities was to gain knowledge about
i) Maintenance procedur → rotor maintenance, Starter maintenance, exciter and maintence
ii) Insulation resistance. iii) air gap measurement
iv) PI test (Polarization Index test) vi) megger testing
v) instrument washing and dry procedure

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 visited were kenameer combustion chamber, burner, transducer, megger, P.T, C.T, Buccolz relay, water tank, fire fighting pump, regulating pump, non return valve, adjusting screw, pressure transmitter, pressure indicator, vibration p/b, knock out bt, main gas filter, shut off valve, solenoid valve, oil pressure accumulator, governement valve, control oil filter, vent valve, automatic voltage regulator. The activities was to know about different form maintenance procedure of different equipment which is needed to run engine smothly.

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

we learned about different maintenance procedure in boiler, reactor in our academic course named switch gear.

31/9/12

Signature of the mentor with date
Name:
Designation:
Contact Phone #:

Engr. Golam Rabbani
Assistant Engineer
Combined Cycle Power Plant
APSCL, Ashuganj
B-Baria

Yasmeen Kamal
13.09.2012

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

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 Ltd. (APSCL)
Name of the student:	JENIFER JOE
ID:	2007-3-80-008

Date:	9.09.12
Start time/End time	8:00 am - 9:00 PM break (1:00 PM - 2:00 PM)
Location:	CCPP (Combined Cycle Power Plant)
Mentor:	Golam Rabbani

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's activities was gaining knowledge about
i) starting procedure of gas turbine, feed pump motor
ii) protection circuit of motor
iii) Single line power diagram of CCPP.
iv) Alignment method in motor & pump.

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 visited were auxiliary pump, line isolator, vacuum breaker, control fuse, earth leakage relay, overload relay, flame cooling water pump, pressure switch, main feed pump motor, standby feed pump motor, latching relay, CVP relay, magnetic conductor, trunk limit switch, economy heater, main condensate extraction pump, standby condensate extraction pump, main spray water pump, standby spray water pump, main vacuum pump, standby vacuum pump, main hotwell pump, supervision relay coil, solenoid valve we learned how to calculate the acceptable range of fuse rating

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

We gained theoretical knowledge about gas turbine on power renewable energy source course, Starting procedure of motor & protection circuit of motor on Electric Machinery Fundamentals

4/9/12

Signature of the mentor with date
Name:
Designation:
Contact Phone #:

Engr. Golam Rabbani
Assistant Engineer
Combined Cycle Power Plant
APSCL, Ashuganj
Brahmanbaria

Tahseen Kamal
18.09.2012

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

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 (Ashuganj Power Station Company Ltd)
Name of the student:	JENIFER JUE
ID:	2007-3-80-005

Date:	5.09.12
Start time/End time	8:00 am – 4:00 pm break (1:00 Pm - 2:00 Pm)
Location:	CCPPC Combined Cycle Power Plant
Mentor:	Golam Rahmani

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 ~~daily~~ objective of the day's activities are
i. to introduce with the procurement method & types of procurement
ii. Motor side problem such as loose bearing, not receiving required current, error in speed, misalignment in motor.

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.

Procurement: The purchase or hiring of goods and the execution of works and performance of services by any contractual means.
Procurement methods: OTM (Open Tendering method), LTM (Limited tendering method), DPM (Direct procurement method)

The equipments visited were microprocessor based relay, DCS module, provisional jumper, auxiliary contact, closing relay, vacuum motor, gearbox, tachometer, shim, reflector

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

We gained theoretical knowledge about motor problem in electric machinery fundamentals course (EEE 304)

5/9/12

Signature of the mentor with date
Name:
Designation:
Contact Phone #:

Engr. Golam Rabbani
Assistant Engineer
Combined Cycle Power Plant
APSCL, Ashuganj
Brahmanbaria.

Tabseen Kamal
8/5/2012

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

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 Ltd (APSCL)
Name of the student:	JENIFER JOE
ID:	2007-3-80-008

Date:	6.09.12
Start time/End time	8:00 am - 4:00 Pm (1:00 Pm - 2:00 Pm) break
Location:	CCPP (Combined Cycle Power Plant)
Mentor:	Golam Kahkasni

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's activities
(i) transformer cooling
(ii) pressure and sflow measurement
(iii) different method of circuit breaker operating
(iv) General arrangement of drawing unit
(v) Crane 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 equipment used were sensing relay, control relay, power relay, oil pump motor, oil reservoir tank, SF6 gas, pressure gauge, adjustable screw, oil & water trap, drain valve, dehydrator, compressor valve, relief valve, regulating valve, accumulator, demand valve, direct feed valve, crane motor – vertical & horizontal, bridge rectifier module, interlocking relay, alarm trip, safety valve, gauge meter, dead oil tester, Bourdon tube gauge, bellows gauge, running dial indicator, diaphrame gauge, slow rate and flow measuring instrument, mass flow measurement instrument, turbo meter, float device multiple core gauge glass, rotameter, thermocouple, temperature gauge, bypass valve, resistive & electronic transmeter.

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

We gain ~~about this in~~ theoretical knowledge in 304 course

19/12

Signature of the mentor with date
Name:
Designation:
Contact Phone #:

Engr. Golam Rabbani
Assistant Engineer
Combined Cycle Power Plant
APSCL, Ashuganj
B-Baria

Tahseen Kamal
18.09.2012

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

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 (Ashuganj power station company Ltd)
Name of the student:	JENIFER JUE
ID:	2007-3-80-008

Date:	7.09.12
Start time/End time	8:00 am - 4:00 Pm break (1:00 Pm - 2:00 Pm)
Location:	CCPP (Combined Cycle Power Plant)
Mentor:	Golam Rabbani

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)

1. Introduction to the control system of Gas engine was the objective of the today's activities.
2. The block diagram how they operate control system.

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 equipment used in block diagram are state of plant, Master control logic reset, trip system healthy, Governor in Auto, AC to DC AVR BOARD healthy, Control indicator, Auto start in progress, UCP duty selector switch, AC motor on, control remote, combustion chamber, multi-point recorder switch, Lub oil trip, EMERGO LUB OIL RAIL, jacking oil, purge timer, PRE-LUB timer, diesel engine, self-running speed timer, AVS (Air valve solenoid), FS (Fuel valve solenoid), turbine speed, fuel throttle valve, Ignitors on, compressor blow off, torch check, CDP control, Governor control CB (circuit breaker), turbine running, ignitor gas solenoid valve, peak load, base load, limit load, damper open / close, start-ment recorder.

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

we read and gain knowledge ~~in switch gear course~~ about gas engine in renewable energy course.

7-19-12

Signature of the mentor with date
Name:
Designation:
Contact Phone #:

Tahseen Kamal 8-Oct-2012

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