

Internship Report
On
Dhaka Power Distribution Company Limited(DPDC)

Submitted By

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Supervised by

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DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING
FACULTY OF ENGINEERING
DAFFODIL INTERNATIONAL UNIVERSITY

APPROVAL LETTER



A Distinguished LANDMARK in Higher Education

Faculty of Engineering

Fax: +88-02-9131947, Email: info@daffodilvarsity.edu.bd

May 24, 2021

To
The Managing Director,
Dhaka Power Distribution Company Limited,
Biddut Bhaban,
Abdul Gani Road, Dhaka-1000.

চাকরিতে নিয়োগের ক্ষেত্রে চাকরিতে নিয়োগের ক্ষেত্রে		স্বাক্ষর তারিখ: 24/5/21
☒ ED (Ad. & HR) ☐ ED (T) Eng. ☐ ED (T) Opa ☐ ED (Fin) ☐ ED (ICT & Pro.)	☐ Comp. Sec. ☐ GM (HR) ☐ GM (ICT, E. & M.) ☐ GM (Audit) ☐ GM (Fin) ☐ CCO to MD	☐ CE (Dev.) ☐ CE (P&D) ☐ CE (Grid) ☐ CE (F&S) ☐ CE (SCADA) ☐ CE (N/S/C)
		☒ PD (G2B) ☒ GM (E&T) ☒ SE (Training) ☐ PD-1 ☐ PD-2

Subject: Application for Industrial Attachment.

Dear sir,

Please note that the following final year students of Electrical & Electronic Engineering department of Daffodil International University are willing to perform industrial training at your organization (Dhaka Power Distribution Company Limited). The duration of the training may vary in between 6 (Six) to 12 (Twelve) Weeks.

Therefore, you are requested to permit the students to avail the opportunity on several convenient dates.

Details of the students are as follows:

Name	ID	Email	Cell No
Md. Abu Talha	182-33-4657	talha33-4657@diu.edu.bd	01996514148
Md. Bakaul Azam	182-33-4653	bakaul33-4653@diu.edu.bd	01752289513
Md. Shobuj Ahmmed	182-33-4660	shobuj33-4660@diu.edu.bd	01936326017
Md. Shaiful Islam Shamim	182-33-4679	shaiful33-4679@diu.edu.bd	01963108040
Md. Fajle Rabbi	182-33-4646	fajle33-4646@diu.edu.bd	01754487072
Md. Jahid Hasan	182-33-4641	jahid33-4641@diu.edu.bd	01688917735
MD.Jamir Hossain	182-33-4680	jamir33-4680@diu.edu.bd	01686848408

Sincerely,

24/5/21

Md. Dara Abdus Satter
Associate Professor & Associate Head
Department of EEE, Faculty of Engineering
Daffodil International University
Phone: 01716795779
Email: abdussatter@daffodilvarsity.edu.bd



XEN/Manager (HR), T&D/SAE-3

মোঃ শফিকুল আলম
উপাধ্যায়ক প্রকৌশলী
প্রশিক্ষণ ও উন্নয়ন, ডিপিডিসি

SAE-3
শেখ সৈয়দুল রহমান
নির্বাহী প্রকৌশলী
প্রশিক্ষণ ও উন্নয়ন, ডিপিডিসি

APPOINTMENT LETTER



ঢাকা পাওয়ার ডিস্ট্রিবিউশন কোম্পানী লিমিটেড
DHAKA POWER DISTRIBUTION COMPANY LIMITED
 (An Enterprise of the Government of the People's Republic of Bangladesh)
 website: www.dpdc.org.bd

Office of the
 Superintending Engineer
 Training & Development
 Training Bhaban, 6th Floor
 3, Sonargaon Road, Katabon, Dhaka
 Phone 9670731 Fax-8616738
 E-mail: setd@dpdc.org.bd

Memo no: 87.410.450.06.00.079.2019.৯৪২

Date: 14/09/2021

Associate Head
 Department of EEE
 Faculty of Engineering
 Daffodil International University
 Dhaka.

Subject: Approval of Attachment Training for 08 (Eight) Students of Daffodil International University.

Based on your letter on 01/04/2021 and 24/05/2021, we are pleased to inform you that following students have been granted permission for attachment training at DPDC. They can participate the training from 20/09/2021 to 18/11/2021 as per the schedule attached herewith.

Sl. No.	Student Name	Technology	Student ID	Mobile No.	Institute
01	Abu Talha	EEE	182-33-4657	01996514148	Daffodil International University (DIU)
02	Bakaul Azam	EEE	182-33-4653	01752289513	
03	Shobuj Ahmmed	EEE	182-33-4660	01936326017	
04	Shaiful Islam Shamim	EEE	182-33-4679	01963108040	
05	Fajle Rabbi	EEE	182-33-4646	01754487072	
06	Jahid Hasan	EEE	182-33-4641	01688917735	
07	Jamir Hossain	EEE	182-33-4680	01686848408	
08	Md. Mahamudul Hasan Pranto	EEE	182-33-4624	01687868649	

The trainees are obliged to bear their identity card with them during training hour and are advised to make their food and accommodation arrangement at their own discretion.

This letter has been issued with the approval of the concerned authority.

Sincerely,


 (Md Mohiul Alam)
 Superintending Engineer
 Training & Development, DPDC.

Copy to (not as per seniority):

1. Executive Director (Admin & HR), DPDC
2. Chief Engineer/ GM/ CS....., DPDC
3. Superintending Engineer/ DGM....., DPDC
4. Chief Co-ordination Officer to Managing Director, DPDC
5. Executive Engineer/ Manager (HR), this office
6. AKM Badrul Alam, Assistant Engineer, this office (will work as Course Co-ordinator)
7. Alavi Afrida Labonno, SAE, this office (will work as Assistant Course Co-ordinator)
8. Office Copy/ Master File

CERTIFICATION



ঢাকা পাওয়ার ডিস্ট্রিবিউশন কোম্পানী লিঃ
DHAKA POWER DISTRIBUTION COMPANY LTD (DPDC)
(An Enterprise of the Government of the People's Republic of Bangladesh)
Website: www.dpd.org.bd

Office of the
Superintending Engineer
Training & Development
Training Bhaban, 6th Floor
Katabon, Dhaka-1000
Phone: 9670731, Fax: 8616738
e-mail: setd@dpdc.org.bd

স্মারক নং: ৮৭.৪১০.৪৫০.০৬.০০.০৭৯.২০২১.৪৬২

তারিখ: ০৩/০১/২০২২ খ্রি.

Associate Head
Department of EEE
Faculty of Engineering
Daffodil International University
Dhaka.

বিষয়: ড্যাফোডিল ইন্টারন্যাশনাল ইউনিভার্সিটি এর ০৬ জন শিক্ষার্থী ডিপিডিসিতে এটাচমেন্ট ট্রেনিং এ অংশগ্রহণ প্রসঙ্গে।

Memo No: 87.410.450.06.00.079.2019.142, Date: 14/09/2021

বর্ণিত বিষয়ে জানানো যাচ্ছে যে, Daffodil International University (DIU)-এর EEE ডিপার্টমেন্ট এর নিম্নবর্ণিত ০৬ জন শিক্ষার্থী ডিপিডিসিতে গত ২০/০৯/২০২১খ্রি. হতে ০৩/০১/২০২২খ্রি. পর্যন্ত এটাচমেন্ট ট্রেনিং এ অংশগ্রহণ করেন।

Sl. No.	Student Name	Technology	Student ID	Mobile No.	Institute
01	Md. Abu Talha	EEE	182-33-4657	01996514148	Daffodil International University (DIU)
02	Md. Bakaul Azam	EEE	182-33-4653	01752289513	
03	Md. Shobuj Ahmmed	EEE	182-33-4660	01936326017	
04	Md. Shaiful Islam Shamim	EEE	182-33-4679	01963108040	
05	Md. Fajle Rabbi	EEE	182-33-4646	01754487072	
06	Md. Jamir Hossain	EEE	182-33-4680	01686848408	

এটাচমেন্ট ট্রেনিং এ নিম্নলিখিত বিষয়ে আলোকপাত করা হয়:

- বিদ্যুৎ সরবরাহের সূচনা, বিদ্যুৎ সেন্টারের রিফর্মের আওতায় সরকার কর্তৃক ক্রমান্বয়ে পিডিবি, আরইবি, ডেসা, ডেসকো ও ডিপিডিসি গঠন।
- ডিপিডিসিতে বিদ্যুৎ সরবরাহ ব্যবস্থা।
- ডিপিডিসিতে নেটওয়ার্ক অপারেশন ও কাস্টমার সার্ভিস (এনওসিএস) কার্যক্রম।
- এনওসিএস এর সহায়ক অফিসসমূহের (যেমন- এইচ.আর, ফিন্যান্স, আইসিটি, অডিট, পরিকল্পনা, উন্নয়ন, মিটারিং, সিস্টেম প্রটেকশন, গ্রীড, জিআইএস, ট্যারিফ এন্ড এনার্জি অডিট) কার্যক্রম।
- ডিপিডিসির প্রশিক্ষণ ও উন্নয়ন দপ্তরের কার্যক্রম।
- ১৩২/৩৩ কেভি জিআইএস উপকেন্দ্র ও ৩৩/১১ কেভি উপকেন্দ্র পরিদর্শন।
- ডিপিডিসির স্ক্যাডা সিস্টেম, ওয়ার্কশপ, মিটার টেস্টিং ল্যাব, কেন্দ্রীয় ভান্ডার, মেডিকেল সেন্টার পরিদর্শন।

শিক্ষার্থীদের উত্তরোত্তর সক্ষমতা কামনায়,


(মোঃ মহিউল আলম)

তত্ত্বাবধায়ক প্রকৌশলী
প্রশিক্ষণ ও উন্নয়ন, ডিপিডিসি।

ই-মেইল: setd@dpdc.org.bd

বিতরণ:

- ১। নির্বাহী পরিচালক (এডমিন ও এইচ.আর), ডিপিডিসি।
- ২। সিসিও টু ব্যবস্থাপনা পরিচালক মহোদয়, ডিপিডিসি।
- ৩। নির্বাহী প্রকৌশলী/ ম্যানেজার (এইচ.আর), অত্র দপ্তর।
- ৪। সহকারী প্রকৌশলী, অত্র দপ্তর।
- ৫। অফিস কপি/ মাষ্টার ফাইল।

Appreciation Letter Formate DIU Abu Talha

DECLARATION

This is to certify that this field study is done by the following students under my direct supervision and this work has been carried out by them in the laboratories of the Department of Electrical and Electronic Engineering under the Faculty of Engineering of Daffodil International University in partial fulfilment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering. The presentation of the work was held on December 2021.

Supervised by:



Professor Dr. M. Shamsul Alam (prof. & dean)

Department of EEE

Daffodil International University

Co-Supervised by:



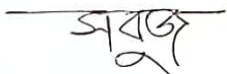
Md. Rahatul Islam Uday

Lecturer

Department of EEE

Daffodil International University

Signature of the candidate:



Md. Shobuj Ahmmed

ID:182-33-4660



Md. Shaiful Islam Shamim

ID:182-33-4679

Dedicated to...
OUR BELOVED PARENTS AND TEACHERS.

ACKNOWLEDGEMENT

In the beginning, we want to thank to our creator for helping us completed field study with good health and soul.

We are also grateful to our advisor Md Professor Dr. M. Shamsul Alam, Dean, Faculty of Engineering, Department of Electronics and Telecommunication Engineering, Daffodil International University, for helping us to complete the field study & prepared the book. He gives us some instructions and guidelines that was enough for us.

In Dhaka power Distribution Company Limited (DPDC), Superintending Engineer (SE) & Executive Engineer (XEN) of training & development also gave their valuable time for our field study activities. The two months' durational field study helps us to find out the reality between theoretical study & field study. Without any doubt we are also thankful to them.

Finally, we thanks to Daffodil International University authority for processing such kinds of field study in reputed company like Dhaka Power Company Limited (DPDC). We hope that, this will be more helpful for our future activities in our practical life.

Your obediently,

Md.Shobuj Ahmmed

Md.Shaiful Islam shamim

Department of Electrical & Electronics Engineering (EEE).

Daffodil International University (DIU).

Executive Summary

For knowing about the power sectors substations and distribution system this field study is more effective to us. In this report we described about the Dhaka Power Distribution Companies substations (Distribution transformer, Circuit breaker, Lightning arrester, Isolator, Insulator, Capacitor bank, Earthing, Busbar). We also described Network Operation and Customer Service (NOCS) and Maintenance. Like (About NOCS division , Power distribution system of NOCS, 132/11-kv grid substation ,33/11-kv substation, 11-kv line, LT line, Jumper, distribution transformer, Ring Main Unit (RMU), Feeder Single line diagram, Alternative feeders, Meter reading section, Computer billing system, New connection process, Prepaid metering system, Divisional control room, Divisional store, Citizen charter, Tariff rule, Tariff rates, Annual performance agreement (APA) targets, Geographical Information System (GIS), Supervisory Control & Data Acquisition (SCADA), Meter testing, Battery backup, etc).

I hope that the following topics explanation gave us the enough knowledge and adding some pictures for better understanding.

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Chapter 1

Introduction

1.1 History of power sector in Bangladesh

Electricity first used 7th December 1901 in Ahsan Manjil where a private generator was installed. Mr Bolton Nawab of Dhaka first switched electricity in Ahsan Manjil. M/S DEVCO development started an electricity distribution system in 1930 for public use. They managed power Dhaka until the ends of British rule in 1947. In 1959, the Government of Pakistan placed under the East Pakistan Water and Power Development Authority (EPWAPDA). In 1972, Bangladesh Power Development Board (BPDB) replaced EPWAPDA.

They service in Dhaka until 1991. Dhaka Electric Supply Authority (DESA) created in march 1990. It worked distribution with Bangladesh Power Development Board (BPDB) till 1991. After that, Dhaka Electric Supply Company Limited (DESCO) formed in November, 1996. Finally they go operation in 1998. In 2008 Dhaka Electric Supply Authority (DESA) handover to Dhaka Power Distribution Company Limited (DPDC) 350 square km. southern part of Dhaka and Narayanganj town. By the combining solar power the total installed capacity is 20,000 MW. The Rooppur Nuclear Power plant established 2,400 (2*1,200) MW for generate electricity and they go operation in 2023.

1.2 East Pakistan Water and Power Development Authority

The East Pakistan Water and Power Development Authority (EPWAPDA) started in 1959 but government of Pakistan took cover this in 1957. Before the independence of Bangladesh, the authority EPWAPDA played a vital role in power sector. From (1960-1970) the generation capacity was increased and this rang was 88 MW to 475 MW. This capacity was earned by natural gas and oil fired power plant. Finally, in 1972 Bangladesh Power Development Board (BPDB) replaced EPWAPDA.

1.3 Bangladesh Power Development Board (BPDB)

Bangladesh Power Development Board (BPDB) established in 1972. It is controlled under the ministry of power, Energy and Mineral Resources. It is one of the most important part of generation and distribution of electricity. It services in the urban areas of the country.

Its Head Quarters situated in Dhaka, Bangladesh. The Minister of BPDB is our honorable prime minister Sheikh Hasina and the state minister is Nasrul Hamid MP. BPDB mainly generate electricity in our country and purchase electricity from others generation company likes (APSCL, EGCB, NWPGL, IPP, NWZPDCL) etc. BPDB also plays a vital role in the distribution of electricity. Generally, BPDB controlled the whole power sector. All the distribution companies and board are the customer of BPDB.

The demand of electricity in our country day by day. We are using ultra-modern devices which are driven by electricity. Our government took some proper steps for increasing the generation of electricity and already established some generation companies. Rooppur Nuclear Power Plant is one of them. Russia and Bangladesh are the sharing partner of this plant. It will add 2400 MW electricity in the total amount of generation.

Recently, our government signed agreement for 590 MW electricity generation plant in Chittagong at Anowara. For the better condition of the environment our government postponed newly Coal based power plant.

The total installed capacity of BPDB Power plants as on November 2021 is 22031 MW and the total derated capacity of BPDB Power as on November 2021 is 20934 MW.

Installed capacity

Fuel Type	Capacity(Unit)	Total(%)
Coal	1768.00 MW	8.03 %
Gas	11450.00 MW	51.97 %
HFO	5953.00 MW	27.02 %
HSD	1341.00 MW	6.09 %
Hydro	230.00 MW	1.04 %
Imported	1160.00 MW	5.27 %
Solar	129.00 MW	0.59 %
Total	22031 MW	100 %

Figure 1:1 Installed capacity

Derated capacity

Fuel Type	Capacity(Unit)	Total(%)
Coal	1688.00 MW	8.06 %
Gas	11100.00 MW	53.02 %
HFO	5341.00 MW	25.51 %
HSD	1286.00 MW	6.14 %
Hydro	230.00 MW	1.1 %
Imported	1160.00 MW	5.54 %
Solar	129.00 MW	0.62 %
Total	20934 MW	99 %

Figure 1:2 Derated capacity

Dhaka Electric Supply Authority (DESA) formed November in 1990. It formed for servicing to the customers and improving revenue collection by decreasing high system loss. Its distribution activities area was around Dhaka city in October 1991. This authority worked with BPDB. Bangladesh Power Development Board suffered much for DESA's huge system loss and it was about 45%. DESA tried to decrease this system loss and they reached about 26% but this was too much. For this, better performance few areas of Dhaka city was handover to the Dhaka Electric Supply Company Limited (DESCO). Yet, DESA's performance was not in favour. As a result the government handover DESA to the a new company named Dhaka Power Distribution Company Limited (DPDC).

1.4 Dhaka Electric Supply Company Limited (DESCO)

Dhaka Electric Supply Company Limited (DESCO) formed in November 1996. After forming process DESCO finally go operation in 1998 in the Mirpur areas. In 2003 it works the area of Gulshan, Banani, Baridhara, Uttara. It established of sales and distribution divisions in 2004. They start the prepaid metering system in 2005. For lengthy activities areas this company goes to public in 2006. In 2007 it take over Tongi Pourashava and distribution licence. The licence was given from Bangladesh Energy Regulatory Commission (BERC).

1.5 Dhaka Power Distribution Company Limited (DPDC)

In 2008 DPDC took all the areas of DESA. DPDC mainly a distribution company. It finally goes operation at 00:00 hours on 1st July. Generally, the area is southern part of Dhaka city and Narayanganj. DPDC is able to decrease the system loss and finally it reached in a single digit. Now this system loss is about 6.69%(2020-2021). The total employees number of DPDC is 3577 and there are three divisions (south, north and central).

The vision is that, to ensure the uninterrupted electricity and develops the financial, social and mankind of the country.

1.6 Rural Electrification Board (REB)

REB is the largest power distribution organization of government. It was established in 1977. It works big portion of our country in rural areas. It has totally 80 Palli Bidhyut Samities. For working in the rural area REB is playing very important role in agricultural sector by electric pumping. It collects large number of revenue. The construction line length is about 5,63,721 km. The average loss is 9.41%.

Chapter 2

Activities of Dhaka Power Distribution Company limited (DPDC)

2.1 Management structure of DPDC

DPDC is under the Ministry of Power, Energy and Mineral resources. It has 12 board members. Chairman (an Addl Secretary) and 10 various members are in the whole management system. Managing Director (MD) is the head of this company.

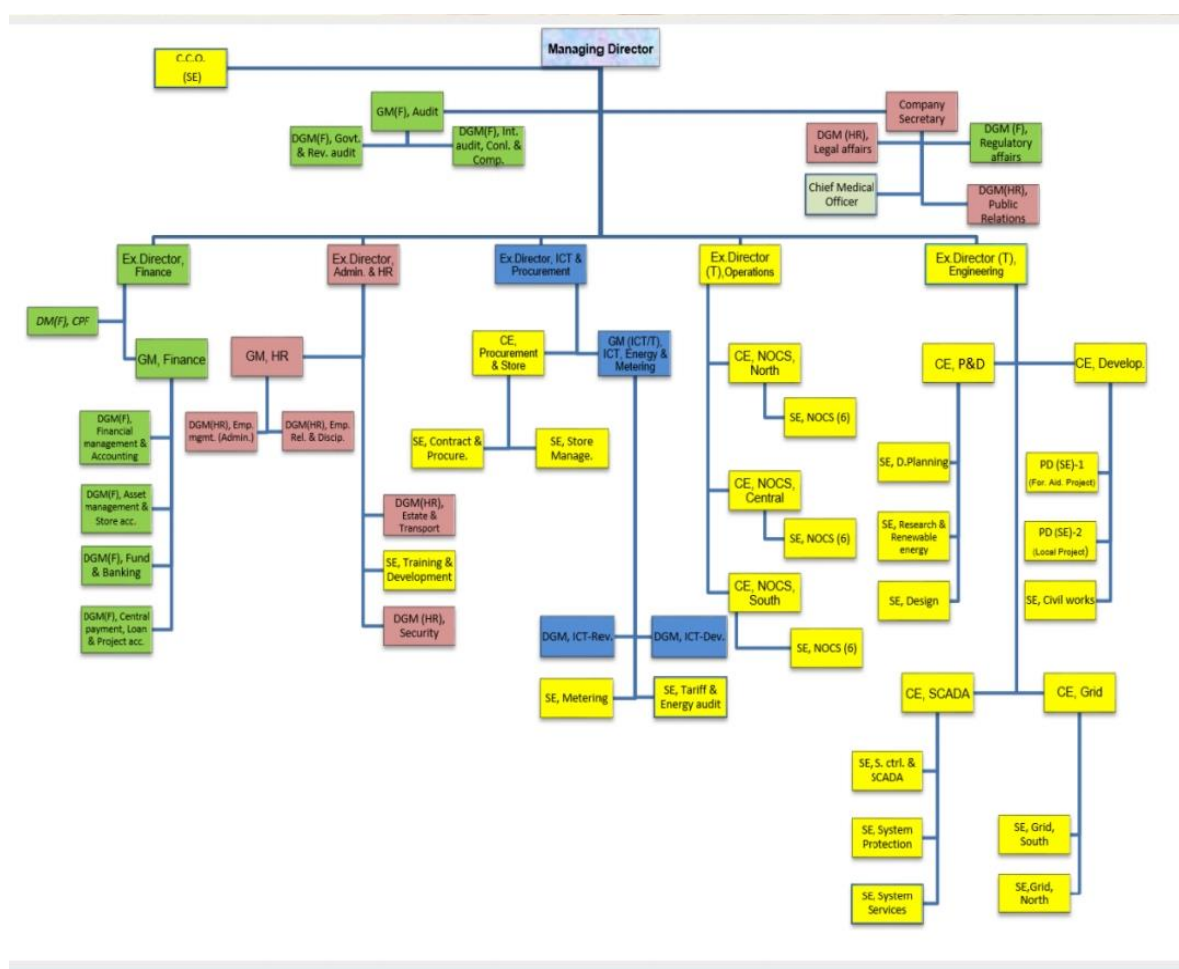


Figure 2:1 Management structure of DPDC

2.2 Service area of DPDC

DPDC service area is the Southern (South, North and Central) of Dhaka city and Narayanganj.

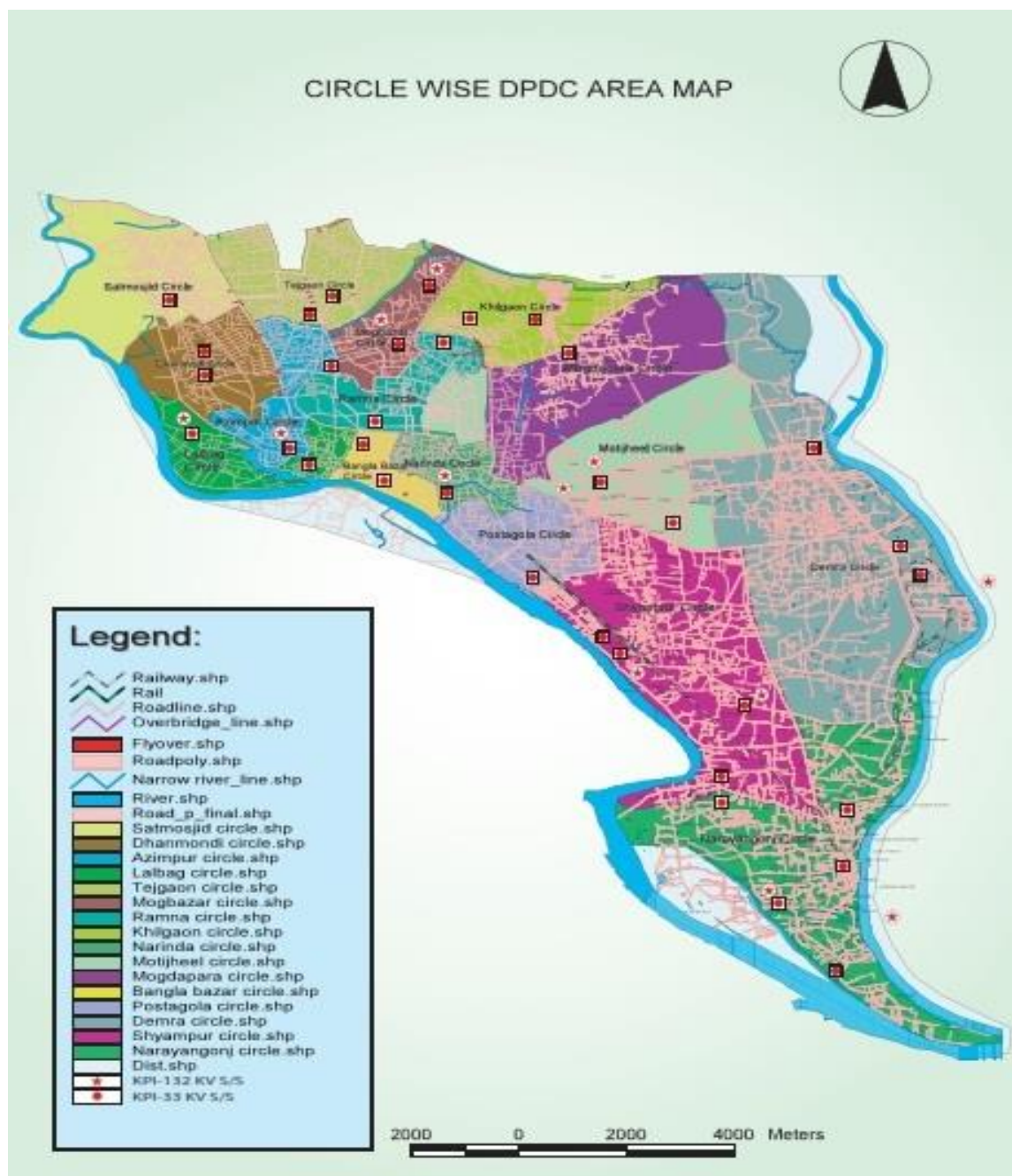


Figure 2:2 Service area of DPDC

2.3 Network Operation and Customer Service (NOCS)

NOCS has 3 zones with 3 Chief Engineers (CE), 18 Circles with 18 Superintending Engineers (SE) 36 Divisions with 36 Executive Engineers (XEN).

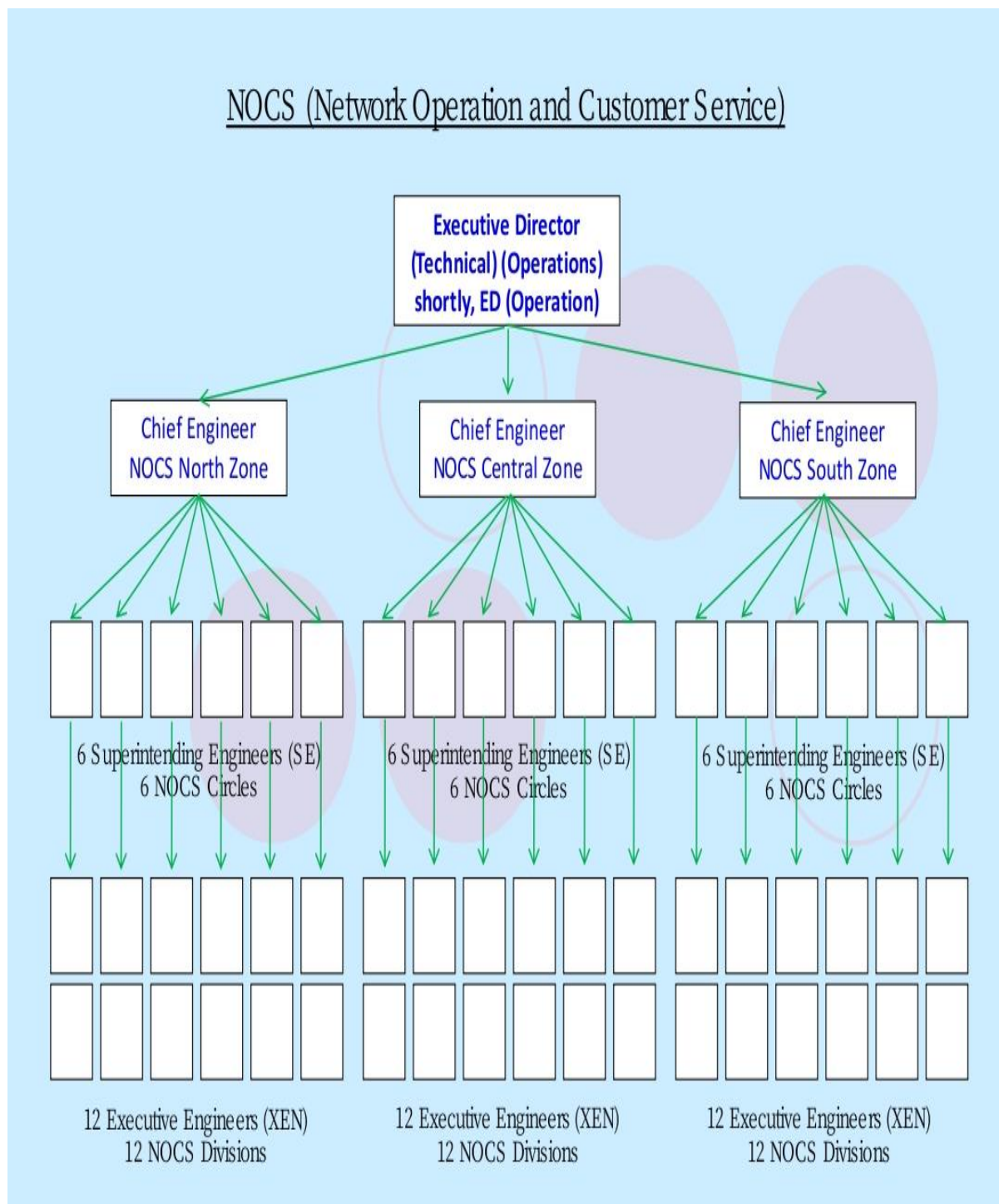


Figure 2:3 Network Operation and Customer Service (NOCS)

2.4 Computerized Billing System

In computerized billing system need meter reading, payment information and new customer information. Then start the bill preparation process. After that this bill sent to customer. It is controlled by ICT circle (Revenue).

Procedure Of Billing System:

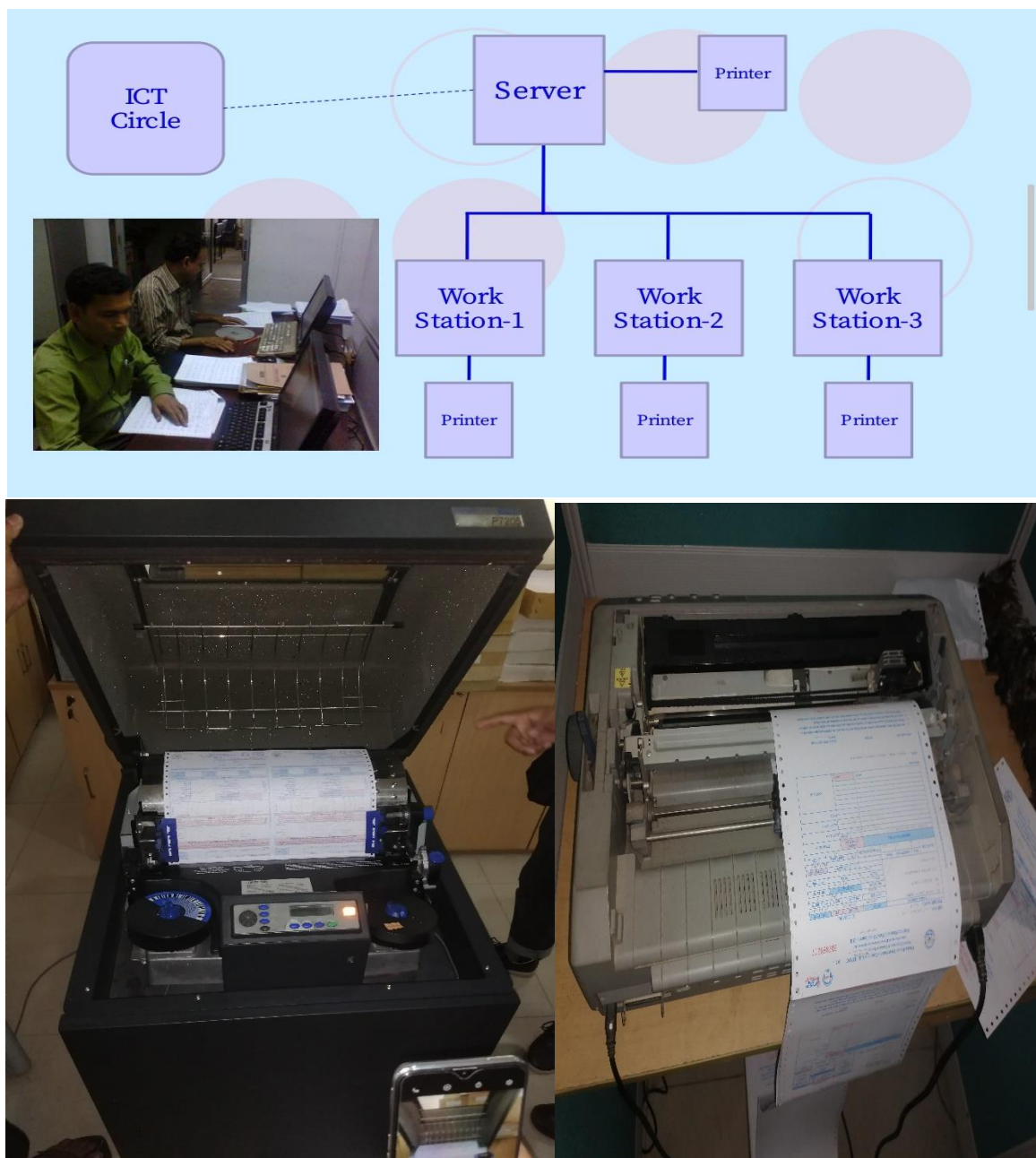


Figure 2:4 Procedure Of Billing System

2.5 System Loss In DPDC

There are reason of system loss. They are given below:

1. Technical reason :

- * Line loss.
- * Transformer loss.

2. Non-Technical reason :

- * Metering fault.
- * Electricity theft.

Month August-2020

Date: 29.09.2020

NOCS	IMPORT	SOLD	SYSTEM LOSS(%)
Tejgaon	27805091	25107055	9.70
Kakrail	21443185	20614201	3.87
Moghbar	17391677	16308733	6.23
Khilgaon	13197262	12039301	8.77
Satmosjid	16634027	15495432	6.84
Sherebangla nagar	18750946	17289454	7.79
Dhanmondi	20596604	19756957	4.08
Jhigatala	23083976	22258914	3.57
Azimpur	16366386	15759311	3.71
Paribagh	28939235	27879795	3.66
Shyamoli	15577113	14320864	8.06
Adabor	26561308	24124605	9.17

NOCS	IMPORT	SOLD	SYSTEM LOSS(%)
Lalbagh	26946145	25846644	4.08
Kamrangirchar	32726989	31793137	2.85
Ramna	20024459	19590198	2.17
Rajarbagh	15580942	14596959	6.32
Bashabo	13128952	12405453	5.51
Bonossri	18492062	17989988	2.72
Molijheel	19563995	19286726	1.42
Mughdapara	15744312	13218943	16.04
Banglabazar	14420462	13160131	8.74
Bongshah	17081715	16792396	1.69
Narinda	12915415	11719808	9.26
Swamibagh	13256059	11542169	12.93

NOCS	IMPORT	SOLD	SYSTEM LOSS(%)
Kazla	29192485	28666718	1.80
Maniknagar	18761618	18083441	3.61
Shyampur	60513812	58841569	2.76
Matuail	18361395	16535426	9.94
Postogola	14624569	14223509	2.74
Jurain	27544877	26682190	3.13
Narayanganj-West	26783532	24109956	9.98
Narayanganj-East	29041989	27303429	5.99
Damra	18747169	16155338	13.83
Siddhirgonj	39940176	36986584	7.40
Fatulla	30381631	27430167	9.71
Shitalokko	40214403	37975423	5.57

Total Import = 820335974

Total Sold = 771890924 System Loss = 5.91 %

System Loss of DPDC 2008-2021 at 132-kV level:

2008-09 = 18.18%

2018-19 = 7.29%

2019-20 = 6.58%

2020-21 = 6.69%

2.6 Tariff System in DPDC

Tariff system depends on load demand of customers. Depending on load demands different tariffs are:

- LT-A: Residential
- LT-B: Irrigation
- LT-C1: Small Industries
- LT-C2: Construction work
- LT-D1: Educational, Religious, etc
- LT-D2: Street Light and Water Pump
- LT-D3: Battery Charging Station
- LT-E: Commercial and Office
- LT-T: Temporary
- Many others.....

2.6.1 Tariffs Rates

Retail Electricity Rate

A. Low Voltage (LT): 230/400 Volt

Electricity Supply: Low Voltage AC Single Phase
230 Volt and Three Phase 400 Volt

Frequency: 50 cycle/second

Approved Demand: Single Phase 0-7.5 KW and
Three Phase 0-80 KW

SL	Customer Category and Slab	New Tariff Per Unit Rate (Tk.) Effective from Bill month 1st March, 2020	Demand Charge (Tk./KW/Month)
1	LT- a: Residential		
	Life Line: 1-50 Units	3.75	
	First Step: From 00 to 75 units	4.19	
	Second Step: From 76 to 200 units	5.72	
	Third Step: From 201 to 300 units	6.00	30.00
	Fourth Step: From 301 to 400 units	6.34	
	Fifth Step: From 401 to 600 units	9.94	

2	LT- b: Agricultural pumping	4.16	30.00
LT- c 1: Small Industries			
3	Flat Rate	8.53	30.00
	Off-Peak Time	7.68	
	Peak Time	10.24	
4	LT- c 2: Construction	12.00	100.00
5	LT- d 1: Education, religious and charitable organizations and hospitals	6.02	35.00
6	LT- d 2: Street lamp and water pump	7.70	60.00
LT- d 2: Battery charging station			
7	Flat Rate	7.64	60.00
	Off-Peak Time	6.88	
	Super Off-Peak Time	6.11	
	Peak Time	9.55	
LT- e: Commercial & Office			
8	Flat Rate	10.30	60.00
	Off-Peak Time	9.27	
	Peak Time	12.36	
9	LT- t: Temporary	16.00	100.00

B. Medium Voltage (MT):11 KV

Electricity Supply: Medium Voltage AC 11 KV

Frequency: 50 cycle/second

Approved Demand: 50KW to maximum 5MW

SL	Customer Category and Slab	New Tariff Per Unit Rate (Tk.) Effective from Bill month 1st March, 2020	Demand Charge (Tk./KW/Month)
MT-1: Residential			
1	Flat Rate	8.40	60.00
	Off-Peak Time	7.56	
	Peak Time	10.50	
MT-2: Commercial & Office			
2	Flat Rate	9.12	60.00
	Off-Peak Time	8.21	
	Peak Time	11.40	
MT-3: Industries			
3	Flat Rate	8.55	60.00
	Off-Peak Time	7.70	
	Peak Time	10.69	

MT-4: Construction			
4	Flate Rate	11.46	100.00
	Off-Peak Time	10.31	
	Peak Time	14.33	
MT-5: General Purpose*			
5	Flat Rate	8.45	60.00
	Off-Peak Time	7.61	
	Peak Time	10.56	
6	MT- 6: Temporary	15.00	100.00
MT- 7: Battery charging station			
7	Flat Rate	7.56	60.00
	Off-Peak Time	6.80	
	Super Off-Peak Time	6.05	
	Peak Time	9.45	
MT-8: Agricultural pumping			
8	Flat Rate	5.00	60.00
	Off-Peak Time	4.50	
	Peak Time	6.25	

C. High Voltage(HT):33 KV

Electricity Supply: High Voltage AC 33 KV

Frequency: 50 cycle/second

Approved Demand: 5MW to maximum 30MW
(Must be Double circuit for above 20MW)

SL	Customer Category and Slab	New Tariff Per Unit Rate (Tk.) Effective from Bill month 1st March, 2020	Demand Charge (Tk./KW/Month)
HT-1: General Purpose			
1	Flat Rate	8.41	60.00
	Off-Peak Time	7.57	
	Peak Time	10.51	
HT-2: Commercial & Office			
2	Flat Rate	9.02	60.00
	Off-Peak Time	8.12	
	Peak Time	11.28	
HT-3: Industries			
3	Flat Rate	8.45	60.00
	Off-Peak Time	7.61	
	Peak Time	10.56	

D. Extra High Voltage(EHT): 132 KV and 230 KV

Electricity Supply: Extra High Voltage AC 132 KV and 230 KV

Frequency: 50 cycle/second

Approved Demand: EHT-1: 20MW to maximum 140 MW (Single or double circuits in technical consideration) ; EHT-2: Above than 140 MW

SL	Customer Category and Slab	New Tariff Per Unit Rate (Tk.) Effective from Bill month 1st March, 2020	Demand Charge (Tk./KW/Month)
EHT-1: General Purpose			
1	Flat Rate	8.36	60.00
	Off-Peak Time	7.52	
	Peak Time	10.45	
EHT-2: General Purpose			
2	Flat Rate	8.31	60.00
	Off-Peak Time	7.48	
	Peak Time	10.39	

2.7 Innovation System In DPDC

DPDC collect innovation ideas from their employees by arranging meetings and other process. Innovation committee mainly handle the whole innovation process. Innovation show-casing by Ministry once yearly. For best innovation announce 1st, 2nd and 3rd prizes.

Their Achievement :

1st prize in 2018 for Prepaid Vending by POS.

2nd prize in 2019 for Electrical Safety Device.

3rd prize in 2021 for Single pole Transformer System (By zoom Online).

2.8 Projects in DPDC

1. It has Smart Prepaid metering project about 8.5 Lac.
2. For Expansion and Strengthening of Power System Network under DPDC Government to Government (G2G)) Project.
3. It has Power Distribution System Development Project too.
4. It has also Prepaid Metering Project under 6 NOCS.

2.8.1 Steps of Project

- Planning
- Tender Document
- Tender Circuler
- Tender Submission
- Tender Opening
- Work Order
- Work Completion

2.9 Digital System In DPDC

2.9.1 Why Digitalization needed?

For completing hard activities by more Easeness digitalization is crying need. For saving time digitilazation plays vital role. If maintains digitalization system then needs so less Mentaly Effort. That's why Digitalization needed.

2.9.2 Items of Digitalizations

There are some digitalizations items and they are given below.

- a) Revenue Management (M-Bill, AMR-RMR).
- b) Customer Service Management (Hotline-16116, SMS & E-mail).
- c) Office Management (E Filing, Pay Roll management).
- d) Procurement Management(E Tendering, E Auction, Store Management System).
- e) Others management (API & MIS Monitoring, GIS, Video Conferencing System).

Chapter 3

Operation & Maintenance Grid-station & Substation

3.1 Grid-Station

Grid Station is define as the combination of various power system. Generally Grid Station reduce the high voltage level to low voltage level. Its elements are generating station, transmission lines, distribution lines. Its power is 132/33 kV.

3.2 Sub-Station

In Substation transmission and distribution lines are connected together. Industries, Hospitals and others institutes are given electricity at 11 kV. In Substation step down the power electricity from 132 or 66 kV to 11kV.

Dhanmondi 132/33 kV Grid-Station to 33/11 kV Sub-Station:



Figure 3:1 Dhanmondi 132/33 kV Grid-Station to 33/11 kV Sub-Station

3.3 Why Need Maintenance?

Maintenance is very important part for Grid-station or Sub-Station. Some reason for maintenance are given below:

- a) For getting the maximum performance of equipment.
- b) For suddenly breakdown or failures protection.
- c) Reduce system loss from such kind of failures.
- d) Long life time of equipment.
- e) To safe and safety from any kinds of hazards.
- f) For ensuring the best quality power supply.

3.3.1 Maintenance program

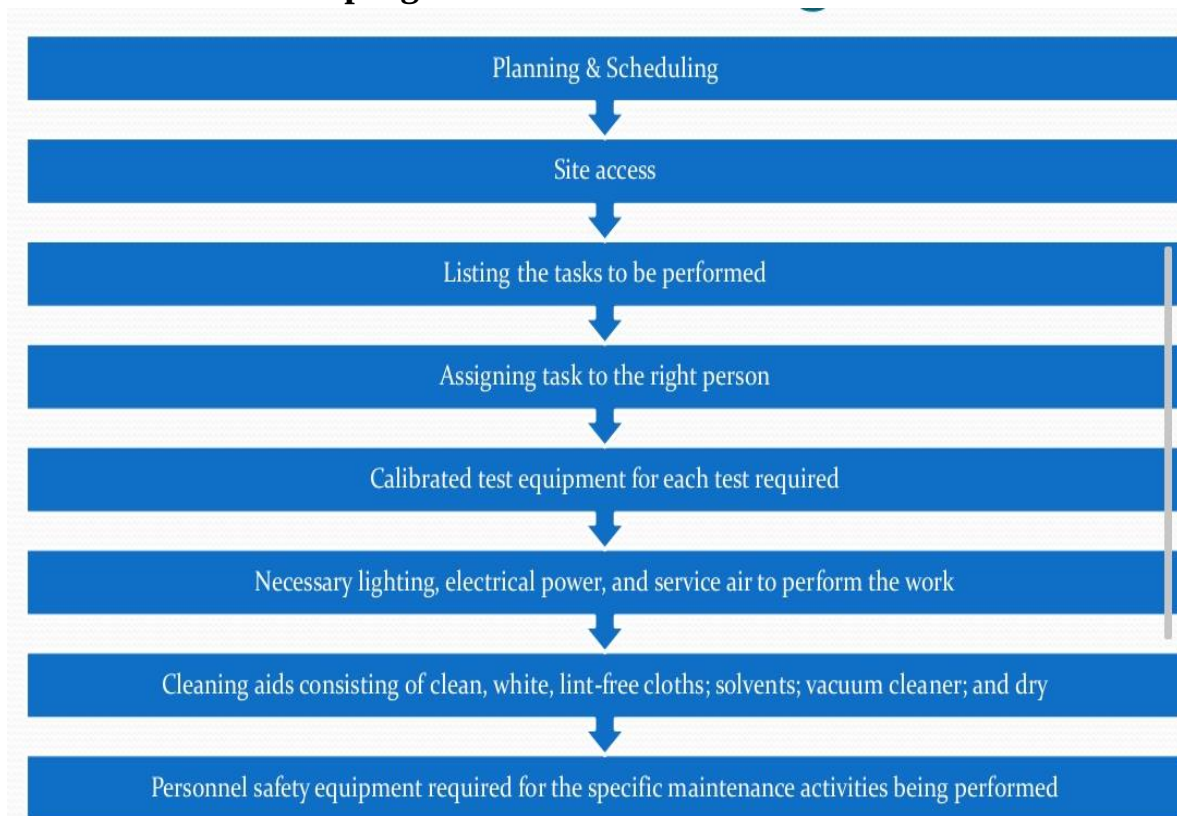


Figure 3:2Maintenance program

3.4 Types of maintenance

There are two types of maintenance. They are:

1. Scheduled or Routine Maintenance.

- a) Preventive Maintenance.
- b) The Scheduled inspection.
- c) Testing and maintenance of critical line components.

2. Maintenance at breakdown of failure.

Chapter 4

Switchgear

4.1 Switchgear

Switchgear is a system where in an electric power system is controlled, regulated and switched off the electrical circuit. Isolation and protection are also maintained in switchgear. There are two types of switchgear :

- a) Outdoors types and
- b) Indoor type switchgear



Figure 4:1 Switchgear

4.2 Bus-bar

A Bus-bar is a metallic strip or bar which is designed inside switchgear, panel boards etc. it is used for local high current in electric power distribution. It is generally connected with high voltage equipments.

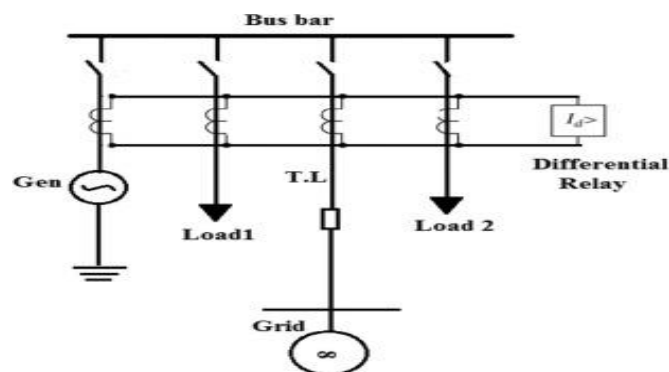


Figure 4:2 Bus-bar

4.2.1 Types of Bus-bar

- a) Single Bus-bar
- b) Single Bus-bar with Bus sectionalized
- c) Double Bus-bar with double breaker
- d) Ring type Bus-bar
- e) Mesh type Bus-bar
- f) Sectionalized type Bus-bar
- g) Transfer and main type Bus-bar.
- etc.

4.2.2 Advantages of Bus-bar

- a) It reduces the system costs.
- b) It improves the system reliability.
- c) It increases the system capacitance.
- d) The wiring errors is eliminated.

4.2.3 Disadvantages of Bus-bar

- a) Its equipment cost is so more.
- b) Its operation system is more complex.
- c) Load shedding is also complex.
- d) Its insulation cost is so more and
- e) It takes more place for setup.

4.3 Circuit Breaker

A circuit breaker is a switching device.it can be operated by manually and automatically. The electrical power system is controlled and protected by circuit breaker. Its saves the equipments from a short circuit fault and other types of electrical fault.



Figure 4:3 Circuit Breaker

4.3.1 Types of Circuit Breaker

There are 4 types of circuit breakers and they are:

- a) Oil Circuit Breaker.
- b) Air Blast Circuit Breaker.
- c) SF6 Circuit Breaker.
- d) Vacuum Circuit Breaker.

4.3.2 Oil Circuit Breaker

In Oil Circuit Breaker used as a dielectric or insulating medium. Generally oil circuit breaker use for arc extinction. When a fault occurs then the oil circuit breaker separated to contacts.

Types of Oil Circuit Breaker

There are mainly two types of oil circuit breaker and they are :

- 1) Bulk Oil Circuit Breaker:
 - a) Plain break oil circuit breakers.
 - b) Arc control oil circuit breakers.
- 2) Low Oil Circuit Breaker.

4.3.3 Air Blast Circuit Breaker

Air Blast Circuit Breaker is an automatically operated electrical switch. It uses Air for protecting an electrical circuit from damage. Which caused by access current from over load and short circuit.

Types of Air Blast Circuit Breaker:

There are three types of air blast circuit breakers and they are:

- 1) Axial-blast type circuit breaker.
- 2) Cross-blast type circuit breaker.
- 3) Radial-blast Type circuit breaker.

4.3.4 SF6 (Sulphur Hexafluoride) circuit breaker

In which circuit breaker SF6 under pressure gas is used for extinguishing the arc is called SF6 circuit breaker. This gas has some good excellent properties like dielectric, arc quenching etc.

Types of SF6 Circuit Breaker:

There are three types SF6 Circuit Breaker and they are:

- 1) Non-Puffer Piston Circuit Breaker.
- 2) Single-Puffer Piston Circuit Breaker.
- 3) Double-Puffer Piston Circuit Breaker.

4.3.5 Vacuum Circuit Breaker

In which circuit breaker Vacuum is used for arc extinction is called Vacuum Circuit Breaker. The fixed and moving contact is used in this circuit breaker. The Vacuum gives the insulating strength which is so high.

4.3.6 The fault clearing time of Circuit Breaker

The fault clearing process:

When a fault occurs then the impedance decrease and the current increases. The circuit breaker use for clearing this fault. For clearing this fault the circuit breaker take some times (sec.). The difference from the faulting time and the fault clearing time is called the fault clearing time of circuit breaker.

4.4 Ring Main Unit (RMU)

In power distribution system Ring Main Unit (RMU) is gas insulated compact Switchgear unit which used at the load connection point. It is used for medium voltage power distribution.

Ring Main Unit (RMU) of Bangladesh Bank:



Figure 4:4 Ring Main Unit

CHAPTER 5

Transformer

5.1 Working principle of transformer

We know that transformer is a electrostatic device. Which works by Faraday's law of electromagnetic induction between to coils. Current is varying in this system for this a varying magnetic field produces in one coil which also varying electromotive force (EMF) in the second coil.



Figure 5:1 Working principle of transformer

5.2 Types of transformer

There are some types of transformer and they are:

- a) Step-up and Step-down transformer.
- b) Current transformer (CT) and Potential transformer (PT).
- c) Instrument transformer.
- d) Distribution transformer.
- e) Power transformer.
- f) Single phase and Three phase transformer.

Transformer generally constructed with two Types. they are:

- a) Core-type. And
- b) Shell-type.

5.3 Why transformer need protection ?

Protection is the pre-condition of transformer. For some reason transformer need protection and this reasons are :

- a) When stresses generated by the supply then need protection.
- b) For stressing due to the load the transformer protection is very important.
- c) When occurs fault in internal side in transformer this time need transformer protection.
- d) Natural effect like thundering the transformer protection is crying need.

5.4 Instruments of transformer protection

For protecting transformer uses some instruments and they are :

- 1) Fuses.
- 2) Miniature circuit breaker (MCB)/ Moulded case circuit breaker (MCCB).
- 3) Lightning Arrester.
- 4) Silica Gel.
- 5) Oil and Oil Level Indicator.
- 6) Horn Gap.
- 7) Tap Changer.
- 8) Temperature Meter.
- 9) Earthing . etc

5.5 Transformer Testing

Transformer testing is very important part. By transformer testing we test insulation and continuity. For insulation test we measure resistance by using Megger in large scale. For continuity test we measure resistance by using AVO meter in small scale.

Insulation test by Megger



Continuity test by AVO meter



Figure 5:2 Transformer testing

5.5.1 Transformer Testing with point (R-Y-B)

Materials	Point of measurement	Resistance (Ideal)	Review	Comments
Megger	R-Y Y-B B-R	= 0 (zero) ohm = 0 (zero) ohm = 0 (zero) ohm	If, doubtly reading high.	Before the measurement the transformer will be isolated from the supply and load.
	HT-LT HT-G LT-G	Infinity Infinity Infinity	If, Short reading Will be near to zero.	
AVO	R-Y Y-B B-R	12 ohm 12 ohm 12 ohm	If, cut coil then reading will be double in one coil.	Same as megger

5.6 Transformer Earthing

- Transformer earthing is a main portion of transformer protection.
- Deepness of earthing is = 20 Feets, 40 Feets, 80 Feets.
- Ideal deepness is = 100 feets.
- Ideal Resistance is = less than 1 ohm (< 1 ohm).
- Generally use GI wire. Metal pipe is also be used.

Chapter 6

System protection

6.1 Transformer protection

Some equipments are given transformer protection. They are explaining in the below:

6.1.1 Current transformer

Current transformer reduce large current and convert into small current by following the ratio. It give safety in an AC transmission.



Figure 6:1 Current transformer

6.1.2 Potential transformer:

We know that potential transformer is a step-down transformer where voltage of a circuit will be lower for better measurement. The lower power is define as potential transformer. It constructed by maintaining high quality, magnetic current etc.



Figure 6:2 Potential transformer

6.1.3 Transformer oil

The high voltage electrical infrastructure in transformers, capacitor make the insulator by using transformer oil. This oil surrounded the core and transformer winding. It reduce the temperature of the transformer core.



Figure 6:3 Transformer oil

6.1.4 Lightning Arrester

It is one kind of isolator. It is used in electric power transmission and telecommunication system. From the damaging effects of lighting it protect the insulation and conductors of the system. It has two terminals one is high voltage terminal and another is ground terminal. It is aslo used to protect electric fences.



Figure 6:4 Lightning Arrester

6.1.5 Silica Gel

Silica gel used in breather for absorbing the moisture from the atmosphere air. When the silica gel is filled in breather then its colour is blue but when it absorbed the moisture then its colour is changed.

Before absorbed moisture:



After absorbed moisture :



Figure 6:5 Silica Gel

6.2 Bus-bar protection

Bus-bar protection maintain some steps and types and they are.

- In bus-bars covers used system protection .
- Its need frame-earth protection.
- Differential protection is also needed.
- Phase comparison protection is very important.
- Directional blocking protection one of them.

6.3 Feeder protection

Feeder need some protection and these protection schemes are :

- Over current protection.
- Earth fault protection.
- Under frequency protection.

6.4 Alarm annunciator

The alarm and the alarming procedure is very important part. It is set-up with the control panel. Alarm gives different types of alarming tunes of different fault as a result any one can gauge what kinds of fault occurs.



Figure 6:6 Alarm annunciator

6.5 Back-up (Battery)

Substation need uninterrupted electricity that's why it needs battery back-up from the battery charging procedure. Battery back-up system consists of the combination of large number of batteries. This battery back-up gives the supply voltage of 110 volts and that's enough for substation's electronics devices.



Figure 6:7 Back-up (Battery)

CHAPTER 7

Conclusion & Discussion

7.1 Conclusion

I have past little extraordinary time at DPDC during the internship program. DPDC is the most practical place in my country for the power sector. Actually, I have accrued practical experience in the power sector from it. I consider that it is the best or famous electricity distribution company. It gives me a chance to perform my theoretical knowledge practically.

My achieves from DPDC are as follows:

- It has enhanced my practical knowledge.
- It has enhanced my perception of the practical activities of the various Equipment.
- It has increased my confidence level for facing job interviews in the future.
- I have learned about the design, implementation, operation, and maintenance of a substation.

7.2 Discussion

DPDC give me great experience in understanding substation equipment. It gives me a friendly environment. I have learned much practical knowledge from DPDC in my internship time and it help my job life. Network automation, protection area is a full part of energy management and financial system. In my training time, I have learned about transmission and distribution system of power, breakers operation and controlling, observe the signal. It has also different type of maintenance. DPDC should running internship program for university student. Finally, I can say that DPDC give me a great opportunity. It is big helps for students of Electrical and Electronic Engineering.

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