

REPORT ON 5 DAYS INTERNSHIP ON “OPERATIONS OF SWITCH GEARS, BREAKERS, POWER TRANSFORMERS AND BATTERIES” IN TANGEDCO

Submitted in partial fulfilment of the requirements for the completion of
PROFESSIONAL TRAINING

By

BAIRAVAN C (41140015)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS
ENGINEERING
SCHOOL OF ELECTRICAL AND ELECTRONICS**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with grade “A++” by NAAC

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SATHYABAMA

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Department of Electrical and Electronics Engineering

Bonafide Certificate

This is to certify that this Report is the bonafide work of **Bairavan C (41140015)** who carried out the internship entitled “**Operations of Switch Gears, Breakers, Power Transformers and Batteries**” under my supervision from 24-05- 2023 to 28-05-2023


EXTERNAL GUIDE

Head of the Department
(DR.S.RADHIKA)

Submitted for Viva voce Examination held on _____



INTERNAL EXAMINER

(Signature)



EXTERNAL EXAMINER

(Signature)

DECLARATION

I, **Bairavan C** here by declare that the Report entitled “**Operations of Switch Gears, Breakers, Power Transformers and Batteries**” is submitted in partial fulfilment of the requirements for the award of Bachelor of Engineering degree in ELECTRICAL AND ELECTRONICS ENGINEERING.

DATE: 23-05-23 to 27-05-23

PLACE: Walajapet

A handwritten signature in black ink, appearing to read 'Bairavan C', with a stylized, cursive script.

Bairavan C
(Signature of the candidate)

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to Board of Management of **SATHYABAMA** for their kind encouragement in doing this Report and for completing it successfully. I am grateful to them.

I convey my thanks to **DR. N. M. NANDHITHA, Prof. & Dean, School of Electrical and Electronics Engineering** and **DR.S.RADHIKA ,Head of the Department, Dept. of ELECTRICAL AND ELECTRONICS ENGINEERING** for providing me necessary support and details at the right time during the progressive reviews.

I wish to express my thanks to all Teaching and Non-teaching staff members of the Department of **Electrical and Electronics Engineering** who were helpful in many ways for the completion of the Report.

(Name of the Candidate)
Bairavan C

PREFACE

Organizations are made up of people and function through people. Without people, organizations cannot exist. The resources of men, money, material, machinery, and mechanism are connected, coordinated and utilized through people. Engineers need to concentrate more on mechanism and the way in which things have been made. The need of training arises for doing things yourself, understanding its way.

Practical exposure for doing things makes a person conversant to the technicalities involved in any job. In view of such benefits, imparting of vocational training has been made an integral part of any academic structure.

In TANGEDCO, training is given to Engineering Aspirants to secure future in the dynamic world of power generation and distribution. In this order I have taken 5 days internship at TNEB. In my report I will brief about the steps involved in the power generation and distribution.

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1. Introduction about the company:

1.1) History of TNEB:

Electricity generation in Tamil Nadu until about 1908 was confined to a few tiny plants in Tea Estates run on water power and to a small hydroelectric station at Kattery near Coonoor. The Government Electricity department was created in 1927. The Pykara Hydroelectric Power Station was constructed by Sir John G. Henry Howard, a British Engineer and the first Chief Electrical Engineer of the then Composite Madras State Electricity Department and commissioned in 1933 with an original installed capacity of 70 MW. The Tamil Nadu Electricity Board was constituted with effect from 1st July 1957 under the Electricity Supply Act 1948 and came to be known as “The Madras State Electricity Board” with Padmashri V.P. Appadurai appointed as Chief Engineer (Electricity).

The first thermal power plant was commissioned during 1971 at Ennore, Chennai with its first unit of 60 MW capacities. Naphtha based gas station of 10 MW capacity was commissioned at Narimanam during 1991-92. TNEB simultaneously ventured into wind generation and 120 units with a total capacity of 19.355 MW was commissioned in the period 1986-93. In 1992, the power sector was thrown open for private participation and the first independent power project was established by GMR Vasavi at Basin Bridge, Chennai.

Today TNEB has grown into a giant organization having a installed capacity of 10,122 MW and serving a consumer base of about 2 crore consumers.

1.2) Profile of TNEB

On 1st July 1957, Tamil Nadu Electricity Board came into being and has remained the energy provider and distributor all these years. During the period the Government have extended the electrical network to all the villages and towns throughout the state. After 53 years of journey on 1st of November 2010 it has restructured itself into TNEB Ltd; Tamil Nadu Generation and Distribution Corporation (TANGEDCO) Ltd; and Tamil Nadu Transmission Corporation (TANTRANSCO) Ltd.

1.3) Mission of the government

The Government of India, Mop have planned to give “Power for all by 2012”. To achieve this, Tamil Nadu Generation and Distribution Corporation limited is making progress in Generation and Distribution sector. It is happy to inform that the electrification of all villages and towns were completed and also electrification of all households is under progress.

1.4) Need

We take immense pleasure in re-dedicating ourselves to serve the people of Tamil Nadu by bringing out a Citizens Charter. This Charter sets out the Standards and Quality of services that will be provided by us.

1.5) Objectives of the charter

- To place before the public an overview of the organization
- To inform the Citizens about the kind of services that we provide
- To state the Standards of service delivery

1.6) Power Generation and Distribution

To satisfy the energy needs of the State, Tamil Nadu Generation and Distribution Corporation Limited has conventional installed capacity of 16,652.20 MW as on 01.04.2022 which includes TANGEDCO owned generating stations, share from the Central Generating Stations (CGS) and Private Power Purchase and non-conventional (Renewable) installed capacity as on 01.04.2022 is 17,225.11 MW which includes Hydro, Wind, Solar, Biomass and Co-generation plants.

The total number of consumers being served in the State as on 31.03.17 is 279.27 Lakhs. Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) with the goal of creating electricity infrastructure to all un-electrified villages / un-electrified hamlets provide access to electricity to all households. Implementation of RGGVY in 26 districts of Tamil Nadu had already been completed. Further, implementation of the RGGVY scheme in Nilgiris, Tirunelveli and Dharmapuri districts is under progress.

2. Nature of Working

2.1 Generation

Starting with a modest installed capacity of 156 MW (Mega Watt) with annual gross generation plus purchase of 630 MU (Million Units) at the dawn of independence, the TNEB has grown by leaps and bounds with installed capacity of 10,098 MW as on 31.3.07. The Board gross generation and power purchase during the year 2006-07 was 63,038 MU.

2.2 Transmission and Distribution

TNEB has 185.82 lakh consumers. The distribution network comprises 1,54,104 circuit kilometers of Extra High Tension (EHT) and High Tension (HT) lines, 5.02 Lakhs kilometers of Low Tension (LT) lines, 1148 Sub-Stations, 1,73,053 distribution transformers besides other assets. As on 31.3.07, 63,956 Towns, Hamlets and Villages have been electrified. In addition, 18.02 Lakhs agricultural pump sets have been given electric supply. The role of Tamil Nadu Electricity Board in improving the economy of the State of Tamil Nadu by extensive electrification of the villages, large scale energization of agricultural pump sets and extension of electricity services to poor/backward and downtrodden sections of the society, in addition to extension of supply to large number of industries has been well recognized. Our commitment to excellence would include a continuous effort to modernize and upgrade not only our tools, plants and machinery but also our most valuable performing assets viz. our human resources.

2.3 Service standards

We are committed to render the highest standards of service to you. This Charter sets out the standards for the various services so as to improve our service to you. It is worth mentioning that these service levels are our maximum response times for important aspects of your electricity service, and that we aim to beat these standards every time we can.

2.4 Service standards (Notified By Tamil Nadu Electricity Regulatory Commission)

Effecting of Service Connection

LOW TENSION SERVICE CONNECTION

Category	Time Schedule for LT
a) Involving no extension or Improvement work	Generally within a week but however not exceeding 30 days
b) Involving extension and improvement without Distribution transformers	60 days
c) Involving extension and improvement with Distribution transformers	90 days

Table 1

TABLE 2: HIGH TENSION SERVICE CONNECTION

Category	Time Schedule for HT/EHT	
	HT	EHT
a) Involving Extension & Improvement work	60 days	150 days
b) Involving the enhancement of Power Transformer/Addition of Power Transformer	120 days	180 days
c) Involving the Commissioning of new substation	180 days	270 days

Table 2

2.5 Temporary Supply

The intending consumers may require temporary services for construction of residential houses, complexes, commercial complexes, industrial premises and also for illumination during festivals, etc. Such temporary services will be effected as per the time schedule specified for the new and additional loads.

2.6 Shifting of Service Connection/Deviation of Lines and Shifting of Equipment:

1.	Shifting of meter/service:	25 days
2.	Shifting of LT/HT lines:	60 days
3.	Shifting of Transformer structure:	90 days

Table 3

The above works will be carried out after remittance of charges due therefore.

2.7 Change of Tariff

Change of tariff will be effected within seven days from the date of receipt of application from the consumer. However, no consumer shall be permitted to change the tariff of the service connection from any Low-Tension Tariff (other than agriculture) to Low Tension Tariff for agriculture. Complaints in Billing, etc. Any complaints in billing received prior to the due date for payment shall be resolved before the next billing along with refund/adjustments, if any. However, the complaints in respect of arithmetic error if any received three days prior to the due date for payment shall be set right within the due date for

payment. The consumer shall not, on the plea of incorrectness, withhold any portion of the amount billed.

2.8 Interruptions and Restoration of Supply

Supply will be restored as per the time schedule furnished below:

INTERRUPTION AND RESTORATION OF SUPPLY

Interruption due to	Power Restoration Time			
	Corporation	Urban Municipalities	Rural	Hill Area
HT Supply failure	1 hour	3 hours	6 hours	12 hours
Fault in Transformer structure or LT line or Pillar Box	2 hours	4 hours	6 hours	12 hours
Fault of Distribution Transformer	24 hours	48 hours	48 hours'	48 hours
Individual Service Connection fault	3 hours	9 hours	12 hours	24 hours

Table 4

2.9 COMPLAINTS RESOLUTION PROCEDURE

If you have concern or complaint about any of the services we offer, you can make a complaint over phone or in person or through a letter to any of our section offices or sub division offices concerned, which is located nearer to your residence. If you feel that your complaint needs the attention of a higher-level officer, you can send your complaint to the Executive Engineer or Superintending Engineer or Chief Engineer concerned or contact them in person in their offices on all working days between 2 PM and 3 PM. You are free to get your grievance redressed by the top officials in the Head Quarters offices viz. Member (Distribution) or Chairman at 144, Anna Salai, Chennai-600 002. In order to mitigate your hardships, we hold grievance day

meeting by the Superintending Engineer concerned once in a month in each division of the circle. We display the date of the grievance day in advance on the notice boards of the division offices. You can also contact any of our offices to know about the grievance day meeting. You will get your grievances redressed at the grievance day meetings.

3. Internship Overview

3.1) Day 1: Introduction to TNEB

- On the first day, I arrived at the TNEB office located in [specific location] and was warmly welcomed by Mr. Giri Rajan, Assistant Engineer, O/M Walaa Urban.
- During the morning session, I was given a comprehensive overview of TNEB's history and its journey to becoming one of the leading power distribution companies in Tamil Nadu.
- The organizational structure was explained, highlighting key departments such as transmission, distribution, and maintenance. I was briefed about the safety measures to be followed inside the substation premises.



Fig. 1

- In the afternoon, I was introduced to my mentor, Mr. Pichandi, Line Inspector, who guided me throughout the internship for five days.
- We also discussed my goals and objectives for the internship, including my interest in learning about power generation, distribution, and renewable energy.

3.2) Day 2: Switchgears and Breakers

- Day 2 was all about switchgears and breakers, and it felt like stepping into a superhero training camp.
- Mr. P. Vasu (Line Inspector), showed me the different types of switchgears and breakers, and I couldn't help but think of them as the guardians of the electrical circuits.
- We did hands-on exercises to operate them safely, emphasizing how crucial it is to protect ourselves and the system.



Fig. 2

- Learning about circuit breakers felt like discovering the secret to keeping the electrical world in check.

3.3) Day 3: Power Transformers



Fig. 3

- On the third day, our focus shifted to power transformers. These are vital devices that convert electrical energy from one voltage level to another, similar to adjusting the volume on your audio equipment.
- Under the guidance of Mr. Pichandi, I gained insights into the internal workings of transformers, akin to examining the inner workings of a complex machine.
- We discussed the critical role of proper transformer maintenance in ensuring uninterrupted and efficient electricity transmission.

3.4) Day 4: Batteries and Backup Systems

- Day 4 centered around batteries and backup systems, which serve as critical emergency power sources. I learned about various battery types, ranging from common ones used in everyday devices to advanced variations.



Fig. 4

- Mr. P. Vasu highlighted the importance of selecting the appropriate battery type for specific applications, drawing parallels to choosing the right tool for a specific task.
- We also delved into the significance of routine maintenance to ensure the reliability of backup systems during power interruptions.

3.5) Day 5: Integration and Troubleshooting

- On the final day, we engaged in activities that required the integration of our knowledge of switchgears, breakers, power transformers, and batteries. These exercises were reminiscent of problem-solving scenarios.



Fig. 5

- Guided by my mentor, I participated in troubleshooting exercises that resembled real-world problem-solving, emphasizing the value of quick thinking and efficient resolution in maintaining a stable electrical supply.

3.6) Safety Measures and Precautions:

1. Personal Protective Equipment (PPE): I was provided with essential PPE, including helmets, safety vests, gloves, and appropriate footwear. It was emphasized that wearing this gear at all times when in the field is non-negotiable.

2. Safety Briefings: Before any fieldwork or visits to substations, safety briefings were conducted. These briefings covered potential risks, emergency procedures, and the importance of staying vigilant.

3. Lockout-Tagout (LOTO): I learned about LOTO procedures, a critical safety measure when working on electrical equipment. This involves disconnecting and locking out power sources to prevent accidental startup during maintenance or repairs.

4. Hazard Identification: Field engineers and technicians were vigilant about identifying potential hazards. I learned to recognize dangers like exposed wires, faulty equipment, and hazardous chemicals.

5. Electrical Safety: Safety around electricity was paramount. I learned about the dangers of high voltage and the importance of maintaining a safe distance from live electrical equipment.

6. First Aid and Fire Safety: I received basic training in first aid and fire safety protocols. Knowing how to respond to injuries or fires in an electrical setting is crucial.

7. Emergency Drills: TNEB regularly conducted emergency drills to ensure that all employees and interns knew how to respond in case of an accident or emergency situation.

5. Conclusion

My 5-day internship at TANGEDCO provided me with valuable insights into the essential components that keep Tamil Nadu's electrical system running smoothly. During this internship, I had the opportunity to explore switchgears, breakers, power transformers, and batteries – the unsung heroes ensuring reliable electricity for our homes and businesses. Learning about their operations, maintenance, and safety measures has enriched my understanding of the intricate workings of the electrical infrastructure.

This experience has deepened my commitment to contributing to a stable and dependable power supply in Tamil Nadu. I'm eager to apply the knowledge I've gained during this internship to my academic pursuits and my future career in the dynamic field of electrical engineering. The practical exposure and hands-on experience have equipped me with a solid foundation for my journey in this exciting and critical sector.

Appendix



TANGEDCO

Tamil Nadu Electricity Board

TamilNadu Generation & Distribution Corporation Limited

CERTIFICATE

This is to certify that

BAIRAVAN C

Studying **BE** in **EEE** at

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

has undergone Internship Training on

**"OPERATIONS OF SWITCH GEARS,BREAKERS,
POWER TRANSFORMERS AND BATTERIES "**

during the period from **23-may-23** to **27-may-23** at

33KV/11KV WALAJA SUB STATION.

27.05.2023

WALAJA

G. G. Rajan
G.GIRI RAJAN

(ASSISTANT ENGINEER)

O/M WALAJA URBAN

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