NARAYANA ENGINEERING COLLEGE
NELLORE, AP (AUTONOMOUS)

DEPARTMENT OF EEE

Report On Industrial Visit

1.	Name of the Activity/Event	33/11KV Indoor Substation, Jagadeesh Nagar		
2.	Date of Activity/Event	26-11-2021		
3.	Organized by/Name of the	Department of EEE		
4.	Place of Activity/Event	Narayana Engineering College, Nellore		
5.	Resource	1.Mr.PRABHU RAJAN		
	Person/Guest/Organization	2. Mrs.S.SUNEETHA		
6.	Type of Activity/Event	Industrial Visit		
7.	Activity/Event objectives	1.Breif analysis of Subject of Distribution. 2 Switch Gear Protection of Circuit Breakers, Isolators and so on etc		
8.	Participation	Students	Faculty	Total Participation
		53	2	53
9.	General remarks	-		
10.	Enclosures	1. Photos 2.Attendance Report 3.Undertaking forms from students		

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Date: 26-11-2021

33/11KV Indoor Substation Visit

Introduction:

On 26 NOV 2021, a group of students from **Narayana Engineering College's** Electrical and Electronics Engineering (EEE) department visited the 33/11KV Indoor Substation. The visit was organized as a part of their curriculum to provide the students with practical knowledge of Distribution of Power. The students were accompanied by their professors and technical staff.

Objective:

The primary objective of the visit was to familiarize the students with the functioning of a switching station and its components, including switchgear, transformers, and protection equipment.

Description:

An indoor substation is a type of electrical substation that is located inside a building or structure. These substations are designed to house transformers, switchgear, and other equipment necessary for the efficient and safe distribution of electricity.

Indoor substations are commonly used in urban areas where space is limited and land is expensive. They are also preferred in areas where the weather is harsh and outdoor equipment is exposed to the elements. Additionally, indoor substations provide added security and protection from vandalism, theft, and other forms of damage.

These substations typically consist of metal-clad switchgear, power transformers, and associated control and protection equipment. The switchgear is used to control the flow of electricity and protect the equipment from damage due to overload, short circuits, or other faults.

The transformers used in indoor substations are typically oil-immersed, and their rating can range from a few hundred kVA to several MVA. They are used to step down the voltage of the incoming power to a level that can be distributed to the end-users.

Indoor substations require proper ventilation and cooling systems to prevent overheating of equipment and ensure efficient operation. The substations are also equipped with fire suppression systems and other safety measures to prevent accidents and ensure the safety of personnel working in and around the substation.

Transformers in indoor substations work by transforming the voltage of electrical power from one level to another level suitable for distribution or transmission. They are designed to handle high voltage and high power levels, making them a critical component in electrical distribution systems.

Transformers consist of two or more coils of wire, known as windings, which are wound around a magnetic core made of laminated steel. The primary winding is connected to the high voltage power supply, while the secondary winding is connected to the distribution network.

When an AC voltage is applied to the primary winding, it generates a magnetic field that induces a voltage in the secondary winding. The ratio of the number of turns in the primary and secondary windings determines the voltage transformation ratio of the transformer. For example, if there are 100 turns in the primary winding and 10 turns in the secondary winding, the voltage transformation ratio would be 10:1, meaning the output voltage would be one-tenth of the input voltage.

The efficiency of a transformer is determined by its design and construction. To minimize energy losses, transformers are designed with a high-quality magnetic core and high-grade insulating materials between the windings. Additionally, cooling systems, such as fans or oil-cooling systems, are installed to maintain the transformer's temperature within safe limits.

In an indoor substation, transformers are housed in enclosures with ventilation systems to ensure adequate air circulation and cooling. They are also equipped with protective devices such as circuit breakers, fuses, and relays, to prevent damage to the equipment and ensure safe operation.

The control room in an indoor substation is a central location where the substation's operations can be monitored and controlled. It is where the personnel responsible for managing and maintaining the substation can monitor the substation's performance, diagnose problems, and take corrective action when necessary.

The control room typically houses a variety of equipment, including monitoring and control systems, communication equipment, alarm systems, and data collection systems. These systems allow operators to remotely monitor and control the substation's equipment and processes.

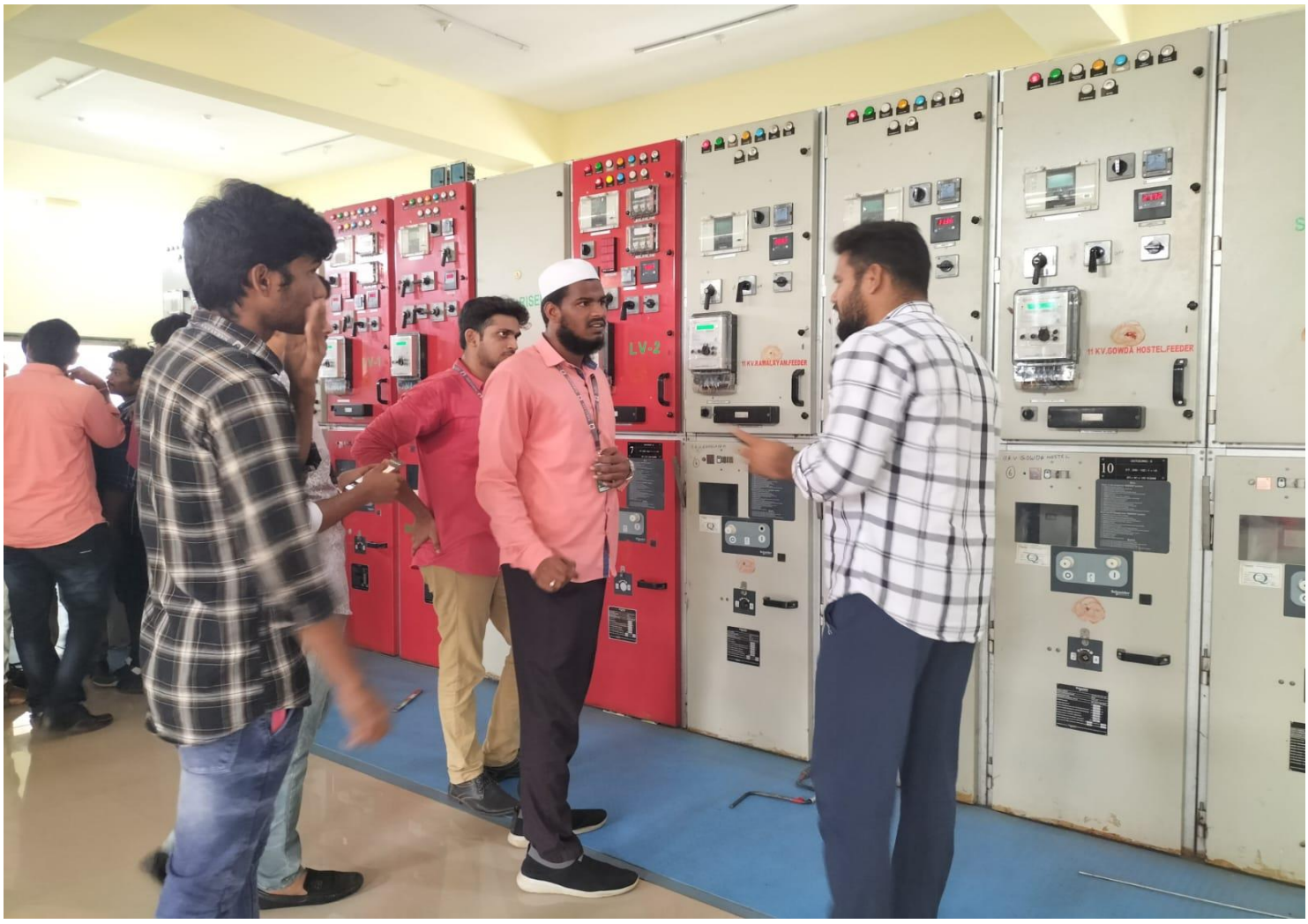
Monitoring and control systems provide real-time information about the substation's voltage, current, temperature, and other critical parameters. They also enable operators to remotely control the substation's equipment, such as transformers, circuit breakers, and switchgear, to optimize performance and ensure safe operation.

Communication equipment allows operators to communicate with other personnel within the substation and with external organizations, such as power suppliers and emergency responders. Alarm systems alert

operators to potential problems, such as equipment failure, overload conditions, or environmental hazards, allowing them to take corrective action before serious damage occurs.

Data collection systems are used to collect and store data about the substation's performance over time. This data can be used to identify trends, diagnose problems, and optimize the substation's performance.

The control room is designed to be a comfortable and secure environment for operators to work in. It is equipped with ergonomic chairs, adjustable lighting, and climate control systems to ensure a comfortable working environment. Additionally, the control room is typically located in a secure area within the substation, protected by access controls and surveillance systems, to prevent unauthorized access.



Protection devices in indoor substations are essential for ensuring the safety of personnel, equipment, and the power supply network. They are designed to detect and isolate faults and abnormal conditions, such as overloads, short circuits, and ground faults, before they can cause damage or harm

There are several types of protection devices used in indoor substations, including:

Circuit breakers: Circuit breakers are devices used to interrupt the flow of electrical current when there is an overload or short circuit in the system. They are designed to quickly isolate the faulty circuit to prevent damage to the equipment and ensure the safety of personnel.

Fuses: Fuses are devices that are designed to melt and break the circuit when there is an overload or short circuit. They are designed to protect the equipment from damage and prevent the possibility of fire.

Protective relays: Protective relays are devices that detect abnormal conditions in the power supply system, such as overcurrent, overvoltage, or underfrequency. They are designed to trigger circuit breakers or other protective devices to isolate the faulty circuit.

Ground fault protection: Ground fault protection devices are designed to detect and isolate ground faults, which can cause serious damage to equipment and pose a safety hazard to personnel. They work by detecting an imbalance in the current flow between the live and ground wires and triggering a protective device to isolate the faulty circuit.

Surge arrestors: Surge arrestors are devices used to protect the equipment from voltage surges caused by lightning strikes, switching operations, or other events that can cause high voltage spikes in the system.

In summary, protection devices in indoor substations are critical for ensuring the safety of personnel, equipment, and the power supply network. They are designed to detect and isolate faults and abnormal conditions quickly and efficiently, preventing damage to the equipment and ensuring the safety of personnel. The specific protection devices used in an indoor substation will depend on the specific needs of the system and the equipment used.

Conclusion:

The visit to the 33/11KV Indoor Substation switching station was an enriching experience for the students of **Narayana Engineering College's EEE department**. The visit helped the students gain a practical understanding of switching stations ,Transformers and their components. It also provided them with insights into the importance of safety and maintenance of switching station equipment and Transformers. The students and staff were grateful for the opportunity to visit the Sub station and extend their thanks to the Andhra Pradesh Southern Power Distribution Company Limited

Faculty In-Charge HOD-EEE