Department of Electrical and Electronics Engineering

A brief report of Industrial Visit

Shivanasamudra hydro & solar power plant, Mandya (Dist.) Karnataka

DATE: 12.11.2024

The Department of EEE, New Horizon College of Engineering has organized an Industrial visit to "Shivanasamudra hydro & solar power plant, Mandya (Dist.) Karnataka "for 5th semister EEE students on 12.11.2024(Tuesday). As a part of the curriculum, the department of EEE provides an opportunity for industrial visits to all the students. Total 60 students visited the industry accompanied by one faculty members and one lab technician.

The Shivanasamudra hydro & Solar power plant, Mandya (Dist.) Karnataka is the first-of-its- kind in Asia. The Shivanasamudra hydro was established in 1902, as a Government of Karnataka Electric power plant. The Shivanasamudra hydroelectric station has generation capacity of 42 MW.

The Shimsha hydel power station has a generation capacity of 17.2 MW The

Shivanasamudra solar power plant has a generation capacity of 10MW.The

Cauvery Hydro Electric power plant has a generation capacity of 3MW.

The solar power plant technician Mr. Savrav had guided the student's throughout the visit by taking the students into various section of industry.

1. **Overview model of Shivansamudra Hydro Power Plant:**

Firstly, the technician briefed about the general layout of complete shivansamudra hydroelectric power plant by showing the penstock arrangements, turbines, transformer units, water reservoir, shimsha hydro power plant etc., to students and the same is shown in fig.1

Fig.1Overview of Hydro power plant

2. Solar Power Plant:

Shivanasamudra solar power plant is under the maintenance of BHEL (Bharat Heavy Electrical Pvt.Ltd) under Power Corporation, Government of Karnataka. It is a 10MW solar power plant which have further divided into 3 parks with capacity of 3.5MW,1.5MW,5MW and all are linked to a common power station (control station) using SCADA supervisory and cloud they are operated effectively.

Fig.2 Overview of Solar Power Plant

3. Initial cost of this plant is around 75crocres estimated by eversion energy pvt ltd. The technician explained the various sections of the industry such as Solar panels set up area as show in fig.2, Inverter Module sections, SCADA module sections and Maintenance section.

4. **Working model of Solar Strings**

The engineer explained about the number of cells which are connected in 1 solar panel. In each panel there are total 72 cells (6*12)(6 in horizontal and 12 in vertical lane). Capacity of each panel :- 40-44V (each panel) and a full panel capacity is (800-880V DC) which are present with a voltage capacity of 42 V from each panel. He did show the connection of 20 solar panels as a string and 4 strings together is developing a voltage of (800-880V) with a current capacity of 140A. Also, he showed the SMC modules which are connected to solar strings

5. **Effect on solar panel:-**

Connected in series :- Voltage will get added up for example 1 panel produces 40V dc as a whole panel in series provides 800V dc.(20 panels in series).Connected in parallel:-Current will get added and voltage will be constant. Cells in a string :- (72*20)1440 cells (20 panels in series constitutes a string).In order to increase current we need to connect the panels (strings) in parallel so that currentswill get added. The inclination angle of solar panel is 12 degrees and the peak power time is 11 am-1 pm which was informed by the technician.

6. **Inverter Section**

The Technician explained about the inverters which are connected from SMC of solar panels. There are 6 inverter modules in each section in which the amount of input power DC and the amount of output power AC which are generating .Inverter used in solar plant is to convert the dc power to ac power for transmission purpose (800V is converted to 400V AC and stepped up using transformer to 11Kv).He explained the auxiliary transformer usage which is present in inverter module section.Voltage near the panel :-40V dc, Voltage near the string :- 800V dc (generating voltage), Voltage near the inverter output :- 400-420V Ac, Voltage near the transformer output :- 11000 V Ac (transmission lines voltage)

From the PCU 4F, it is observed the

DC input power	:	445kW
Active Power	:	442kW
Reactive Power	:	140kvar
Efficiency	:	98.9%
Amount of Active power	:	6782.93MWh
Amount of Reactive Power	:	1351.85Mvarh
Today’s amount of active power	:	1420kWh

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7. Cauvery Hydro Power Plant

We also visited the Cauvery hydroelectric power plant which is very closer (1 km) to shivanasamudra hydro & solar power plant. This plant is Karnataka's first low head hydroelectric power plant (8metre) which is established in 1996 with a generating capacityof 3MW power. In which the plant engineer Mr. Kishore explained about the turbines, generators and the control mechanism of power plant (manual control mechanism) as shown in fig. 3.

Fig. 3 Explanation of control unit at Cauvery Hydroelectric power plant

Fig.4 Working of turbines

Snapshots of Industrial visit are attached below.

Fig.5 Group photo at Shivanasamudra hydroelectric plant

Fig.6 Group photo at Shivanasamudra Hydro power plant

Fig.7 photo at Cauvery hydroelectric power plant

Fig .8 photo of Sir sheshadri iyer hydro power station