SREE VENKATESWARA COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi and Affiliated to JNTU,Anantapur)
Northrajupalem (Vi), Kodavaluru(M) , S.P.S.R Nellore (Dt)-524316

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

LIST OF INDUSTRIAL VISITS

Academic Year	Date	Year & Batch	Name of The Company	Location	No. Of Students Attended
2018-19	23.02.2019	2016 BATCH III BTECH-II SEM	400/220/132 KV Substation	Manubolu, Nellore, A.P	58
	11.02.2019	2017 BATCH II BTECH –II SEM.	800x2 MW Thermal Power Plant ,APGENCO	Nelatur, Nellore, A.P	63
	30.10.2018	2015 BATCH IV BTECH –I SEM	SDSC-SHAR	Sriharikota, Nellore, A.P	68
	27.09.2018	2017 BATCH II BTECH –I SEM	Balaji Energy Private Ltd, Somasila (10 MW Hydro Power Plant)	Somasila, Nellore, A.P	49
	25.08.2018	2016 BATCH III BTECH-I SEM	800x2 MW Thermal Power Plant ,AP Genco	Nelatur, Nellore,A.P	58
	15.03.2014	2011 BATCH III.BTECH-II SEM	Rayalaseema Thermal Power Plant	Proddatur, Kadapa(Dt),A.P.	52

SUBSTATION VISIT DOCUMENTATION

REPORT ON SUBSTATION

INTRODUCTION:

The 400KV/220KV/132KV Sub-station is located in Kagithalapuru Road ,Manubolu i.e on Nellore-Gudur road and is 27 KMs from Nellore centre.

SOURES OF SUPPLY:

The 400 KVSS Nellore is adjacent to 400 KVSS PGCIL and both substation buses are connected through Bus sectionalizing breakers.

It consists of 2 no.s 400KV/220 KV Inter Connecting Transformers, 6 Nos 220 KV feeders, 2nos 220KV/132 KV Power transformers,5 nos 132 KV feeders to meet the load catered over the Nellore and Chittor districts.

The 400KV side one and half breaker system adopted.220 KV side double bus connected with bus coupler and with transfer Bus .132 Kv side single bus system.

The following are the Transformers available in 400/220/132 KV NelloreSubstation..

1. 2 no's 400/220KV,315 MVA Interconnecting Transformers of ABBmake
2. 2 no's 220/132 KV,100 MVA PTR of Traffo-Union make
3. 2 no's 33kv/433 volts ,630 KVA Station Transformers

The following are the six numbers 220KV feeders available in 400/220/132 KV Nellore Substation..

1. 220KV Manubolu - Nellore circuit-I
2. 220KV Manubolu - Nellore circuit-II
3. 220KV Manubolu - Nellore circuit-III
4. 220KV Manubolu - Renigunta circuit-I
5. 220KV Manubolu - Renigunta circuit-II
6. 220KV Manubolu - Sullurpet circuit

The following are the five numbers 132 KV feeders available in 400/220/132 KV Nellore Substation..

1. 132KV Manubolu - Gudur circuit-I

2. 132KV Manubolu - Gudur circuit-II
3. 132KV Manubolu - SBQ steels circuit
4. 132KV Manubolu - Nellore circuit
5. 132KV Manubolu - Chendodu circuit

SUBSTATION BAYWISE INFORMATION

There are 14 bays in 400 KV yard

1. Bay-1 is proposed line from krishnapatnam
2. Bay-2 is Tie Circuit breaker of Dia-1
3. Bay-3 is ICT-1 breaker of Dia-1
4. Bay-4 is proposed line from krishnapatnam
5. Bay-5 is Tie Circuit breaker of Dia-2
6. Bay-6 is ICT-1 breaker of Dia-2
7. Bay-7 is empty
8. Bay-8 is empty
9. Bay-9 is empty
10. Bay-10 is empty
11. Bay-11 is empty
12. Bay-12 is empty
13. Bay-13 is 1352CB i.e Sectionalizing breaker of BUS-I 14.Bay-13 is 1452CB i.e Sectionalizing breaker of BUS-II

There are 16 bays in 220KV yard

1. Bay-1 is ICT-I LV
2. Bay-2 is ICT-II LV
3. Bay-3 is Bus coupler
4. Bay-4 is 220KV Renigunta-I feeder
5. Bay-5 is 220KV Renigunta-II feeder
6. Bay-6 is 220KV Nellore-I feeder
7. Bay-7 is 220KV Nellore-II feeder
8. Bay-8 is 220KV Sullurpet feeder
9. Bay-9 is 220KV Nellore-III feeder

10. Bay-10 is 220KV Transfer Bus coupler feeder
11. Bay-11 is empty
12. Bay-12 is empty
13. Bay-13 is empty
14. Bay-14 is empty
15. Bay-15 is 100MVA PTR-II
16. Bay-16 is 100MVA PTR-I

There are 2 nos 100MVA PTR LV bays and 6 feeder bays in 132KV yard The Six feeder Bays are

1. Bay-1 is 132KV Gudur-1 feeder
2. Bay-2 is 132 KV Nellore feeder
3. Bay-3 is Empty
4. Bay-4 is 132 KV SBQ Steel feeder
5. Bay-5 is 132 KV Gudur-II feeder
6. Bay-6 is 132 KV Chendodu feeder

PROTECTIVE RELAYING:

Transformer protective relays:

- Differential relays
- Over current and earth fault protection relay
- Over flux relay
- Bucholtz relay

Other protective relays:

- Bus-bar protection
- Local breaker back up
- Pole discrepancy relay
- DC earth leakage

Capacitor Tripping Device (CTD):

CTDs are provided to Transformer Breakers i.e., for 100MVA Transformers both HV and LV.

The following Breakers are having Capacitor Tripping Device (CTD)

1. HV Breaker of 100 MVA Transformer No 1
2. LV Breaker of 100 MVA Transformer No 1
3. HV Breaker of 100 MVA Transformer No 2
4. LV Breaker of 100 MVA Transformer No 2

Note : Don't Switch off DC Switch for the Transformers Which is having Capacitor Tripping Device (CTD)

100 MVA POWER TRANSFORMERS:

There are 2 nos 220 KV / 132 KV, 100 MVA Power Transformers working in parallel at 400/220/132 KVSS Nellore Substation. Each transformer is equipped with protective switch gear both on HV & LV sides. The various protective switch gear and other associated equipment provided are discussed in the following sections.

220 KV / 132 KV, 100 MVA Power Transformer:-

The 100 MVA PTR-I of M/s Trafo-Union has provided with a Breaker, 3 nos CTs and 3 nos Lightning arresters both on HV & LV sides as protective switch gear. It is controlled by a Control & Relay panel of M/s ER.

The breaker available on HV side is of M/s AREVA. It uses Spring mechanism for operating the breaker. It uses SF6 gas as quenching medium. Hence it is necessary to maintain the rated SF6 pressure for proper quenching of Arc under normal and fault conditions. For rated pressures of Hydraulic & SF6 circuits refer section 'Technical Information of Breakers'.

The CT ratio adopted on HV side is 300 / 1 – 1 – 1 – 0.375 – 0375 – 1 A. The five cores in secondary of CT are meant for Non.dir.O/C& Dir.earth fault protection, Differential Protection, Bus bar protection scheme and for metering purposes respectively. The Over Load and Directional earth fault relay provided is CSC-211, the differential relay provided is CSC-326 of M/s ER. The over flux relay provided is CSC-211 of M/S ER.Different displays available in relays are mentionedunder the section "Reading of Relays ".

The breaker available on LV side is of M/s Crompton Greeves . It uses Spring Charge to drive operating mechanism of the breaker. Hence it is necessary to charge the spring before closing the breaker. It uses SF6 gas as quenching medium. Hence it is necessary to maintain the rated SF6 pressure for proper quenching of Arc under normal and fault conditions. For rated pressures of SF6 circuits refer section 'Technical Information of Breakers'.

The CT ratio adopted on LV side is 500 / 1 – 0.5775 - 0.66 - 1 – 1 A. The three cores in secondary of CT are meant for Over Load& earth fault protection, Differential Protection and for metering purposes respectively. The Non. dir.O/C& Dir. earth fault relay provided is CSC-211 of M/s ER. The over flux relay provided isCSC-211 of M/S ER

The other protections available for the above power transformer are Buchholtz relay, OLTC Buchholtz relay ,PRD (Pressure Relief Device) protection, Winding Temperature High trip protection, Oil Temperature high protection Low oil level alarm, Over flux protection etc.

BATTERY:

Type of Battery	Exide make maintenance free VRLA Batteries
Recommended Battery voltage	2.23+/- 0.01 at Ambient Temp of 25 to 34 C
Battery capacity	400 AH

Maximum Charging current	15 % of 10 hr rated battery capacity i.e 60 Amps
Maximum Charging volts	2.4 Volts
Minimum Charging volts	2.20 volts

BATTERY BANK:

No cells in bank	105 cells
Float voltage applied to bank	235 volts

BATTERY CHARGER:

Make	Caldyne
Mode of operation	Automatic/Manual
Out put current	Float mode - 40 Amps Boost mode - 60 Amps at Battery terminal plus 40 Amps load
Out put voltage	Float Mode Auto – 245.30 V/Cell (2.23 v/cell) Manual – 0-245.30 volts
Out put voltage	Boost Mode – up to 2.23 v/cell

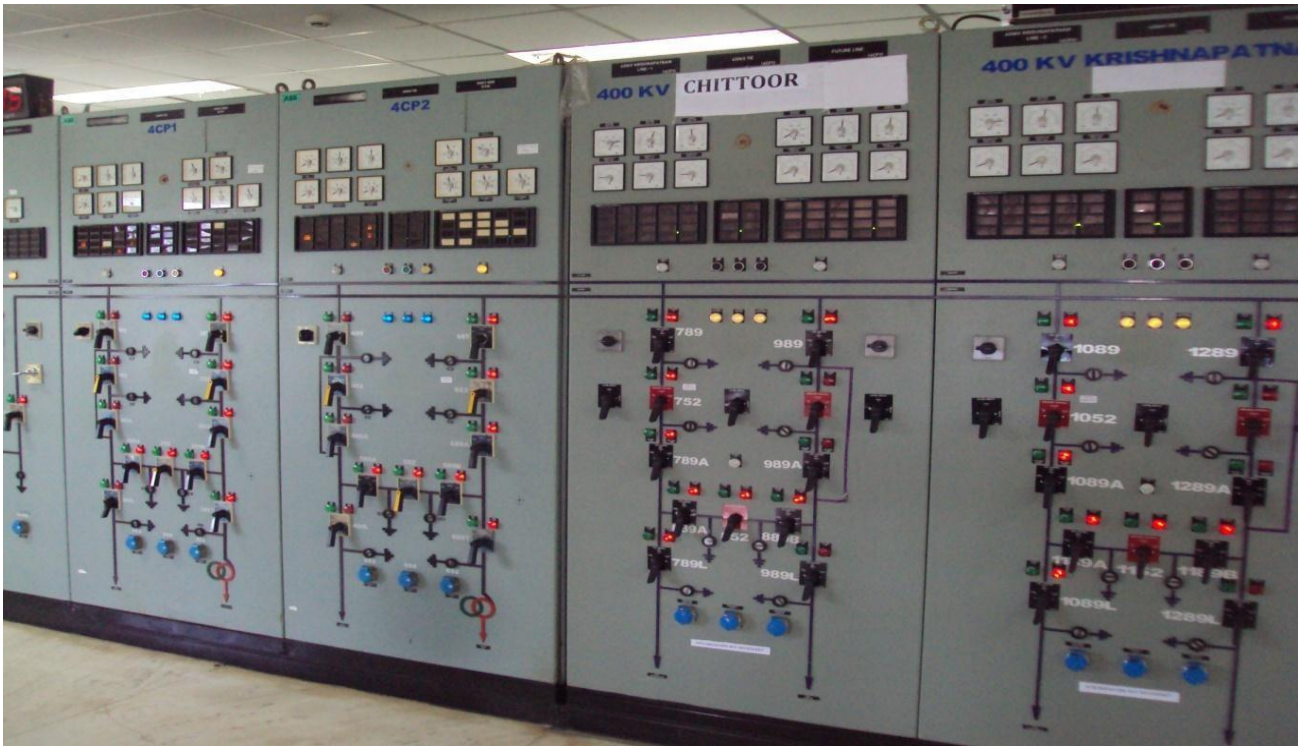
The DCDB-I connected to Battery Bank-I and DCDB-II is connected to Battery Bank-II . The two DCDB s connected (paralleled) through BUS COUPLER. Normally the bus coupler is always in open condition. Whenever LC is issued on one of the Battery Banks or on one of the chargers, then only Bus Coupler is closed to transfer DC loads on to the second one and LC issued.

Current transformers:

Potential transformers:

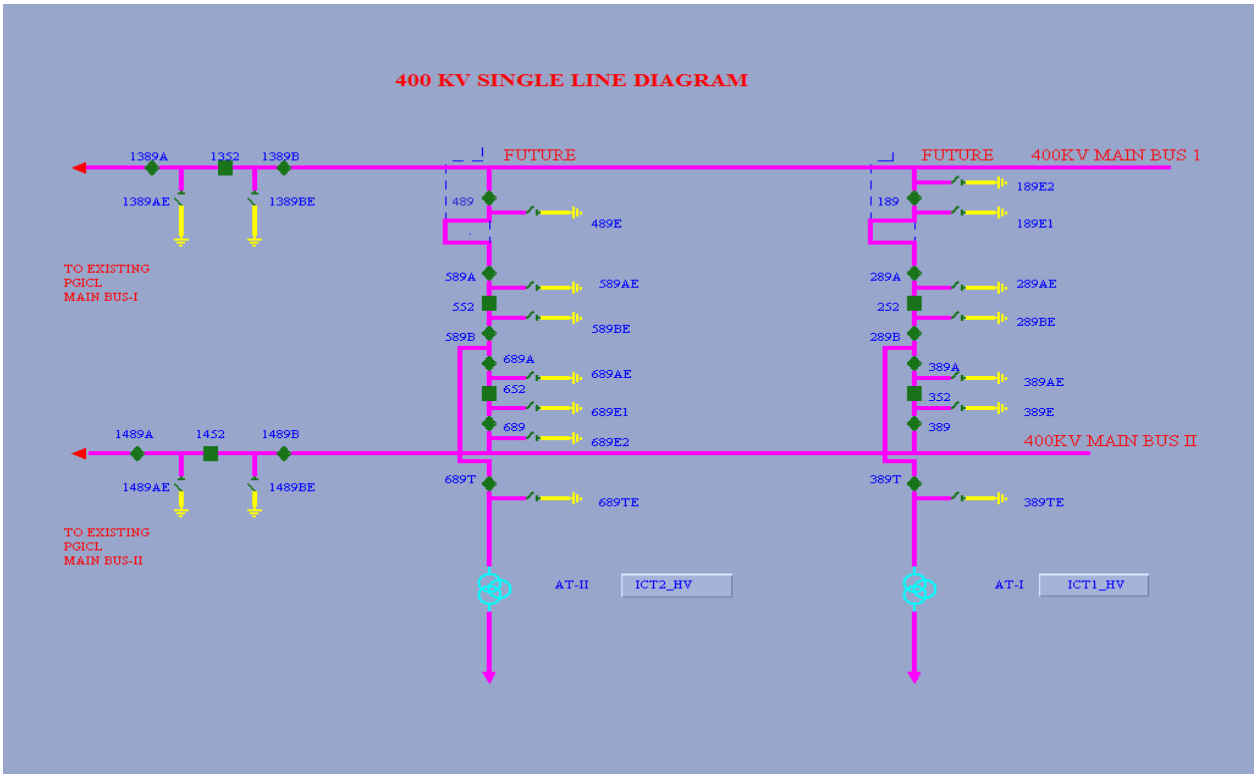
Wave tappings:

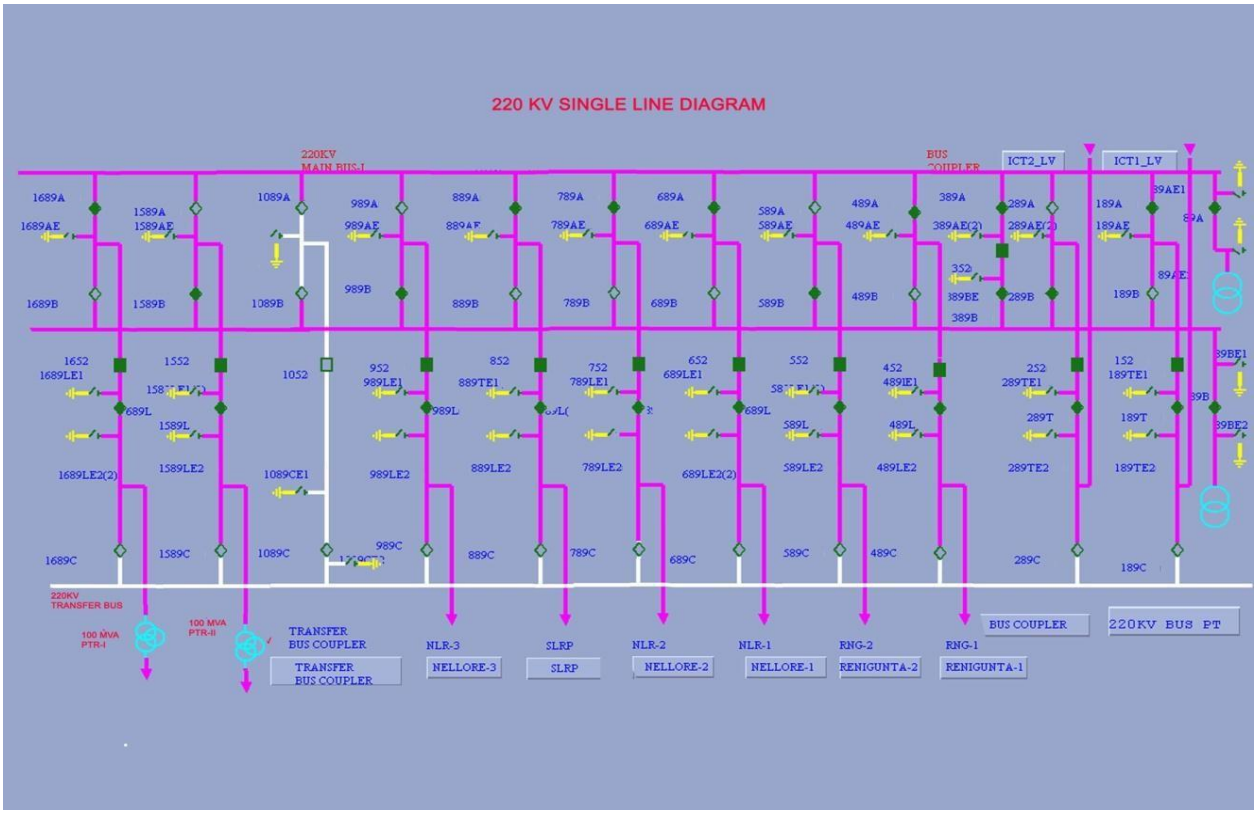
Control panels:

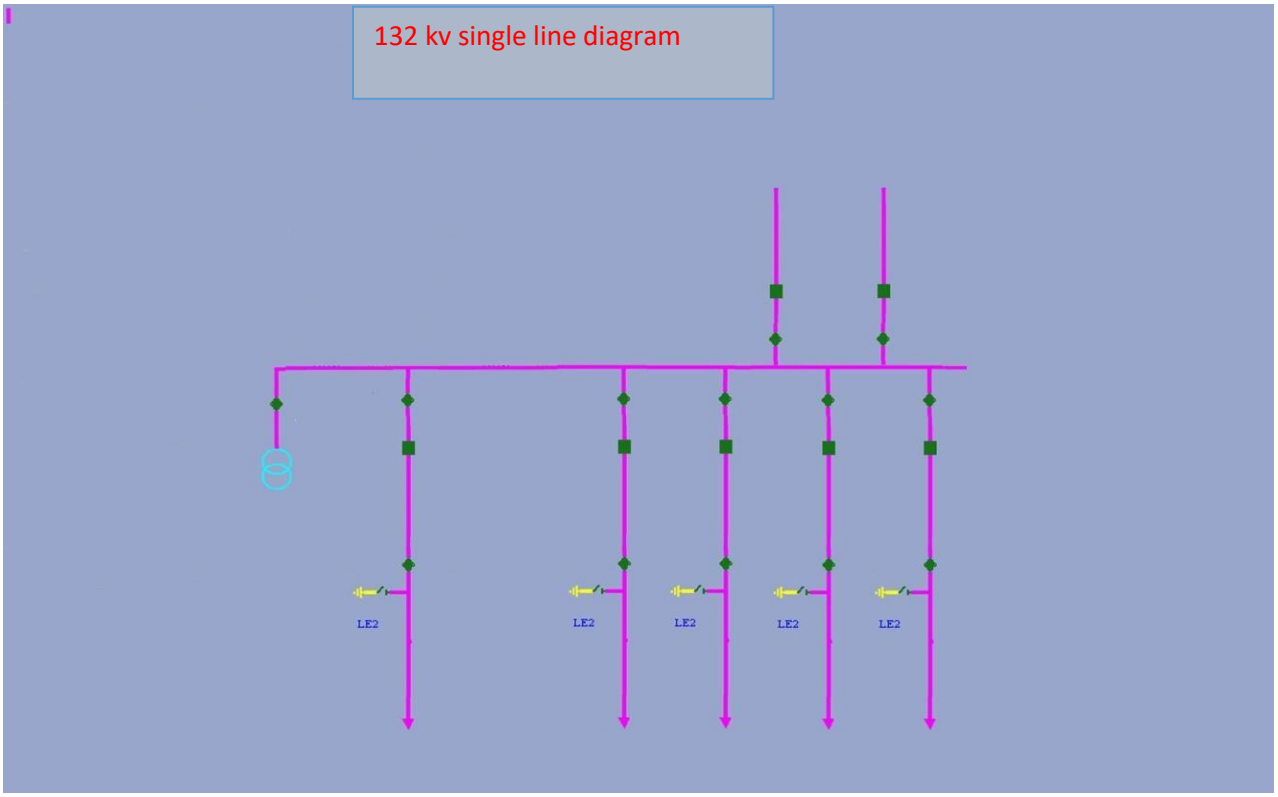


Layout:

Single line diagram of Sub-station with details of equipment is attached below


400 KV SINGLE LINE DIAGRAM
1389A
1352
1389B
1389AE
1389BE
FUTURE
489
489E
589A
589AE
552
589BE
589B
689A
689AE
652
689E1
689
689E2
689T
689TE
TO EXISTING
PGICL
MAIN BUS-I
1489A
1452
1489B
1489AE
1489BE
TO EXISTING
PGICL
MAIN BUS-II
AT-II
ICT2_HV
FUTURE
400KV MAIN BUS 1
189
189E2
189E1
289A
289AE
252
289BE
289B
389A
389AE
352
389E
389
400KV MAIN BUS II
389T
389TE
AT-I
ICT1_HV


220 KV SINGLE LINE DIAGRAM
220KV
MAIN BUS-I
BUS
COUPLER
ICT2_LV
ICT1_LV
1689A
1689AE
1589A
1589AE
1089A
989A
989AE
889A
889AE
789A
789AE
689A
689AE
589A
589AE
489A
489AE
389A
389AE(2)
289A
289AE(2)
189A
189AE
39AE1
89A
1689B
1589B
1089B
989B
889B
789B
689B
589B
489B
389BE
389B
289B
189B
89AE
1652
1689LE1
1552
1589LE1
1052
952
989LE1
852
889TE1
752
789LE1
652
689LE1
552
589LE1
452
489LE1
252
289TE1
152
189TE1
39BE1
39B
39BE2
689L
1589L
989L
889L
789L
589L
489L
289T
189T
1689LE2(2)
1589LE2
1089CE1
989LE2
889LE2
789LE2
689LE2(2)
589LE2
489LE2
289TE2
189TE2
1689C
1589C
1089C
989C
889C
789C
689C
589C
489C
289C
189C
220KV
TRANSFER BUS
100 MVA
PTR-I
100 MVA
PTR-II
TRANSFER
BUS COUPLER
TRANSFER
BUS COUPLER
NLR-3
NELLORE-3
SLRP
SLRP
NLR-2
NELLORE-2
NLR-1
NELLORE-1
RNG-2
RENIGUNTA-2
RNG-1
RENIGUNTA-1
BUS COUPLER
220KV BUS PT



CONCLUSION:

From This Industrial Tour Of Manubolu Sub Station, We Have Learned More Things Practically.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Sree Venkateswara College Of Engineering

INDUSTRIAL VISIT DOCUMENTATION

REPORT ON AP GENCO.

INTRODUCTION:-

Sri Damodaram Sanjeevaiah Thermal Power Station is located in Nelatur Village, near Krishnapatnam and at a distance of 23 km from Nellore city of Andhra Pradesh. The power plant is one of the coal-based power plants of Andhra Pradesh Power Development Company Limited (APPDCL). It is the Special Purpose Vehicle (SPV), a joint venture company of APGENCO (with 50% equity) and IL AND FS (50% equity) partnership.

The proposed capacity of plant is 1600 MW. The project is under construction and likely to be completed by the end of 2014. The Power station is designed for blended coal in the ratio of 70% washed domestic coal from Talcher Coalfield to 30% imported coal. Sea water is proposed for cooling purpose and potable water by desalination. Krishnapatnam port (about 5 km from site) will cater to the requirement of importing heavy machinery and both domestic & imported coal of 3.5 and 1.5 million tons per annum respectively.

INSTALLED CAPACITY:

Stage	Unit number	Installed capacity	Date of Commissioning	status
Stage 1	1	800MW	March 2014	running
Stage 2	1	800MW	--------	Under construction

MAIN PARTS OF RTPP THERMAL POWERPLANT:

1. COALHANDLING AND COAL PULVERIZING PLANT
2. BOILER
3. SUPERHEATER
4. ECONOMIZER
5. TURBINE
6. GENERATOR
7. CONDENSER
8. ASH HANDLING AND ASH STORAGE PLANT
9. COOLING TOWERS.
10. DISTRIBUTION

COAL HANDLING:

We all are went to coal wagons in that wagons the coal size is 200x200mm i.e., the coal is sent through this wagons to the conveyer belts later it is sent to crushes with the help of slip ring induction motor because the slip ring induction motor has high starting torque in the crushes the coal is divided into 20x20 mm. these petroleum is pulverized i.e., power form it is fed into boiler. The boiler size is 60 feet i.e., almost 8 floor building.

In the upper part of the boiler, drum is provided. The working of drum is it converts steam to water. The drum has pressure and temperature of150.39kg/cm & 1600.93degree centigrade. The drum in such a boilers do not contain any tabular heating surface so containing with smaller diameter consequently so they with stand with high pressure. Heat transfer rates run from 0.5x10^6 to 1.4x10^6 kilo-calories per hr. per cubic meter of surface. The general view of a coal transportation by using conveyer belts as shown below

CONVEYER BELTS :-

The coal from the washery to the power plant is transported by a pipe conveyor belt of 7 km length. The pipe conveyor is the second longest pipe conveyor in the world and the longest pipe conveyor in India. It is an environment friendly, non polluting safe and economic system for coal transport.

PULVERIZED MILLS AND FD FANS:

The boilers input devices i.e., three fans and millsthe three fans are:

1. PAD fans primary air fan
2. Secondary air fan.
3. FD fans i.e., forced draft fans of 150mm water column the main purpose of FD fan is seeking of power.

BOULED MILLS:

Bouled mills are like grinders which crush the coal and it is pulverized and sent to boilers. The balled mills are just like a drum i.e., 30mm,50mm etc.from the drum the steam sent to the HPT i.e., high pressure turbine. It consists of pressure 35.435kg/cm and temp. Of 28.82 degree centigrade .from it is sent to intermediate pressure turbine (IPT) and from this it is sent to the low pressure turbine (LPT) for

the purpose of reducing the pressure from LPT goes through the condenser and exciter. The condenser which condenses the exhaust steam and also removes air and non-condensable gases from steam .exhaust then it is used as recycling purposes. Due to the efficiency of a thermal power station is a decrease. Theinternal view of bouled mills as shown below:

BOILER:

The boiler is a rectangular furnace about 50 feet (15 m) on a side and 130 feet (40 m) tall. Its walls are made of a web of high pressure steel tubes about 2.3 inches (58 mm) in diameter.

Pulverizedcoal is air-blown into the furnace through burners located at the four corners, or along one wall, or two opposite walls, and it is ignited to rapidly burn, forming a large fireball at the center. The thermal radiation of the fireball heats the water that circulates through the boiler tubes near the boiler perimeter. The water circulation rate in the boiler is three to four times the throughput. As the water in the boiler circulates it absorbs heat and changes into steam. It is separated from the water inside a drum at the top of the furnace. The saturated steam is introduced into superheat pendant tubes that hang in the hottest part of the combustion gases as they exit the furnace. Here the steam is superheated to 1,000 °F (540 °C) to prepare it for the turbine.

Plants designed for lignite (brown coal) are increasingly used in locations. Lignite is a much younger form of coal than black coal. It has a lower energy density than black coal and requires a much larger furnace for equivalent heat output. Such coals may contain up to 70% water and ash, yielding lower furnace temperatures and requiring larger induced-draft fans. The firing systems also differ from black coal and typically draw hot gas from the furnace-exit level and mix it with the incoming coal in fan-type mills that inject the pulverized coal and hot gas mixture into the boiler.

SUPERHEATER:

Thermal power plants often have a super heater section in the steam generating furnace. The steam passes through drying equipment inside the steam drum on to the super heater, a set of tubes in the furnace. Here the steam picks up more energy from hot flue gases outside the tubing and its temperature is now superheated above the saturation temperature. The superheated steam is then piped through the main steam lines to the valves before the high pressure turbine, Intermediate and then low pressure turbines.

ECONOMISER:-

An economiser is a mechanical device which is used as a heat exchanger by preheating a fluid to reduce energy consumption. In a steam boiler, it is a heat ex-changer device that heats up fluids or recovers residual heat from the combustion product i.e. flue gases in thermal power plant before being released through the chimney. Flue gases are the combustion exhaust gases produced at power plants consist of mostly nitrogen, carbon dioxide, water vapor, soot carbon monoxide etc. Hence, the economiser in thermal power plants, is used to economise the process of electrical power generation, as the name of the device is suggestive of. The recovered heat is in turn used to preheat the boiler feed

water, that will eventually be converted to super-heated steam. Thus, saving on fuel consumption and economising the process to a large extent, as we are essentially gathering the waste heat and applying it to, where it is required. Nowadays however, in addition to that, the heat available in the exhaust flue gases can be economically recovered using air pre-heater which are essential in all pulverized coal fired boiler.

TURBINE:

The turbine generator consists of a series of steam turbines interconnected to each other and a generator on a common shaft. There is a high pressure turbine at one end, followed by an intermediate pressure turbine, two low pressure turbines, and the generator. As steam moves through the system and loses pressure and thermal energy it expands in volume, requiring increasing diameter and longer blades at each succeeding stage to extract the remaining energy. The entire rotating mass may be over 200 metric tons and 100 feet (30 m) long. It is so heavy that it must be kept turning slowly even when shut down (at 3 rpm) so that the shaft will not bow even slightly and become unbalanced. This is so important that it is one of only five functions of blackout emergency power batteries on site. IT SPINS AT EITHER 3,000 OR 3,600 RPM

GENERATOR:

AP JENCO has 2 *800 KW generators to meet the demand of various types of consumers and commercial loads .If anyone of the unit is failed another unit will come into action.

ASH HANDLING AND ASH STORAGE :-

COOLING TOWERS :-

. A **cooling tower** is a heat rejection device which extracts waste heat to the atmosphere through the cooling of a water stream to a lower temperature. Cooling towers may either use the evaporation of water to remove process heat and cool the working fluid to near the wet-bulb air temperature or, in the case of *closed circuit dry cooling towers*, rely solely on air to cool the working fluid to near the dry-bulb air temperature. Common applications include cooling the circulating water used in oil refineries, petrochemical and other chemical plants, thermal power

stations and HVAC systems for cooling buildings. The classification is based on the type of air induction into the tower: the main types of cooling towers are natural draft and induced draft cooling towers.

WATER STORAGE :-

DISTRIBUTION:-

Thus the output is about 28% to 30% from this we can conclude that the more loss is at condenser.

CONCLUSION:

From This Industrial Tour of AP GENCO We Have Learned More Things Practically.

PHOTOS:-

SREE VENKATESWARA COLLEGE OF ENGINEERING

INDUSTRIAL VISIT DOCUMENTATION

REPORT ON SATISH DHAVAN SPACE CENTRE SHAR

The following is the report on the industrial visit to the SDSC, SHAR (Satish Dhawan Space Centre, Sriharikota Range).There were atotalof52students,2 Staff members and 2 others.

We can see a video – 'Gateway to Space' - on the ISRO, its history, and the current facilities available. After the video, questions were fielded to the official, and they were answered with ease.

THE 'GATEWAY TO SPACE' VIDEO:

The GSLV and PSLV are the two launch vehicles used currently by ISRO to launch satellites in to the geo synchronous and polar orbits respectively. The GSLV has 3 stages – the first is a solid(fuel) stage, the second a liquid (fuel) stage and the third is a cryogenic stage. The satellites launched so far have applications such as National development/infrastructure, telecom, disaster warnings, resource management, etc.

The PSLV can launch multiple satellites simultaneously at a low cost and high reliability. The various facilities at SDSC were listed and their functions explained in brief.Weather predictionis another important factor atthetime of launch, and the SHAR boasts of this facility too.The latest addition to the SDSC was the S200 propellant plant.

THE FOLLOWING TECHNICAL DETAILS WERE GIVEN:

The countdown begins at (t-57) hours. At this time, the liquid propellants are filled into the system. At (t-16) hours, the mobile service car is with drawn and the system is connected to the Launch and Mission control Centre (which are placed 6km from the launch site) through electrical wires only. The cryogenic fuel is set around the launch site.The mission director and other senior scientists assemble at the Mission Control Centre. The computer networks do the complex calculations, and other details like mission safety are all displayed. At (t-6) seconds, the strap on motors ignite, and the solid boosters ignite next at t=0. The performance is monitored in real time. High precision radars are used to track the vehicle right from lift off to satellite injection. Such radars are present in PortBlair, Mauritius, and Indonesia for real time monitoring. At about 17minutes after blast off, the GSLV completes the mission–puts the satellite in geo synchronous orbit. The following map shows the direction of launch of various types of launch vehicles.

The Sriharikota Range has been chosen for its proximity to the equator and to use the rotation of the earth.It is close to Lake Pulikat and is a bout 100km north of Chennai and close to the Bay of Bengal.

QUESTIONS AND ANSWERS [EXTENSION OF THE 'GATEWAY TO SPACE' VIDEO]

1. What is LEO?

A:Low earth orbit, at 350-400 km from earth's surface.

2. What is the difference between Liquid and Solid propellants?

A:Liquid propellants have higher efficiency, but lesser thrust, while solid propellants have lesser efficiency but greater thrust.

3. What can be the possible reasons for failure of launch?

A:Poor work man ship is the root of all failures of launch.

4. What are the factors which are used to decide the location of a space centre?

A:Proximity to equator,closer to water sources, lesser population (in case of an toward incident)are the main factors. Ideally, the equator will be best spot for launch of a satellite because it offers the shortest path. Also, the eastcoast is best suited to take advantage of earth's rotation.

5. What are the similarities and differences between GSLV and PSLV satellites?

A: Both the vehicles have similar electronics and same first and second stages. The PSLV has a maximum payload of about 1500kg and the orbit is at 800/900km. It has a third stage of solid propellant and fourth stage of liquid propellant. It has a propulsion system of 6 liquid propellant

starters.

The GSLV has a maximum payload of about 2000kgs. It has a third cryogenic stage for better performance and has no fourth stage. It has 4liquid propellant starters.

6. What about the disposal of satellites after their lifetime?

A: Low earth orbit satellites decay by themselves after their lifetime. They enter the earth's atmosphere and are burnt by friction. Geo synchronous satellites have reserve propellants which are used to push them out into deep space. Also, the retrieval of satellites which are damaged prematurely is being researched.

MISSION CONTROL CENTRE:

After another round of security checks, we were taken to the Mission Control Centre. We were seated in the visitor's box where the VVIPs are seated during launches. Here,we were told about the history and geographical features of SHAR. The SHAR was renamed SDSC after former ISRO chairman Prof. Satish Dhawan on the 5th of September, 2002. The range is about 175 sq. km in area and has a coast line of 60km.

The mission control is the focal point of the controlling the vehicle. There are 8 'hold buttons' at different places around the range.Incase of abnormalities in subsystems (affecting the health of the rocket), the hold button is used to terminate the countdown. In case the abnormality has been resolved, the vehicle director can arrange to resume the countdown.

The mission control center has several rows of computers. The first row is used to supervise the control of the launch vehicle. This is the position of the directors and the chairman. The vehicle director is also seated with the other senior scientists. The second and third rows

control the operations on the vehicle. Various chiefs of operations are seated in the serows. These computers are connected by Ethernet and fibre optics.

There is a separate ring safety server which is controlled by a senior scientist. In case of abnormalities in the path of the rocket, this person can detonate the rocket so that the rocket is blown up over the sea and does not affect neighbouring human population. There are 45 levels of information relating to the launch of the rocket. The supervisory row (first row) receives this information on multi-channel CCTVs. Also, 8 channel intercoms are available for voice communication.

The vehicle Director authorises the launch at (t-16) minutes. An automatic sequence program checks the health of the rocket(with respect to various parameters) and ensures that any deviations in the parameters are within specific limits.

ISRO TELEMETRY, TRACKING AND COMMAND NETWORK (ISTRAC) SHAR GROUND STATION

Various animations related to the tracking rockets and the orbiting of satellites were shown.There was another animation of the Chandrayaan's route to the moon. The MIP had to make 5orbits around the earth and 4 around the moon before impact. Each orbit around the earth was of increasing height and each orbit around the moon was of decreasing height.

LAUNCH PAD II:

This is the location that we see every time a launch is broadcast on television. The rocket is assembled and brought to the launch pad. The rocket is electrically insulated from lightning by 4 lightning protection towers. These towers also house high resolution cameras at several levels to monitor the various stages of the rocket. These cameras are protected by concrete enclosures. The launch pad itself is about 70m high. This means that the protection towers are even taller. An anchor is present to hold the rocket in place until the time of blast off. Separate pipes are present to deliver cryogenic fuels, which are supplied at(-)180 degrees Celsius. Finally, there are exhaust deflection ducts which deflect the exhaust gases through under ground tunnels to a place which is a few tens of metres away. In case the flame returns to the rocket, balance will be lost and the rocket may topple. The tunnels are filled with water to reduce pressure and temperature. Also, cryogenic fuel tanks are available in separate towers.Each floor in the launch pad is 4m high. This launch pad is called ‘umbilical’ due to the presence of the pipes which feed fuel to the rocket.

LAUNCH PAD I:

Unlike the ‘umbilical’ type, this is a pedestal type. The whole tower moves away from the rocket just before the blast off. As a particular ‘fuel regulation’ process was taking place at the time, entry was denied.

ASSEMBLY AND STATIC TEST AND EVALUATION COMPLEX:

This was the last location visited in the range. Two buildings constitute the complex – the assembly building and the test buildings which are placed adjacent to each other. Motors which are in excess of 2m dia are present and they are fabricated in Mumbai.

Several tests are done on a launch vehicle, such as vibration test, centrifugal test, and statictest.Of these, only the static test is done in SHAR. There are work of statictests-ballistic test and the other is to optimize insulation. After assembly, the motors are tilted horizontally and they are integrated to floating members. The floating members are in turn connected to fixed members. The floating members are made to undergo thrust from the motors and the strain is determined from them.From a calibration curve, the strain is converted to thrust and the motor is characterized. Flexible nozzles of the strap on motors are also tested on this test bed.

The over all experience was enthralling n and inspiring.It help edusappreciate the complex working and tireless effort of the scientists who work to make each launch a success. The inspiration derived was well worth the time spent. We returned with newly found patriot is filled with in us, as the trip revealed India to be a superpower in Space Sciences.

CONCLUSION:

From This Industrial Visit Of SHAR We Have Learned More Things Practically.

SREE VENKATESWARA COLLEGE OF ENGINEERING

INDUSTRIAL VISIT DOCUMENTATION

REPORT ON SOMASILA HYDRO ELECTRIC PROJECT

INTRODUCTION:

Balaji Energy to setup 10 MW somasilahydro electric project in Somasila in Atmakur Taluka in Nellore(Dt) of Andhra Pradesh. The project involves setting up of two units of vertical Kaplan adjustable blade type turbines of capacity 5 MW each to harness the hydro potential available at Somasila reservoir. The project had been commissioned in 2007.

Objective:

The objective of the project was to meet the increasing demand for electric power (particularly during peak hours) in AP by constructing a pumped-up power plant in AP that would utilize the SomasilaReservoir as its upper reservoir and as its lower reservoir, effectively utilizing the river flow rate, and thereby contribute to the industrial promotion and improvement of the residents' lives by electrification in AP.

Somasila Reservoir is constructed across River Pennariver near Somasila, village of Ananthasagaram Mandal in Nellore District of Andhra Pradesh.The Project envisages storage of 78.00TMC of water at F.R.L. +100.58M. The contemplated ayacut under the project is 5, 84,500 acres in SPSR Nellore and Prakasam Districts. Out of which stabilization of wet ayacut under Pennar Delta Kanupur canal system and existing tanks in up lands is 4,05,500acres and new I.D.is1, 79,000 acres. Out of the above ayacut an extent of 82,500 acres stabilization and 1,35,000 new I.D is under Somasila

Project canals viz., GKNC Canal (North Feeder Channel), south feeder channel and Kavalicanal.The allocation of water for the above ayacut is 60.892 TMC. It also envisages to transmit 30.00 TMCof water to Kandaleru Reservoir under Telugu Ganga Project for irrigating 3, 00,000 Acres of I.D. ayacut in Nellore and Chittoor Districts besides 15.00 TMCof Krishna water to Chennai city for drinking water purposes. In addition to the above 2.40 TMC of water was allocated to Nellore, Kavali, Gudur and Tirupathi towns for drinking water needs. The Andhra Pradesh State Electricity Board has sanctioned 2 x 5 M.W. Mini HydelScheme for Power Generation at Somasila Dam, Nellore District for captive utilization in G.O. M.S.No.180, dated 29.12.1994 in favor of M/s.Balaji Power Corporation Private Limited. Further the Government in G.O.Ms.No.100 I&CAD. TGP-I(2) Department, dated 9.7.1999 have issued no objection certificate to hand over the scheme to the said firm for implementing the Power Project. Accordingly the firm has executed the Mini Hydel Project including civil, electrical and mechanical works and water is being supplied to power house and project is commissioned in the year during December 2005and it is enhanced to 2 X 6 MW i.e. 12 MW. Approval accorded for an additional capacity of 11 MW and will come into operation in due course.

Location of Head works	:
Village	: Somasila
Mandal	: Ananthasagaram
District	: Nellore (Foreshore area in Kadapa Dist.)
River/Tributary	: Pennar River
Nearest City/ Town (including KMs.)	: Nellore 90 KMs
Name of the upper stream projects	: Mylavaram Dam, Cheyyeru Project and Lower Sagileru.Project (Complete).
Village benefited	: 101 Nos
Mandals benefited	: 15 Nos
Catchments area	: 48,645 Sq.km
Maximum Flood discharge (observed)	: 6,26,274 Cusecs, 2001year
Designed Discharge at F.R.L	: 6,95,000 Cusecs
Designed Discharge at M.W.L	: 7,90,000 Cusecs
Gross Capacity at FRL in TMC	: 77.988 TMC
Water spread area at FRL (Sq.Km.)	: 212.285 Sq.km
Water allocation	: 60.892 TMC
Average Monsoon rainfall	: 1031.76 mm
FRL/MWL	: +100.58M/+101.80M
Gross storage	: 77.988 TMC.
Dead Storage	: 7.567 TMC
Live storage between MDDL&FRL	: 70.421 TMC
Budget for the Year 2015-16	: Plan â€“ 124.9800Crs.

Irrigation Potential:

The total ayacut contemplated under the Project is .4,05,500 acres wet (stabilization) and 1, 79,000 acres (New I.D) ayacut.

Component Works	:
a) Earth Dam	:
i) Type of dam	: Zoned Earth Dam
ii)Total Length	: 352 Meters
iii)Top width	: 18 Meters
b) Non Over Flow Dam	:
i) Type of dam	: Masonry Gravity
ii) Total length	: 172.53 Meters
iii) Top level	: 105.15Meters
c) Spill Way	:
i) Type of Spill way	: Ogee Type
ii) Total Length	: 236.21 Meters
iii)Crest level	: 86.87 Meters
d) No.of Gates	: 12 Nos.
Size of the radial gates	: 15.24 x 14.17 meters
e)Maximum Designed Discharge	6, 95,000 C/s at F.R.L.100.58 meters. 7, 90,000 C/s at : M.W.L.101.80 meters

Irrigation Potential:

The total ayacut contemplated under the Project is .4,05,500 acres wet (stabilization) and 1, 79,000 acres (New I.D) ayacut.

The Mandals covered are Alluru, Bogolu, Buchi, Dagadarthi, Indukurpet, Kovur, Kodavalur,Muthukur, Nellore, Sangam, ThotapalliGudur, Venkatachalam, Vidavalur, Podalakur, Nellore Rural, Manubolu, Jaladanki, Kaligiri, Kavali, Kaluvoy, Chejerla, Podalakur, Ananthasagaram, Atmakur, Marripadu and A.S.Peta.

Type & Category:

According to the Appendix B to the simplified modalities and procedures for small-scale CDM project activities the proposed project activity fall under the following type and category.

Project Type: Type I – Renewable Energy Projects

Category I.D: Renewable Electricity Generation for a grid

The project activity utilizes renewable hydro potential for power generation and exports the generated power to the grid. Since, the capacity of the CDM project is 10 MW, which is less than the qualifying capacity of 15 MW, the project activity is regarded as small-scale CDM project activity and UNFCCC indicative simplified modalities and procedures are applied.

Technical details of the project activity:

The project activity envisages generation of hydel power utilizing the head created at the existing Somasila irrigation dam. It is proposed to have a separate water conductor system for drawing the required quantum of water from Somasila Reservoir through an approach channel followed by a tunnel to the intake dam and release of water after power generation into the Pennar River. The project comprises of two synchronous generators of capacity 5 MW each coupled to two units of Vertical Kaplan adjustable blade type turbines. Power is evacuated through 33/11 KV sub-stations at Somasila and Anantasagaram. Power evacuation is taking place from two sub-stations as the individual substation does not have the required load. The project installed capacity and data is as follows:

Brief technical details of the project design:

Hydrology

Design Discharge : 69.61 m3 /sec

Average Gross head : 21.55 m

Net Design head : 17 m

Energy:

Gross energy generation : 31.00 GWh

Annual export to the grid : 30.69 GWh

Plant Equipment:

Type of turbine : Vertical Full Kaplan Type

Type of generator : Brushless Synchronous

No. of generating units : 2 Nos.

Capacity of each generating Unit : 5 MW

Generation voltage : 11 kV Grid

interfacing voltage : 33 kV

Frequency : 50 Hz

LOCATION:

Somasila hydro Power Station is located at somasila in Andhra Pradesh. The power plant is one of the hydro peak power plants of APGENCO.

Fig : Map showing the Project Location in Nellore District in Andhra Pradesh

Main Parts of Somasila Hydro Powerplant:

1. DAM
2. SPILLWAYS
3. PENSTOCKS
4. TUNNELS
5. SURGE TANK
6. TURBINE
7. GENERATOR

DAM:

Dams are structures built over rivers to stop the water flow and form a reservoir. The reservoir stores the water flowing down the river. This water is diverted to turbines in power stations. The dams collect water during the rainy season and stores it, thus allowing for a steady flow through the turbines throughout the year. Dams are also used for controlling floods and irrigation. The dams should be water-tight and should be able to withstand the pressure exerted by the water on it. There are different types of dams such as arch dams, gravity dams and buttress dams. The height of water in the dam is called head race.

SPILLWAYS:

A spillway as the name suggests could be called as a way for spilling of water from dams. It is used to provide for the release of flood water from adam. It is used to prevent over toping of the dams which couldresult indamage or failure of dams. Spillways could be controlled type or uncontrolledtype. The uncontrolled types start releasing water upon water rising above aparticular level. But in case of the controlled type, regulation of flow is possible.

PENSTOCKS:

Penstocks are pipes which carry water from the reservoir to the turbines inside power station. They are usually made of steel and are equipped with gate systems. Water under high pressure flows

through the penstock. A tunnel serves the same purpose as a penstock. It is used when an obstruction is present between the dam and power station such as a mountain.

POWER STATION:

Power station contains a turbine coupled to a generator. The water brought to the power station rotates the vanes of the turbine producing torque and rotation of turbine shaft. This rotational torque is transferred to the generator and is converted into electricity. The used water is released through the tail race. The difference between head race and tail race is called gross head and by subtracting the frictional losses we get the net head available to the turbine for generation of electricity.