Good afternoon,

My topic is to explain you about the electrical distribution system at Computer Centre. But before going to that let me explain about the available power systems in India. Now a day each and every appliance in our home and office works on electricity. Where from we are getting electricity? None else then the generating stations. What are the types available?

Slide 1:

India gets its major share of electricity from thermal power. This slide shows a thermal power plant run by NTPC. The fuel used in the thermal power station is coal. We have abundant coal deposits and we are using the same. We can understand the operation of a thermal power station from the next slide

Slide 2&3:

This is a simple flow chart of a thermal power station. The main components are the furnace and the boiler. Coal is burnt in the furnace and the heat is used to boil the water in the boiler. Water is fed into the boiler with the help of feed water pump. As you all know water’s boiling temperature is 100 deg. C where it converts from liquid state to gaseous state called steam. The hot steam is pressurized through various stages and final high pressure steam is released on the turbine fins or blades. As a result the turbine starts to rotate. The turbine is mechanically coupled to the alternator or generator which converts mechanical energy to electrical energy. Faradays law of electromagnetic induction: Whenever a conductor is moved in a magnetic field such that it cuts the field, an emf is generated in the conductor. The steam is sent to a condenser where it again gets converted in to liquid state water and sent back to the boiler and the loop continues.

The other side of the furnace, the gases from the burnt coal are sent to the tall chimney for exhaust.

The thermal power station is 40% efficient but still we dependent on this system due to abundant coal reserve. But soon we are going to exhaust the reserves due to over exploitation.

Slide 4 & 5:

We can see how a Hydral power plant is built. These plants are limited and are generally built in the hill valleys where abundant water flow is available. Water flow is more during rainy seasons. So we can’t depend on Hydral power plants completely to cater our needs. Let’s see the operation. The flowing water is stored in a reservoir. The water in the upstream or reservoir is with high pressure and is released through a control gate and is directed on to the turbine with high velocity. It is coupled to the generator which generates electricity. The generated electricity is fed to a step up transformer and sent to the transmission lines for distribution.

Slide 6:

Here we can see Wind mill power plant. Again these units are located where we have lot of wind and is also seasonal dependent. Wind rotates the blades of the mill which are coupled to the generator which produces electricity which is further stepped up and sent to the grid for transmission and distribution.

Slide 7:

Let’s come to the atomic power plant where we are working. We in IGCAR develop the technology for future reactors. We use radio-active materials like Uranium, Thorium as fuel in these reactors. We have different technologies used in these reactors. MAPS is a loop type reactor. Uranium is used as primary fuel in this reactor. Nuclear fission is adopted to generate heat in the reactor vessel. We can see the block diagram. The radio-active material is placed in the reactor vessel and fission process is initiated by a Nuclear Physics personal. Enormous amount of heat is generated in this process which is transferred to the coolant in the reactor vessel. Control rods control the nuclear reactions. MAPS uses heavy water called Deuterium as its coolant and moderator. The water gets boiled and converts in to steam and is directed on to the turbine which is coupled to the generator which produces electricity.

One of the major disadvantages observed in this reactor technology is what if the loop fails? The heat cannot be transferred and it may lead to a nuclear accident. Hence Scientists came out with a new current technology which we are implying in the BHAVINI reactor. It is a proto type fast breeder reactor. Thorium is used as fuel. This is not a loop type reactor but a pool type reactor. Sodium is used as coolant. At room temperature it is in solid state. Sodium melting point is 97.79Deg.C. and boiling point is 882.9degrees Centigrade. This is a high range of temperature between melting and boiling point. Hence the temperature retentivity of Sodium is very high. We have Boran Carbide B4C control rods to control the power of the reactor. Two redundant shut down mechanisms CSRDM and DSRDM are designed. Apart from this we have Transfer Arm for loading and unloading of fuel SA’s.

Slide 10:

This slide shows the transmission and distribution of power from generating station to the consumer. Electricity is usually generated in power stations at about 22,000 volts, then increased by substation transformers to 275,000 and 400,000 volts, and fed into the National Grid system to be transmitted, efficiently, over long distances. High voltage transmission is preferred to reduce transmission losses. Power is same at the transmission and the receiver end. It is cheaper to generate at a relative lower voltage and then step it up for transmission. Hence, most power generating plants are designed to operate at 11KV.

The high voltage lines are transmitted at 11KV,22KV,33KV,66KV,132KV and 220KV in India as the provider wanted to make sure the receiver would get at least 10KV,20KV,30KV,60K,120KV and 220KV` after a ten percent voltage drop