



# SNS COLLEGE OF TECHNOLOGY

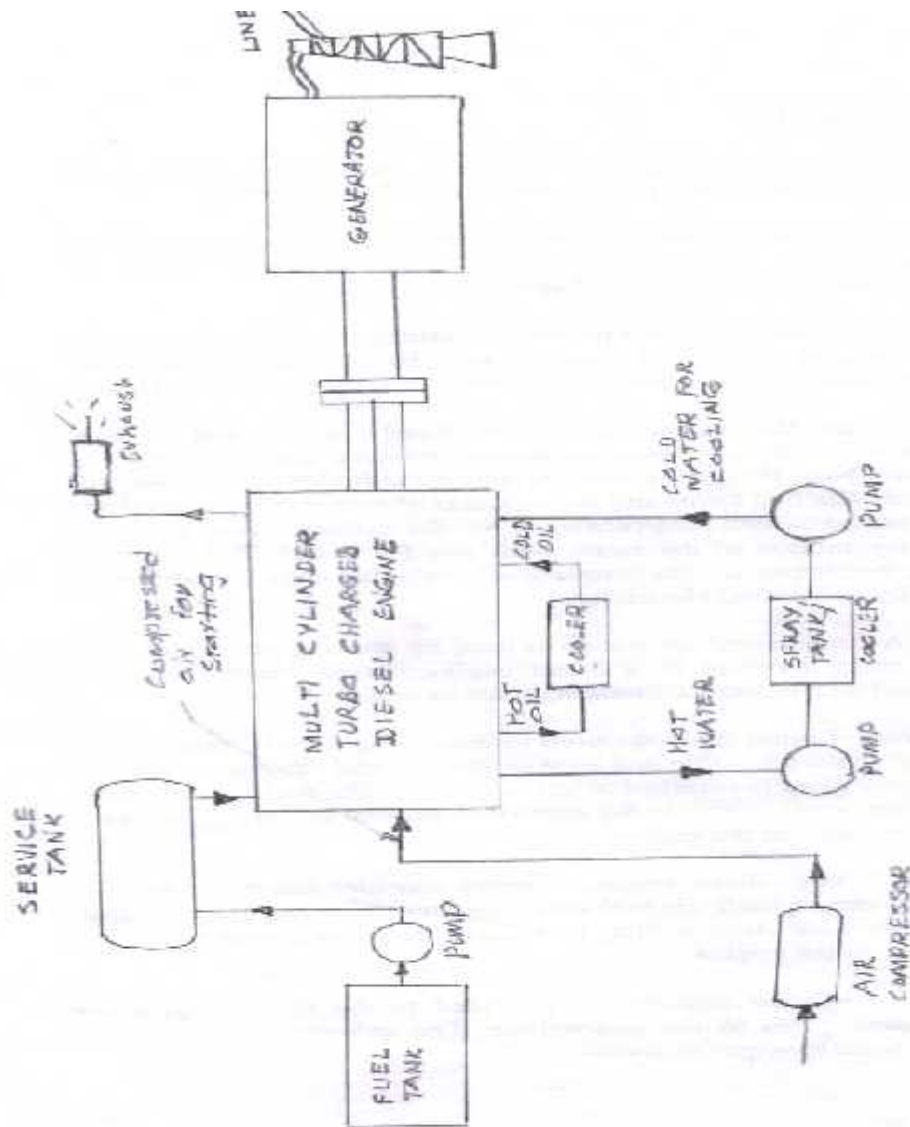
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## Department of Mechanical Engineering

### Diesel Power Plant



LAYOUT OF DIESEL POWER PLANT

A generating station in which diesel engine is used as the prime mover for the generation of electrical energy is known as Diesel Power Plant.

The diesel power plant consists of the following components: 1. Diesel engine 2. Starting system 3. Fuel supply system. 4. Air intake system 5. Exhaust system 6. Cooling system and 7. Lubricating system.

**Diesel Engine:** It is the central, power producing element in the power plant. It is a compression ignition engine. The engine may be of two or four stroke engine but the two stroke engine is more preferable. Usually multi cylinders are used.

Atmospheric air enters the cylinders of the diesel engine and is then compressed. At the end of the compression, the temperature and pressure of the air reach high values. Now the fuel is injected into the cylinder through the fuel injectors and ignited. The fuel burns and the products of combustion expand and exert force on the piston, which reciprocates inside the cylinder. This motion is converted into rotary motion of the crank shaft and fly wheel. The engine is directly coupled to the alternator. The torque available at the engine shaft rotates the alternator thereby generating electricity.

**Starting system:** A compressed air system is used for starting the engine. The high compression ratio involved in a diesel engine makes starting by hand cranking difficult and so mechanical cranking must be restored.

**Fuel supply system:** Liquid fuels are used in diesel engines (IC engines) on account of their high calorific value and ease of storage and handling. The fuel delivered to the power plant is received in storage tanks. The fuel from the tank passes through a filter which removes the impurities present in the fuel before it is injected into the cylinder of the engine.

**Air intake system:** A large diesel engine requires considerable amount of air for combustion. The atmospheric air will vary in temperature and dust content. The air system is provided with a filter to remove dirt which may otherwise cause excessive wear of the engine.

**Exhaust system:** An exhaust manifold is provided to the diesel engine for conveying the exhaust gases to the atmosphere. The exhaust system should silence the exhaust noise to requisite levels.

**Cooling system:** The temperature existing in the engine cylinder due to the burning of the fuel are in the order of  $1500^{\circ}\text{C}$  to  $2000^{\circ}\text{C}$ . These temperature may cause uneven expansion of the engine parts such as cylinder head, walls, piston and exhaust valves. Thus a well designed cooling system is essential for proper cooling of the engine and for a long life of the engine but at the same time it should not provide excessive cooling of the engine. Cooling water is kept in circulation around the cylinders by the jacket circulating pump.

**Lubricating system:** This is essential to reduce wear and tear of the moving parts. Lubricating system is also used to cool the engine to a certain extent. In a lubricating system, the oil which is hot after lubricating the various parts of the engine returns to the lubricating tank. The hot lubricating oil is then sent to the oil cooler where it is cooled by the cold water coming out of the heat exchanger.

In a diesel power station, diesel engine is used as the prime mover. The diesel burns inside the engine and the products of this combustion act as the working fluid to produce mechanical energy. The diesel engine drives the alternator which converts mechanical energy into electrical energy. As the generation cost is considerable due to high price of diesel, such power stations are only used to produce small power.

**Advantages:**

- 1.The design and layout of the plants are quite simple.
- 2.It occupies less space.
- 3.It can be located at any place.
- 4.It can be started quickly and it can pickup load in a short time.
- 5.It requires less quantity of water for cooling the engine.
- 6.Overall cost is less than that of a steam power plant.
- 7.The thermal efficiency is high.

**Disadvantages:**

- 1.The plant has high running cost.
- 2.The plant is suitable to generate small power.
- 3.Maintenance cost is more.