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## Power Plant Engineering Interview Questions

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#### **Q1. What is Power plant engineering?**

Power plant engineering is also known as power station engineering that copes with the production, transmission, sharing and usage of electric power. In this process, energy from chemical forms like coal, fuel etc. is converted to the kinetic energy of turbines which in turn helps in the generation of electricity.

#### **Q2. What is the function of economizer?**

As the name suggests, an economizer is a mechanical device used to economize the process of electrical power generation.

##### **Function of the economizer:**

- Economizer works as a heat exchanger by preheating a fluid which as a result minimizes energy consumption.
- In a steam boiler, it heats the fluid and recovered residual heat which in turn is used to preheat the boiler feed water that is ultimately converted to superheated steam. In this way, it saves fuel consumption and gathers the residual heat to use it wherever it is required.
- In addition to this, the economizer also used the heat produced from the combustion of the flue gases before releasing them through the chimney.

#### **Q3. Enlist different types of power plants?**

There are many types of power plants in the world that work together to satisfy the growing need for electric power. Below mentioned are some main types of power plants.

1. Hydroelectric power plants: Hydroelectric power is an eco-friendly power plant and it is the most effective of all. As the name suggests, it generates electricity from water.
2. Nuclear power plants: It is a type of power plant that produces a massive amount of energy. It produces

electricity by converting nuclear energy into electricity.

3. Coal-run power plants: In this type of power plant, we have a very large carbon footprint. It satiates 40% of the world's energy needs.
4. Solar power plants: Solar power plants generate electricity by converting sunlight into electricity by using photovoltaic cells.
5. Wind power plants: In this plant, wind energy is converted to electrical energy by using wind turbines.
6. Geothermal power plant: It uses the earth's core heat to create steam.

#### **Q4. What are the main units in a gas turbine power plant?**

The main units in a gas turbine power plant can be stated as the different sections it consists. Gas turbines are basically comprised of three primary sections mounted on the same shaft. These are the compressor, the combustion chamber (or combustor), and the turbine. Whereas the compressor can be either axial flow or centrifugal flow.

#### **Q5. List few advantages of high pressure boilers in modern thermal power plant?**

Followings are some advantages of high-pressure boilers in the modern thermal power plant.

1. This type of boiler does not need a circulation pump.
2. It is light in weight
3. As the drum is absent in a high-pressure boiler, the initial cost is low.
4. It takes very little time to start and can be put in service in 15 minutes.
5. It does not demand a high heat of vaporization.
6. A high-pressure boiler does not need much area as they are small in size.
7. Heat is divided into every part so the danger of overheating is less.
8. It also works at supercritical pressure.
9. The plant efficiency in this boiler is also high.

#### **Q6. What are commercial sources of energy?**

**Commercial sources of energy** are those sources that are used to generate electricity. These sources are easily available in the market at a specific price. There are many commercialized forms of this energy source. For example. Coal, advanced petroleum products.

#### **Q7. What is use of steam turbine?**

The steam turbine is used in many applications. Some examples are mentioned below: -

1. **Combined Heat and Power system:** One of the major uses of Steam turbines can be seen in combined heat and power (CHP) systems where it supports the system.

2. **Driving Mechanical Equipment:** Steam turbines are also used in many driving equipment like refrigerator chillers, boiler feedwater pumps, air compressors.
3. **Combined Cycle Power Plants:** Steam turbines are used in large industrial applications and power plants. These turbines permit power plants to produce power by using gas turbines and utilize heat and gas to produce steam in the process. This steam further generates additional power. Combined cycle power plants including steam turbines can achieve electrical efficiency beyond the 50-per cent mark.

### **Q8. What are the two types of coal handling?**

The two types of coal handling are hydraulic coal handling systems and mechanical coal handling systems. It can be handled by different equipment's of coal transfer such as:

- Belt conveyors.
- Screw conveyors.
- Bucket elevators.
- Grab bucket elevators.
- Flight conveyors or scrapers.

### **Q9. When and where first nuclear power plant is installed in India?**

India launched its first nuclear power plant in Boisar, Maharashtra in Oct-1969. It is known by the name Tarapur Atomic Power Plant-1 (TAPS-1). In today's time, India has a total of 22 operating reactors in 7 nuclear power plants. The total capacity of all these reactors is around 6780 MWe.

### **Q10. What is Boiler draught?**

Boiler draught is the small difference between the pressure of the atmosphere and the air present in a chimney or furnace. A boiler is used to produce the draught so that it can provide enough air for combustion. This makes the hot gases present in a chimney, flow through the system and then discharge these gases before releasing into the atmosphere.

### **Q11. What is super critical boiler?**

The supercritical boiler is a boiler with an operating parameter more than a critical point ( $P=221.2$  bar &  $T=373$  c\*) and it is used to produce electric power. The supercritical boiler is beneficial to the environment as it produces less greenhouse gas and uses less fuel.

## Q12. What is use of alternator in power plants?

An alternator is the lifeblood of a generator. It is also known as 'Genhead' as it is a part that changes the mechanical energy (received from engine) to electrical energy. An alternator has two components

1. A stator – stationary component
2. A Rotor – rotary/moving component

Both of these work together to generate a relative movement between the electric field and magnetic field and as a result electricity is produced.

## Q13. What is De-Laval impulse turbine?

The **de Laval turbine** is a single-stage impulse turbine. The turbine consists of a single rotor to which impulse blades are attached. The nozzles also allow governing of the turbine by shutting off one or more of them.

## Q14. What is economiser?

An **economizer** is a mechanical device used to reduce energy consumption to perform a useful function. Economizers recycle energy produced within a system such that it captures the heat of the flue gas and transfers it to the feed water in a boiler, it uses part of the total refrigerant flow from the condenser to cool the rest of the refrigerant flow, etc.

## Q15. What is penstock?

Penstocks are the pipes or long channels that are used to transport water inside the power station. These penstocks are made up of steel. Penstocks take water from the hydroelectric reservoir and carry it to the turbines. It plays a very important role in hydroelectricity as it allows the water under high pressure to flow.

## Q16. What is bleeding in a steam power plant?

It is the process in which expanded steam is extracted from the expansion path to utilize it for some purpose. Bleeding in a steam power plant is always performed in advance of the closing of expansion.

## Q17. What is the use of air preheater?

Air preheater is also recognized as an air heater or air-heating pipe. Air preheater as the name suggests is a

device used to heat the air before using it for other purposes. Air preheaters are used to exchange heat energy with desuperheaters.

### **Q18. What is spillway?**

A spillway is an important part of Dam. The function of the spillway is to prevent overflow in a reservoir. It releases pressure from Dam due to increasing water flow. The spillway has three parts in which the approach facility permits the flow of water to the spillway. The water is carried from the approach facility to an outlet structure through the discharging conduits. The last part is the tailwater channel (outlet structure) which disperse the excessive energy of the flow downstream.

### **Q19. What is a photovoltaic cell?**

A photovoltaic cell (PV) which is also known as a solar cell is an extremely used technology in solar plants to convert solar energy into electricity. It is made up of Silicon alloys.

### **Q20. What is a CANDU type reactor?**

CANDU reactor developed in Canada is a type of reactor which is used for the generation of electricity. This reactor is now being used all around the world in nuclear power plants. CANDU is a short form of Canadian Deuterium Uranium. Deuterium or heavy water is used in this reactor as the reactor's neutron moderator. This reactor uses Uranium as a fuel which makes this reactor special. This reactor provides almost 15 percent of electricity to Canada.

### **Q21. List some method to dispose nuclear waste?**

Nuclear waste or radio waste as the name suggests is the residue of the nuclear substances that were utilized. It is very harmful to both mankind and the environment. Hence dealing with this is a tedious and important process. Let's see some of the processes utilized to dispose of nuclear waste.

1. **Storage:** As the radioactive material goes on decays from time to time. So, the radioactive material is stored until it is no longer radioactive. This process is known as radioactive decay which depends on the number of materials and the radioactive level.
2. **Recycling:** Some radioactive materials can be recycled or reused. Example of these elements is Uranium and Plutonium. Both of these elements have a longer life span and therefore can be used for recycling.
3. **Transmutation:** Transmutation is another method for nuclear waste disposal in which harmful radioactive chemical elements are converted to less harmful elements. It can be done with the help of outside forces like proton hitting.
4. **Geological Disposal:** In this method, waste is disposed into the ground where it is out of human reach. Though it is not eco-friendly and has some harmful effects.

## Q22. What is Nuclear fission?

Nuclear fission is the process in which a large nucleus splits into two or smaller nuclei. This process releases a large amount of energy. In simple words, it is the process where the nucleus is divided into fragments with the release of energy.

## Q23. Explain Cetane Number?

**Cetane number** is also referred to as Cetane rating. It is a method to measure the performance or quality of diesel fuel. High cetane numbers represent the better fuel which burns better in the engine. It is similar to the octane rating as both of these methods are used to assign the rating to fuel. The only difference in both is that the cetane rating gives the rating to diesel whereas the octane rating rates gasoline.

## Q24. What are breeder reactors?

A breeder reactor is a type of nuclear reactor that generates more fissionable material than it devours to produce energy. This type of reactor is used to increase the fuel supply so that more electric power can be generated.

## Q25. What is principle of cogeneration?

Cogeneration is also known as combined heat and power and it is the most efficient way of utilizing fuel. It uses one single source of energy to produce two different forms of energy (one is heat/ thermal energy and the other one is electrical or mechanical energy). Fuel can be anything like natural gas, diesel, wood, coal, bagasse, propane, etc. Cogeneration uses the fuel to produce electricity which in turn generates heat and this heat is used to boil water to produce steam. Cogeneration is extremely utilized in cooling buildings and space heating.

## Q26. List some methods of solar energy utilization?

Some methods to use Solar energy:

1. **Solar Electricity:** This is one type of solar energy application that has become extremely popular in recent years. In this, solar panels are installed on the top of the roof or in the open ground where they can get proper electricity. These solar panels captured the sunlight to convert it to electricity.
2. **Solar Lighting:** A solar light can be seen everywhere from security lights and home landscaping to street lights and road signs.
3. **Artificial Photosynthesis:** In this process, photosynthesis is engineered to convert sunlight into some useful chemical fuels
4. **Solar Transportation:** This is the future of solar-powered vehicles which provide the power to the vehicles. This includes trains, airplanes, buses, and race cars.

5. **Solar Water Heating:** Use of solar energy is also used in water heating systems. By using solar power, water is heated which can be used for various processes. There are special heaters available in the market called solar water heaters that absorb the sun's heat and transfer it to a water tank.

**Q27. What net positive suction head?**

**Net positive suction head (NPSH)** is defined as the difference between inlet pressure and the lowest pressure level inside the pump. NPSH is therefore told about the loss of pressure occurring inside the first part of the pump housing.

**Q28. What is Fuel cell?**

A device that is used to produce electricity through an electrochemical reaction, not by combustion is called a fuel cell. In this electrochemical reaction, hydrogen reacts with oxygen to produce water, heat, and electricity. Fuel cells are widely used in some applications as a source of electricity. These cells can also be seen in moving vehicles like cars, trucks, trains, buses, and more.

**Q29. What is surge tank?**

Surge tanks with long pipes are installed in hydropower plants to minimize pressure forces created due to the acceleration of the large water masses. This surge tank is important to minimize the length of the water column to speed up which in turn reduces pressure forces.

**Q30. List different types of tariff methods?**

The tariff is a method used to charge a consumer for the consumption of electric power. It includes the cost of production and supplying electricity at a reasonable price.

There are many types of the electricity tariff, some of them are mentioned below: -

1. Straight-line Meter rate tariff
2. Block meter Rate tariff
3. Power factor tariff
4. Seasonal rate tariff
5. Peak load tariff
6. Three-part tariff
7. Flat Demand Rate tariff
8. Two-part tariff

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