



# PIE Tech

**POLLACHI INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
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**Degree/Branch: BE Mechanical Engineering**

**Semester/Year: VII /IV**

**Subject code &Name : ME 6701 Powerplant Engineering**

## **Question Bank**

### **UNIT -I COAL BASED THERMAL POWER PLANTS**

#### **PART-A (2 Marks for each questions)**

**1. Write about classification of draught?**

Draught is classified as 1. Natural draught 2. Artificial draught .The artificial draught is further classified as (a) Steam jet draught (b) Mechanical draught (c) Induced draught (d) Forced draught

**2. What are the advantages and disadvantages of forced draught system?**

Advantages: Since the fan handles cold air, the fan size and the power required are less. • No need of water cooled bearings because the air being handled is cold air, • Pressure throughout the system is above atmospheric pressure so the air leakage • into the furnace is reduced. Disadvantages: Recirculation due to high air-entry and low air-exit velocities •

**3. What is the difference between stocker firing and pulverized fuel firing?**

The stocker firing method is used for firing solid coal whereas pulverized firing method is used for firing pulverized coal.

**4. What is supercritical boiler?**

Give two advantages. (Nov/Dec 2015) A supercritical boiler is a type of boiler that operates above the critical pressure of 22 MPa. Advantages: Higher unit cycle efficiency (40 - 42%) • Lower heat rate and electricity generation cost is lower • Lower water losses because no continuous blow down • Reduced auxiliary power consumption • 10

**5. Describe the steps to be followed in plant coal handling.**

(i) Coal delivery (ii) Unloading (iii) Preparation (iv) Transfer (v) Temporary storage (vi) Covered storage (vii) In plant handling (viii) Weighing (ix) Feeding the coal into furnace.

**6. Define Binary cycle.**

A binary vapour cycle is a combination of two cycles, one in a high temperature region and the other in a lower temperature region.

**7. Write about fluidized bed boilers?**

When the high velocity gas is passed through a packed bed of finely divided solid particles, the particles become suspended in the gas stream and the packed bed becomes a fluidized bed. Burning of a fuel in such a state is known as Fluidized Bed Combustion. The boiler plant using this fluidized bed combustion is known as fluidized bed boilers.

## **8. How the ash handling system is classified?**

1. Mechanical handling system 2. Hydraulic system 3. Pneumatic system 4. Steam jet system

## **9. What is pulverize and why it is used?**

In a pulverize, the coal is reduced to fine powder and then supplied into the combustion chamber with the help of hot air current. The pulverized fuel systems are nowadays universally used for large capacity plants and using low cost (low grade) fuel as it gives high thermal efficiency and better control as per the load demand.

## **10. What is the function of a draught system?**

To supply required quantity of air to the furnace for combustion of fuel. • To draw the combustion products through the system. • To remove burnt products from the system • 11

## **11. Give the example for once through boiler**

Benson boilers • Once through forced circulation boiler •

## **12. What is meant by cogeneration system?**

Cogeneration is the combinations of heat and power (CHP). The power plant generates electricity and useful heat at the same time.

## **13. What is steam and heat rate?**

Steam Rate is the rate at which a boiler produces steam, normally expressed in terms of kg/hr. The heat rate is the amount of heat energy used by a power plant to generate one kilo watt hour (kWhr) of electricity.

## **14. What are the methods of improving efficiency of Rankine cycle?**

Reheating • Regeneration • Combined reheating and regeneration •

## **15. Name the different circuits of steam power plant.**

Coal and Ash circuit • Water and Steam circuit • Air and Flue gas circuit • Cooling water circuit •

## **16. What do you understand by the term boiler draught?**

Boiler draught may be defined as the small difference between the pressure of outside air and that of gases within a furnace or chimney at the grate level, which causes flow of air/hot flue gases to take place through boiler.

## **17. Define compounding of steam turbines**

Compounding of steam turbines is the method in which energy from the steam is extracted in a number of stages rather than a single stage in a turbine

## **18. What is stoker? Classify it.**

A mechanical device for feeding coal to a furnace 12 Class 1 Stokers - 10 to 100 lbs (4.5 to 45 kg) coal per hour • Class 2 Stokers - 100 to 300 lbs (4.5 to 135 kg) per hour • Class 3 Stokers - 300 to 1200 lbs (135 to 540 kg) per hour • Class 4 Stokers - more than 1200 lbs (more than 540 kg) per hour •

**PART B(16 Mark Questions)**

1. Draw the general layout of thermal power plant and explain the working of different circuits.
2. Explain in detail about different types of Fluidized Bed Combustion (FBC) boiler.
3. Explain the various processes involved in coal and ash handling with neat sketch.
4. Construction and working of Benson Boiler
5. Explain the different types of draught systems
6. Explain in detail about various types of condenser used in thermal power plant.
7. Discuss the functions of air pre heater and its types
8. Explain the working of a mercury- water binary cycle
9. Ideal reheat regeneration cycle operates with steam as the working fluid. Steam enters at 50 bar and 500°C where it expands till its saturated vapour. It is reheated at constant pressure to 400°C and then it expands in the intermediate turbine to appropriate minimum pressure such that a part of the steam bled at this pressure heats feed water to a temperature of 200°C. The remainder expands to a pressure of 0.1 bar in L.P. turbine. Determine the minimum pressure at which the bleeding is necessary and the quality of steam bled per Kg of flow at the turbine inlet. Also compute the thermal efficiency of the plant.