

Powerplant Engineering

Unit 1

- 1 Name the types of Boilers. Draw the sketch of Lancashire Boiler.
- 2 How dust is collected in steam power plant?
- 3 Explain with neat sketch steam condenser, cooling tower and cooling pond.
- 4 Write the physical significance of Load-Estimation Curve.
- 5 Explain with neat sketch one boiler accessories and one boiler mountings.
- 6 Calculate the cost of generation per kWh for a power station having the following data:

Installed capacity of the plant=120 MW.

Capital cost=Rs.96 x 10⁶

Rate of interest and depreciation=14%

Annual cost of fuel oil, salaries and taxation =Rs.12 x 10⁵

Load factor=40%. Also find the saving in cost per kWh if the annual load factor is raised to 50%?

- A Explain Rankine Cycle with P-V and T-S diagram.
- B Explain any one process for making pulverized coal?

Unit 2

- 1 How you will handle the ash in steam power plant?
- 2 Write short notes on; (i) Coal handling system (ii) Feed water treatment
- 3 Write the differences between accessories mountings. Name any five accessories and mountings.
- 4 Explain different methods of fuel firing?

5 A power station has a maximum demand of 80×10^3 kW and daily load curve is defined as follows:

Time(hour)	0-6	6-8	8-12	12-14	14-18	18-22	22-24
Load(MW)	40	50	60	50	70	80	40

A Determine the load factors of power station.

B What is the load factor of standby equipment rated at 25MW that takes up all load in excess of 60 MW? Also calculate its use factor.

6 Write the components of Steam Powerplant with Block diagram.

Unit 3

1. Calculate the cost of generation per kWh for a power station having the following data:
 Installed capacity of the plant=120 MW.
 Capital cost=Rs.96 x 10⁶
 Rate of interest and depreciation=14%
 Annual cost of fuel oil, salaries and taxation =Rs.12 x 10⁵
 Load factor=40%. Also find the saving in cost per kWh if the annual load factor is raised to 50%?
2. Explain Rankine Cycle with P-V and T-S diagram.
3. Explain any one process for making pulverized coal?
4. Write short notes on; (i) Coal handling system (ii) Feed water treatment
5. Write the differences between accessories mountings. Name any five accessories and mountings.
6. Explain different methods of fuel firing?
7. Calculate the cost of generation per kWh for a power station having the following data:
 Installed capacity of the plant=120 MW.
 Capital cost=Rs.96 x 10⁶
 Rate of interest and depreciation=14%
 Annual cost of fuel oil, salaries and taxation =Rs.12 x 10⁵
 Load factor=40%. Also find the saving in cost per kWh if the annual load factor is raised to 50%?
8. Explain Rankine Cycle with P-V and T-S diagram.
9. Explain any one process for making pulverized coal?
10. Name the types of Boilers. Draw the sketch of Lancashire Boiler.
11. How dust is collected in steam power plant?
12. Explain with neat sketch steam condenser, cooling tower and cooling pond.

13. An input-output curve of a 10 MW station is expressed as follows:
 $I=10^6(10+8L+0.4L^2)$
 Where I is in kcal per hour and L is in mega watts.
 Without plotting any curve find the load at which the maximum efficiency occurs.
14. Find the increase in input required to increase station output from 3 to 5 MW by means of the input-output curve and also by incremental rate curve.
15. Write the components of Steam Power plant with Block diagram.
16. Write the physical significance of Load-Estimation Curve.
17. Explain with neat sketch one boiler accessories and one boiler mountings.
18. How you will handle the ash in steam power plant?
19. Name the types of Boilers. Draw the sketch of Lancashire Boiler.
20. How dust is collected in steam power plant?
21. Explain with neat sketch steam condenser, cooling tower and cooling pond.
22. Write the physical significance of Load-Estimation Curve.
23. Explain with neat sketch one boiler accessories and one boiler mountings.
24. How you will handle the ash in steam power plant?
25. Write short notes on; (i) Coal handling system (ii) Feed water treatment
26. Write the differences between accessories mountings. Name any five accessories and mountings.
27. Explain different methods of fuel firing?
28. A power station has a maximum demand of 80×10^3 kW and daily load curve is defined as follows:

Time(hour)	0-6	6-8	8-12	12-14	14-18	18-22	22-24
Load(MW)	40	50	60	50	70	80	40

29. Determine the load factors of power station.
30. What is the load factor of standby equipment rated at 25MW that takes up all load in excess of 60 MW? Also calculate its use factor.
31. Write the components of Steam Powerplant with Block diagram.

Unit 4

1. A run of river plant is used as a peak load plant with weekly load factor 30% all the capacity being firm capacity. Determine the minimum flow of river so that power plant may act as base load plant when rated installed capacity is 15 MW, and operating head is 20m, with plant efficiency 90%.
 - a. Also determine the daily load factor when stream flow is $15\text{m}^3/\text{s}$
2. Explain with the help of neat diagram a regeneration cycle. Derive also an expression for its thermal efficiency.
3. Explain with neat sketch, hydro electric power plant. How you can select site for hydro electric power plant?
4. Explain different methods of fuel firing?
5. Explain geothermal power plant, ocean thermal power plant, solar power plant.
6. How you will handle the ash in steam power plant?

7. Explain Diesel power plant
8. Explain with neat sketch about Fluidized bed boiler?
9. What is the object of energy storage in a utility system?
10. Explain Nuclear power plant. What is the function of a reactor?
11. Calculate the cost of generation per kWh for a power station having the following data:
 Installed capacity of the plant=120 MW.
 Capital cost=Rs.96 x 10⁶
 Rate of interest and depreciation=14%
 Annual cost of fuel oil, salaries and taxation =Rs.12 x 10⁵
 Load factor=40%. Also find the saving in cost per kWh if the annual load factor is raised to 50%?
12. What do you understand by peak shaving and load levelling?
13. A power station has a maximum demand of 80 x 10³ kW and daily load curve is defined as follows:

Time(hour)	0-7	7-9	9-12	12-16	16-17	17-21	21-24
Load(MW)	40	50	60	50	70	80	40

- i) Determine the load factors of power station.
 - ii) What is the load factor of standby equipment rated at 25MW that takes up all load in excess of 60 MW?
 - iii) Calculate its use factor.
14. The percentage composition of a sample of coal is found to be as follows:
 C=88%, H₂=4.3%, O₂=3%, N₂=0.7%, S=1%, Ash=2%
 Calculate the minimum weight of air required for complete combustion of 1 kg of this coal.
 If 40% excess air is supplied, calculate the percentage composition by volume of the dry flue gases.

Unit 5

- 1) What is Forebay? Describe a pumped storage power plant.
- 2) A gas turbine has a pressure ratio of 6 and maximum cycle temperature of 800° C. The isentropic efficiencies of compressor and turbine are 0.82 and 0.85 respectively. Calculate the power output and thermal efficiency when air enters compressor at 15°C and 1 bar.
- 3) What is chemical fuel? How does it differ from a nuclear fuel?
- 4) Name the essential components of diesel electric plant. Why these plants are preferred as peak load and stand by plants?
- 5) Explain with the help of neat diagram a regeneration cycle. Derive also an expression for its thermal efficiency.
- 6) Describe a hydro power plant. Draw a layout hydro power plant.
- 7) Write the advantages and disadvantages of Diesel Power plant.
- 8) What do you mean by non conventional energy resources? What are the different types of non conventional energy resources?
- 9) Explain the following lubrication system in a diesel engine
 - a. Wet pump lubrication system
 - b. Dry pump lubrication system

- 10) What are the various factors for selecting the site for nuclear power plant? What is the future of nuclear power?
- 11) What is the function of surge tanks in hydro plants? Construct the various types of surge tanks.
- 12) Write short note on -:
 1. Geothermal plant
 2. MHD generator
- 13) Name the various fuels used in gas turbine.
- 14) What is the function of a reactor? Differentiate between homogeneous and heterogeneous reactor.
- 15) Name the essential components of diesel electric plant. Why these plants are preferred as peak load and stand by plants?
- 16) Explain with the help of neat diagram a regeneration cycle. Derive also an expression for its thermal efficiency.
- 17) What are the various factors for selecting the site for nuclear power plant? What is the future of nuclear power?
- 18) Describe a hydro power plant. Draw a layout hydro power plant.
- 19) Write the advantages and disadvantages of Diesel Power plant.
- 20) What is the function of surge tanks in hydro plants? Construct the various types of surge tanks.
- 21) What is Forebay? Describe a pumped storage power plant.
- 22) A gas turbine has a pressure ratio of 6 and maximum cycle temperature of 800°C . The isentropic efficiencies of compressor and turbine are 0.82 and 0.85 respectively. Calculate the power output and thermal efficiency when air enters compressor at 15°C and 1 bar.
- 23) What is chemical fuel? How does it differ from a nuclear fuel?