

Systems in Mechanical Engineering

Question Bank

1. Draw neat labeled diagram and working of thermal power plant. State its Advantages and disadvantages.
2. Explain working of hydroelectric power plant with neat labeled diagram. Write two advantages of hydroelectric power plant.
3. Draw neat labeled diagram of Nuclear power plant and explain the energy extraction (conversion) process. State its Advantages and disadvantages.
4. Draw neat labeled diagram of Solar power plant. Explain energy extraction in the plant. State any two advantages.
5. Explain working of hydrogen –oxygen fuel cell with neat labeled diagram. Write two advantages and disadvantages of hydrogen fuel cell.
6. Explain working of Centrifugal Pump with neat labeled diagram and its application.
7. Explain working of Single acting reciprocating pump with neat labeled diagram and its application.
8. Explain construction and working of Pelton wheel turbine with neat labeled diagram and its application.
9. A steam power plant has a coal consumption of 36000 kg/hr having calorific value of coal as 18000 kJ/kg. The turbine runs at 1200 rpm and the generated on the turbine rotor is 480×10^3 N-m find 1)input power 2)output power and 3)efficiency of power plant. State any two Disadvantages of steam power plant.
10. A coal fired power plant uses 100 tons of coal per day. The average power output from plant is 5800 KW. Compute the efficiency of power plant. Take calorific value of coal as 21000 kJ/kg. Write two advantages and disadvantages of thermal power plant.
11. Describe the concept of Heat Pump and Refrigerator with diagram and write expression for COP. Compare Heat Engine & refrigerator.
12. Explain various modes of heat transfer with example and State Stefan Boltzmann's law and Fourier's law, Newton's law of cooling.
13. Explain the working of Four Stroke SI Engine with line diagram.
14. Explain the working of Four Stroke CI Engine with line diagram. Write its advantages.
15. Classify boilers with examples (any four parameters)
16. Distinguish between smoke (fire) tube and water tube boiler

- 17.** The COP of a refrigerator operating on a reversed Carnot cycle is 5.4 when it maintains -5°C in the evaporator. Determine the condenser temperature and refrigerating effect if the power required to run the refrigerator is 3.2 kW. Draw the sketch of system.
- 18.** A reversible heat engine operates on Carnot cycle between source and sink temperatures of 225°C and 25°C . If the heat engine receives 40 kW from the source, find the net workdone, heat rejected to sink and efficiency of the engine.
- 19.** State Second law of thermodynamics. A refrigerator system is used to maintain a cold storage at 40°C . The heat leakage from the surrounding into the cold storage is estimated to be 1800 kJ/min. If the COP of the refrigeration system is 1.5.
- Find: i) The amount of heat rejected to the surrounding
ii) Power required to drive the refrigeration system.
- Draw the sketch of the system.
- 20.** A hot plate area of 1.5 m^2 is maintained at 300°C . The air at 200°C blows over the plate of convective heat transfer co-efficient (h) is $20\text{W/m}^2\text{K}$. Calculate rate of convective heat transfer.
- 21.** Black body at 1100°C has surrounding at 200°C find the heat loss per unit area by radiation.
- 22.** The glass windows of a room has total area of 10 m^2 and glass is 4 mm thick. Calculate quantity of heat leaving from room through glass, when inside surface of window is at 25°C and outside surface is at 10°C . The value of thermal conductivity for a glass is 0.84 W/mK .