6TH SEM./MECH./DIP IN MECH./MECH.(MAINT)/ MECH.(PROD.)/ MECH(SAND.) / MECH(IND. INT.)/ 2024(S)

Th-3 POWER STATION ENGINEERING

Full Marks: 80   **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

USE OF STEAM TABLE AND MOLLIER DIAGRAM ALLOWED

1.   **Answer All questions**   2 x 10
   a. Define work ratio and specific steam consumption in a Rankine cycle.
   b. State any four sources of energy.
   c. Define mountings of boiler with examples.
   d. What do you mean by fission reaction? Give an example.
   e. Define and classify steam turbine.
   f. What is the function of air extraction pump?
   g. Name the major components of hydel power plant.
   h. Differentiate between captive power plant and central power plant.
   i. Name four nuclear fuels.
   j. Write any two advantages of using a condenser in a steam power plant.

2.   **Answer Any Six Questions**   6 x 5
   a. Enumerate and explain essential components of a nuclear reactor.
   b. Define and explain accessories of boiler? Describe economiser in a steam power plant.
   c. Differentiate between jet condenser and surface condenser.
   d. State the advantages and disadvantages of hydroelectric power plant.
   e. Explain the disposal of nuclear waste.
   f. Mention different captive power plant located in Odisha and for what purpose these are used.
   g An ideal engine works on Carnot cycle between the temperature limits of 327^0c and 77^0c. If 550KJ of heat is supplied to the working medium during a cycle of operation.
      Then find
            (i) Thermal efficiency of the cycle.   (ii) Quantity of heat rejected

3   Explain working of nuclear power plants with block diagram.   10
4   For a diesel power station discuss briefly about lubricating system.   10
5   A steam power plant is supplied with dry saturated steam at a pressure of 12bar 10
    and exhausts into a condenser at 0.1bar.
    Calculate the Rankine efficiency by using (a) steam table and (b) Mollier chat.

6   Classify and explain the general arrangement of storage type of hydroelectric   10
    project and explain its operation.
7   Derive the expression for thermal efficiency of Rankine cycle with the help of   10
    P-V, T-S, and H-S diagram.

6TH SEM./ MECHANICAL (IND.INTG)/ 2022(S)
MET 604 Power Plant Engineering

Full Marks: 80   Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks
(USE OF STEAM TABLE AND MOLLIER DIAGRAM ALLOWED)

2 x 10

1.   Answer **All** questions

   a.   State any four sources of energy.

   b.   What do you mean by fission reaction? Give an example.

   c.   Define Work Ratio and Specific Consumption in a Rankine cycle.

   d.   What is the need of Boiler mounting? Give two examples of Boiler mounting.

   e.   What is the function of Condenser?

   f.   What is Captive Power plant?

   g.   What is the function of Air Extraction Pump?

   h.   What is the function of injection system in a Diesel power plant?

   i.   Name the major components of a Hydel power plant.

   j.   Define and classify Steam Turbines.

2.   Answer **Any Six** Questions   6 x 5

   a.   What are the differences between Jet condenser and Surface condenser?

   b.   State the advantages and disadvantages of Hydroelectric power plant.

   c.   Briefly explain about different types of Mechanical Draft Cooling Tower.

   d.   Differentiate between PWR and BWR Power Plant.

   e.   What are the various accessories of boiler? Describe the role of Superheater in a steam power plant.

   f.   Why compounding of Steam Turbine is necessary? Explain velocity compounding.

   g   Explain the fuel storage and supply system of a Diesel power plant.

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3   Derive the expression for thermal efficiency of Rankine cycle with   10
the help of P-V, T-S and H-S diagram.

4   Explain the different methods of disposal of nuclear waste.   10

5   Explain in detail about Natural circulation cooling system and Forced   10
circulation cooling system.

6   The velocity of steam at inlet to a simple impulse turbine is   10
1000m/sec and the nozzle angle is 20^0. The mean blade speed is
400m/sec and the blades are symmetrical. The mass flow rate of
steam is 0.75kg/sec. The friction effects on the blades are negligible.
Estimate :
(a) the blade angles,
(b) the tangential force on the blades,
(c) the axial thrust
(d) the diagram power
(e) the diagram efficiency.

7   A steam power plant is supplied with dry saturated steam at a   10
pressure of 12bar and exhausts into a condenser at 0.1 bar. Calculate
the Rankine efficiency by using (i) Steam table and (ii) Mollier chart.