11920

3 Hours / 100 Marks   Seat No. ☐☐☐☐☐☐☐☐

Instructions :
(1) All Questions are *compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Use of steam tables, logarithmic, Mollier's chart is permitted.

Marks

1.   (A)   **Attempt any SIX :**   6 × 2 = 12

   (a)   Classify the energy sources.

   (b)   What is biomass ? Give its example.

   (c)   State the two advantages of Nuclear energy over hydraulic energy.

   (d)   What is pure substance ?

   (e)   Define the terms :

      (i)   Heat

      (ii)   Work

   (f)   What is irreversibility ?

   (g)   Define the term :

      (i)   Dry steam

      (ii)   Wet steam

  (h) Classify the condensers.

  (i) State advantages of lubricant additives.

 (B) Attempt any TWO : $4 \times 2 = 8$

  (a) Draw the labelled layout of Tidal Power plant. State its limitations.

  (b) What is property ? Compare between extensive property and Intensive property, state its examples.

  (c) What is dryness fraction of steam ? State its significance.

2. Attempt any FOUR : $4 \times 4 = 16$

 (a) Draw an enthalpy – entropy chart for steam. Show the constant pressure and constant entropy processes on it.

 (b) Compare the water tube boiler with fire tube boiler.

 (c) Define :

  (i) Condenser efficiency

  (ii) Vacuum efficiency

 (d) State the Dalton's law of partial pressure.

 (e) Explain the effect of air leakages in condenser performance.

 (f) Represent the Carnot Cycle on P-V and T-S chart. State its limitations.

3. Attempt any FOUR : $4 \times 4 = 16$

 (a) Explain with neat sketch the construction and working of impulse turbine.

 (b) Draw the labelled sketch of surface condenser.

 (c) A petrol engine working on otto cycle has compression ratio of 8 and consumes 1 kg of air per minute. If maximum temperature is 2000 °K and minimum temperature is 300 °K, find power developed by engine.

    (d)   Differentiate between two stroke and four stroke engine on following basis –

        (i)   No. of cycles

        (ii)   No. of power strokes

        (iii)   Thermal efficiency

        (iv)   Weight

    (e)   Explain with neat sketch the valve timing diagram for 2 stroke petrol engine.

    (f)   What is Detonation ? State the causes and effects of detonation.

4.   **Attempt any FOUR :**   **4 × 4 = 16**

    (a)   How the solar energy is used for power generation ?

    (b)   Write the steady flow energy equation. Give the meaning of each suffix used. Apply it to Boiler.

    (c)   Differentiate between closed system and open system.

    (d)   State the Kelvin Planck statement of second low of thermodynamics. Apply it to Heat Engine.

    (e)   Draw a labelled sketch of different types of Nozzles. State its applications.

    (f)   What is heat exchanger ? Classify it.

5.   **Attempt any FOUR :**   **4 × 4 = 16**

    (a)   Explain the terms point function and path function.

    (b)   Explain the terms enthalpy and entropy of steam.

    (c)   Draw the temperature – enthalpy diagram and show the process of steam generation from 1 kg ice on it. Label all the points & processes.

    (d) What is Boiler Draught ? Differentiate between natural and mechanical draught.

    (e) Explain with neat sketch the forced draught cooling tower. State its application.

    (f) State the four advantages of surface condenser over jet condenser.

6. **Attempt any TWO :** **8 × 2 = 16**

    (a) Draw the labelled sketch of Cochran boiler. Show the path of steam flow, water flow and flue gas flow on it.

    (b) What is preignition ? Write the causes and effects of preignition on engine performance. How it can be controlled ?

    (c) Explain with line diagram the construction and working of counter flow heat exchanger. State its advantages over parallel flow heat exchanger.

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