23242

3 Hours / 70 Marks   Seat No.

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

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

(3)   Figures to the right indicate full marks.

(4)   Assume suitable data, if necessary.

(5)   Use of steam tables, logarithmic, Mollier's chart is permitted (Psychrometry Chart).

Marks

1.   **Attempt any FIVE of the following :**   **10**

(a)   Define unit of Refrigeration. State its value in S.I. system.

(b)   List the factors affecting human comfort.

(c)   State the function of (a) Condenser (b) Expansion device used in vapour compression refrigeration system.

(d)   Enlist the factors affecting the selection of a condenser.

(e)   State the necessity of Air Conditioning.

(f)   Define :

    (i)   DBT

    (ii)   WBT

(g)   State the different materials, which is used for making ducts.

2. **Attempt any THREE of the following :** 12

   (a) Represent reversed carnot cycle on PV & TS diagram, also explain the process involved.

   (b) Explain the concept of ozone depletion.

   (c) Explain working of Flooded type evaporator with neat sketch.

   (d) Explain Dalton's law of partial pressure in relation with conditioning of air.

3. **Attempt any THREE of the following :** 12

   (a) Compare refrigerator with heat pump with the help of block diagram.

   (b) Draw and explain superheated compression process on T-S & P-H diagram.

   (c) Describe, how occupants load is calculated.

   (d) An inventor has claimed to have manufactured a refrigerator having COP 7.4, when working between $-10\ ^{\circ}C$ and $30\ ^{\circ}C$. Check whether his claim is correct or not ? Justify.

4. **Attempt any THREE of the following :** 12

   (a) Air is supplied to a conditioned room at $17\ ^{\circ}C$ DBT and 50% RH. The air leaves the room at $25\ ^{\circ}C$ DBT, during which, RH decreases by 5%. Find (1) DPT of supply air (2) Change in enthalpy during the process (3) Change in specific humidity during process. Show it on chart.

   (b) Enlist the types of fan used in air-conditioning system. Explain any one with a sketch.

   (c) Write the component of Automobile air-conditioning system with their function.

   (d) State the working principle of capillary tube.

   (e) Differentiate industrial and commercial air-conditioning system.

5. **Attempt any TWO of the following :** **12**

(a) A simple saturation vapour compression cycle using R-12 is designed to 10 TOR capacity. The vapour is dry saturated at the start of compression. For the -5 °C evaporator temperature and 35 °C condenser temperature. Find (1) Mass flow rate of refrigerant (2) Power required in kW & (3) COP, given enthalpy values

    (i) At the start of compression = 185 kJ/kg ;

    (ii) At the end of compression = 206 kJ/kg ;

    (iii) At the start of expansion = 70 kJ/kg.

(b) Explain with neat sketch the working of "Thermostatic Expansion Valve".

(c) Draw a neat diagram of practical vapour absorption system and explain its working.

6. **Attempt any TWO of the following :** **12**

(a) Compare between vapour absorption refrigeration and vapour compression refrigeration systems.

(b) Estimate cooling load calculation for a CAD/CAM laboratory of your institute.

(c) Explain with neat sketch, year round air-conditioning system.

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