17612

21415

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 Psychometric chart is permitted.

Marks

1. (A) Attempt any THREE of the following : **12**

(a) Define :

(i) C.O.P.

(ii) One ton of refrigeration.

(b) Draw only neat labelled symmetric diagram of a simple vapour compression refrigeration system.

(c) Prove that $(C.O.P)_{pump} = 1 + (C.O.P.)_{Ref}$

(d) Define :

(i) SHF

(ii) RSHF

(B) Attempt any ONE of the following : **6**

(a) Sketch vortex tube refrigeration and write its features.

(b) Draw a neat labelled schematic diagram of simple air-craft cooling system. Represent it on T-S diagram.

P.T.O.

2. Attempt any TWO of the following : **16**

(a) A simple saturation vapour compression cycle using R-12 is designed for 10 TR capacity. The vapour is dry saturated at the start of compression. For the 268 K evaporator temperature and 308 K condenser temperature, Find :

(i) Mass flow rate of refrigerant

(ii) Power required in kW.

(iii) C.O.P.

(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) Discuss briefly the different types of heat loads which have to be taken into account in order to estimate the total heat of MRC lab of your institute.

(c) Explain Summer air-conditioning system with neat schematic setup diagram.

3. Attempt any FOUR of the following : **16**

(a) Differentiate between heat pump and refrigerator (any four parameters).

(b) Classify the condensers used in refrigeration system.

(c) State the function of evaporator and explain any one type of evaporator.

(d) State any four advantages of multistaging in vapour compression refrigeration system.

(e) Draw a neat labelled sketch of wobble plate type compressor.

4. (A) Attempt any THREE of the following : **12**

(a) Explain dry expansion type of Chiller with neat sketch.

(b) Explain the process of “Humidification by air washing” with neat sketch.

(c) Explain By-pass factor of a cooling coil and write down its formula for sensible cooling process.

(d) Explain Ozone layer depletion and its effect on global warming.

(B) Attempt any ONE of the following : **6**

(a) Explain the working of a capillary tube and state its advantages.

(b) Explain the following losses in ducts used for air-conditioning :

(i) Loss due to enlargement

(ii) Loss due to sudden contraction

(iii) Surface frictional loss.

5. Attempt any TWO of the following : **16**

(a) In winter air-conditioning system, 100 m^3 of air per minute at 15° C DBT and 80% relative humidity is heated until its DBT is 22 °C with constant specific humidity. Find heat added to the air per minute (Use Psychometric Chart)

(b) Compare vapour compression and vapour absorption refrigeration system.

(c) State the function of the following components in practical aqua-ammonia absorption refrigeration system :

(i) Absorber

(ii) Rectifier

(iii) Analyser

(iv) Heat exchangers

6. Attempt any FOUR of the following : **16**

(a) Define the term effective temperature and explain its significance in the design of air-conditioning system.

(b) Draw diagram of grills and registers used in air distribution system.

(c) Explain automobile air-conditioning system.

(d) Explain the desirable properties of insulating material used for air-conditioning system.

(e) Explain significance of air conditioning in the following (any two) :

(i) Photographic industry

(ii) Textile industry

(iii) Machine Tool industry

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