

17612

21819

3 Hours / 100 Marks

Seat No.

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- 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 Non-programmable Electronic Pocket Calculator is permissible.
  - (6) Psychrometry chart is allowed.

**Marks**

1. Attempt any FIVE :

20

- (a) (i) Define Ton of Refrigeration.
- (ii) C.O.P.
- (b) Explain with a neat sketch Solar refrigeration system.
- (c) What are different secondary refrigerants ? State its applications.
- (d) Draw reversed Carnot and P-V & T-S planes.
- (e) Compare refrigerator with heat pump with the help of a block diagram.
- (f) Draw the following processes on T-S & P - h diagram :
  - (i) Dry Saturated compression
  - (ii) Superheated compression
- (g) Explain the concept of Ozone Depletion Potential (ODP).

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

- (a) Explain construction and working of Thermostatic expansion valve with a neat sketch.
- (b) Explain in brief Global Warming Potential (GWP).
- (c) Explain in brief compressor used in Car Air Conditioning system.
- (d) What are the applications of Hermetic, Centrifugal, Plate type and scroll compressors ?
- (e) Explain the working of finned evaporator with a neat sketch.
- (f) What are the sources which contribute to the sensible heat gain ?

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

- (a) Explain in brief evaporative condensers with a neat sketch.
- (b) Define :
  - (i) Specific humidity
  - (ii) DBT of air
- (c) What is Dalton's law of partial pressure ?
- (d) The DBT and WBT of air is at 30 °C and 20 °C respectively.

Find the following from the psychrometric chart :

- (i) Relative humidity
- (ii) Enthalpy
- (iii) Moisture content
- (iv) Dew point

- (e) Explain any one Humidifier with a neat sketch.
- (f) Show the following Psychrometric processes on chart :
- (i) Sensible heating
  - (ii) Sensible cooling
  - (iii) Cooling & dehumidification
  - (iv) Heating & humidification

4. Attempt any TWO of the following :

16

- (a) In a simple  $V_{CC}$ , following are the properties of R-134a at various points :

Location of refrigerants	Enthalpy (kJ/kg)	Specific Volume ( $m^3/kg$ )
Compressor Inlet	$h_1 = 183.2$	$v_1 = 0.0767$
Compressor discharge	$h_2 = 222.6$	$v_2 = 0.0164$
Condenser Exit	$h_3 = 84.9$	$v_3 = 0.00083$

The piston displacement volume for the compressor is 1.5 litre per stroke and its volumetric efficiency is 80%. speed of compressor is 1600 RPM. Find,

- (1) Compressor power in kW
  - (2) Refrigeration capacity in tons of refrigeration (TR)
- (b) Estimate cooling load calculation for a CAD/CAM laboratory of your institute.
- (c) Explain working of Aqua-Ammonia vapour Absorption refrigeration system with a neat block diagram.

5. Attempt any TWO of the following :

16

- (a) What are the desirable properties of a refrigerant ?
- (b) Explain with a neat sketch of Electrolux refrigerator.
- (c) What are the desired properties of an insulating material ?

P.T.O.

**6. Attempt any FOUR :****16**

- (a) Classify air conditioning system.
  - (b) What are the different types of fans ?
  - (c) Explain with a neat sketch of a domestic refrigerator.
  - (d) Explain with a neat sketch of a room air conditioner.
  - (e) Explain in brief central Air conditioning system.
  - (f) Enlist the commercial applications of air conditioning system.
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