Instructions : (1) All Questions are compulsory.
(2) Answer each next main Question on a new page
(3) Illustrate your answers with next sketches wherever necessary.
(4) Figures to the right indicate full marks.
(5) Assume suitable data, if necessary.
(6) Mobile Phone, Pager and any other Electronic Pocket Calculator is   permissible.
(7) Use of Psychometric chart is permitted.

1. (a) Attempt any **THREE** of the following : [12]
  (i) Define C.O.P and unit of refrigeration also explain heat engine.
  (ii) Sketch Bell column cycle on P-V and T-S. List process involved.
  (iii) Draw a neat labelled symmetric diagram of a simple vapour compression refrigeration system.
  (iv) Draw a neat labelled sketch and explain working of pulse tube refrigeration.

1. (b) Attempt any **ONE** of the following : [6]
  (i) Explain and draw Electrolux refrigeration system.
  (ii) What is the ultimate effect of under cooling (sub-cooling) on C.O.P.? Show on P-h and T-s diagram?

2. Attempt any **TWO** of the following : [16]
  (a) A vapour compression refrigerator uses R-12 as a refrigerant and the liquid evaporates in the evaporator at –15°c. The temperature of this refrigerant at the delivery from the compressor is 15°C. When the vapour is condensed at 10°C; find the COP if
  (i) There is no under cooling
  (ii) The liquid is subcooled by 5°C before expansion by throttling.

  Take specific heat at constant pressure for the super heated vapour as 0.64 kJ/kg°k. and that of liquid as 0.94 kJ/kg°k.

  The other properties of refrigerant are as follows.

Temp °C	Enthalpy (kJ/kg)		Specific Entropy (kJ/kg°k)	
	Liquid	Vapour	Liquid	Vapour
–15	22.3	80.88	0.0904	0.7051
10	45.4	191.76	0.1750	0.6921

  Sketch the P–H and T–S diagram for both conditions.

  (b) State functions of expansion devices and give classification of same. Explain construction and working of thermostatic expansion valve with neat sketch.
  (c) List psychometric processes and explain evaporative cooling process with sketch.

3. Attempt any **FOUR** of the following : [16]
  (a) Explain working of ''Flooded type evaporator' with a neat sketch.
  (b) Differentiate 'Open type' and 'Hermetically sealed type' compressors.
  (c) Classify ducts used in air-conditioning systems.
  (d) Write four industrial applications of refrigeration and A/C system.
  (e) Explain automobile air-conditioning systems.

[12]

4. (a) Attempt any **THREE** of the following :
  (i) State the classification of condenser used in refrigeration system ?
  (ii) Explain working principle of evaporative condenser with neat sketch ?

    (iii) Explain the concept of sensible heat factor and bypass factor with suitable sketches ?

    (iv) List different types of dehumidifiers. Describe most commonly used type with sketch ?

4. (b) Attempt any **ONE** of the following :   **[6]**

    (i) Explain the thermal exchange mechanism of human body with environment?

    (ii) Explain factors affecting human comfort?

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

    (a) Draw a labeled sketch and explain working of window air conditioning system?

    (b) Explain with neat sketch the various losses in the duct?

    (c) A cold storage room has walls made of 0.23 m of brick on the outside, 0.08 m of plastic foam and finally 15 mm of wood on the inside. The outside and inside temperature are 22°C and −2°C respectively. If the inside and outside heat transfer coefficient are 29 and 12 W/m^2 °K respectively the thermal conductivities of bricks, foam and wood are 0.98, 0.02 and 0.17 W/m °K respectively. Determine rate of heat removal by refrigeration per unit area of wall.

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

    (a) Draw schematic diagram of Bell-Coleman air refrigeration cycle with P-V and T-S diagram.

    (b) Give classification of refrigerants and state at least one refrigerant name in each refrigerant type.

    (c) What is need of multistaging? State advantages and limitations of it.

    (d) Explain pulse tube refrigeration system.

    (e) Explain working of dry expansion type chillers with sketch.

Paper Discussion Schedule for T.Y. Diploma Sem.VI

Date	Day	Timing	Centre
9 April 2017	Sunday	9 a.m. to 11 a.m.	Dadar, Nerul
9 April 2017	Sunday	12 p.m.to 2 p.m.	Thane

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