11718

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.

(8) Use of Psychrometry chart is allowed.

Marks

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

(i) State desirable properties of ideal refrigerant.

(ii) Classify evaporators w.r.t. 'frost'.

(iii) State Dalton's law of partial pressure.

(iv) Give industrial application of Air-conditioning system.

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

(i) Explain with neat sketch 'Ice Plant'.

(ii) Explain with neat sketch 'Thermostatic expansion valve'.

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

(a) Describe how following loads are calculate :

(i) Infiltration load

(ii) Occupants load

(b) Atmospheric air at a dry bulb temperature of 16 °C and 25% relative humidity passes through a furnace and then through a humidifier in such a way that the final dry bulb temperature is 30 °C and 50% relative humidity.

Find :

(i) Heat added to the air

(ii) Moisture added to the air

(iii) Sensible heat factor of the process

(c) Explain with neat sketch summer and winter Air-conditioning system.

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

(a) Name the refrigerant used in following :

(i) Air-conditioner

(ii) Ice Plant

(iii) Domestic refrigerator

(iv) Water cooler

(b) What are the factors affecting on comfort Air-conditioning system ?

(c) State working of capillary tube. State it's two advantage.

(d) Explain working of 'steam jet refrigeration system'.

(e) State advantages of multistaging in vapour compression cycle.

(f) Draw a neat labelled sketch of automobile air-conditioning system.

4. (a) Attempt any TWO of the following : **12**

(i) Select the components and refrigerant for (1) Ice Plant, (2) Domestic Refrigerator.

(ii) Differentiate between air cooled and water cooled condenser.

(iii) Explain working of split air-conditioning system.

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

(i) Explain working of humidification by air washing with neat sketch.

(ii) Define : (1) Unit of refrigeration

(2) CoP

(3) Energy Efficient Ratio (EER)

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

(a) A simple saturated vapour compression refrigeration cycle with the following data works on Freon 12 refrigerant.

Evaporator temperature = – 20 °C

Condensate temperature = 30 °C

The refrigerant entering the compressor is dry saturated. Take C_p for Freon 12 in superheated region = 0.165.

Sketch P-H and T-S diagram and calculate

(i) CoP,

(ii) Weight of refrigerant for 1 ton capacity

(iii) Compressor power required

Properties of Freon 12 are as follows :

Temp. (°C)	Enthalpy (kJ/kg)		Entropy (kJ/kg)	
	Liquid	Vapour	Liquid	Vapour
30	228.54	363.56	1.0979	1.543
– 20	181.76	342.6	0.931	1.566

(b) What is the function of a condenser in a refrigeration cycle ? Explain the working of evaporative condenser with neat sketch.

(c) Differentiate between Central and Unitary Air-conditioning system.

6. Attempt any FOUR of the following : 16

(a) Represent Bell-Coleman cycle on P-V and T-S diagram.

(b) Define : (i) Dew point temperature.
(ii) Specific humidity

(c) Explain term 'Green House effect' and 'Global Warming'.

(d) Explain in brief superheating with the help of P-H and T-S diagram.

(e) Differentiate between vapour absorption and vapour compression refrigeration system.

(f) Explain the effect of change in suction pressure in vapour compression refrigeration system.
