

**Sample Question Paper:
Scheme – I**

Programme Name : Mechanical Engineering
Programme code : ME
Semester : VI Sem
Course Title : Refrigeration and Air Conditioning
Marks : 70

22660

Time: 3 Hrs.

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) Preferably, write the answers in sequential order.
- (6) Use of psychrometry chart is allowed

Q.1) Attempt any FIVE of the following.

(10 Marks)

- a) Define 'COP'
- b) List factors affecting on Human comfort
- c) Name any four refrigerants used in Household appliances
- d) State the function of 'Drier'
- e) Explain term 'Dew point temperature'
- f) Name any two types of Dehumidifiers
- g) List desirable properties of Insulations used in Air conditioning applications

Q.2) Attempt any THREE of the following.

(12 Marks)

- a) Represent Carnot cycle on p-V and T-S diagram
- b) Name any two secondary Refrigerants with their applications
- c) Explain with neat sketch working of 'Capillary tube'
- d) Represent following psychrometric processes on psychrometric chart
 1. Heating with Humidification
 2. Sensible heating

Q.3) Attempt any THREE of the following.

(12 Marks)

- a) Draw block diagram of 'Air Refrigeration system' .State the function of each component
- b) List the advantages of Vapor Compression system
- c) Name different Sensible Heat gain sources to be considered for calculating Cooling load of a given application.

- d) 1.5 kW per ton of refrigeration is required to maintain the temperature of – 40 deg C in refrigeration system, which works on Reverse Carnot cycle. Find out (i) COP (ii) Temp. of source and (iii) Heat rejected per ton.

Q.4) Attempt any Three of the following.**(12 Marks)**

- A surrounding air having DBT 38 deg C and RH 60% is converted to conditioned air having DBT 26 deg C and WBT 24deg C. Plot the process on psychrometric chart and find out following properties of conditioned air : (1) Relative Humidity (2) Specific humidity
- Enlist different types of fans used in air-conditioning system. Explain anyone with a sketch.
- Explain with neat sketch the working of Automobile Air conditioning
- Draw constructional features of ' Hermitically sealed Compressors '
- Explain with neat sketch the construction of ' Slings Psycrometer '

Q.5) Attempt any TWO of the following.**(12 Marks)**

- A vapour compression system uses CO₂ as refrigerant and works between the temperature limits of 25 deg C and -5 deg C. The dryness fraction before compression is 0.6 and compression end in the wet region. Find out COP of the system, assuming there is no sub-cooling of liquid refrigerant. Use following table as properties of CO₂.

Temp. deg C	Enthalpy kJ/Kg		Entropy kJ/Kg. deg K		Latent Heat kJ/Kg
	Liquid	Vapour	Liquid	Vapour	
25	164.77	282.23	0.5978	0.9918	117.46
-5	72.57	321.33	0.2862	1.2146	248.76

- Explain with neat sketch the working of 'Thermostatic Expansion Valve'
- Refrigeration system works on VCR system.

Enthalpies at various points are given below :

Compressor inlet = 1460 kJ/kg

Compressor outlet = 1796 kJ/kg

Inlet to expansion valve = 322 kJ/kg

The refrigerant is superheated by 15 C before it enters the compressor and subcooled by 3 deg C before expansion. Show the cycle on PH and T-S chart.

Find (i) COP (ii) Power required for 1 kg of refrigerant circulated/min.

Q.6) Attempt any TWO of the following.**(12 Marks)**

- Draw Li-Br Absorption system showing all important components. State the functions of each component.
- Explain with neat sketch the working of 'Direct central Air conditioning system'
- Calculate Cooling load of Metrology Laboratory of your Institute.

Sample Test Paper I
Scheme – I

Programme Name : Mechanical Engineering
Programme Code : ME
Semester : Sixth
Course : Refrigeration and Air Conditioning
Marks : 20

22660

Time:1 hour

Instructions :

- a) All questions are compulsory
- b) Illustrate your answers with neat sketches wherever necessary
- c) Figures to the right indicate full marks
- d) Assume suitable data if necessary
- e) Preferably, write the answers in sequential order

Q.1 Attempt any FOUR.

(8 Marks)

- a. Define 'Ton of Refrigeration'
- b. Name refrigerant leak testing Methods
- c. List applications of Refrigeration
- d. Classify refrigerant Compressors
- e. State the function of Solenoid valve
- f. Name any four manufacturers of Household refrigerators

Q.2 Attempt any TWO

(12 Marks)

- a. Represent Bell Coleman cycle on P-V and T-S diagram
- b. A refrigeration system works on vapour compression cycle. Enthalpies at various points are given below.
Compressor inlet – 1460 kJ/kg.
Compressor outlet – 1796 kJ/kg.
Inlet to expansion valve – 322 kJ/kg.
Calculate :(i) COP and(ii) Power required for 1 kg of refrigerant circulated per min.
The refrigerant is superheated by 15 deg C before it enters the compressor and sub cooled by 3 deg C before expansion. Sketch the cycle on p-h & T-S diagram
- c. Explain with neat sketch the working of Screw compressor.

**Sample Test Paper II
Scheme – I**

Programme Name : Mechanical Engineering
Programme Code : ME
Semester : Sixth
Course : Refrigeration and air conditioning
Marks : 20

22660

Time:1 hour

Instructions: All questions are compulsory

1. Illustrate your answers with neat sketches wherever necessary
2. Figures to the right indicate full marks
3. Assume suitable data if necessary
4. Preferably, write the answers in sequential order

Q.1 Attempt any FOUR.

(8 Marks)

- a. State the necessity of Air conditioning
- b. List different types of Psychrometer
- c. Name latent heat gain sources
- d. State the functions of diffusers
- e. List different types of fans used in air conditioning applications
- f. Define ‘ Dry Bulb temperature’

Q.2 Attempt any TWO.

(12Marks)

- a. Air is supplied to a conditioned room at 17°C DBT and 50% RH. The air leaves the room at 25°C DBT during which RH increases by 5%. Find (i) DPT of supply air (ii) Change in enthalpy during process. (iii) Change in specific humidity during the process. Show it on psychrometric chart.
- b. List different types of outlets used in air distribution system? Enlist the factors to be considered to select outlets and location of outlet used in air distribution system
- c. Calculate heat load of an Auditorium of your institute