

U.S.N.

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E.

Branch: Mechanical Engineering

Course Code: 23ME6PEHVA/ 22ME6PEHVA

Course: HVA for Industrial Applications

Semester: VI

Duration: 3 hrs.

Max Marks: 100

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.
3. Use of psychrometric chart and steam table is permitted.
4. Marking on psychrometric chart is permitted.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.			UNIT - I	CO	PO	Marks
	1	a)	What is the Boot Strap type aircraft cooling system? Explain its working principle with the help of $T-s$ diagram.	CO1	PO1	10
		b)	Explain the significance of following thermodynamic properties of the refrigerants: i) Suction vapour volume. ii) Critical temperature and critical pressure. iii) Boiling point.	CO1	PO1	10
			OR			
	2	a)	Explain the importance of aircraft cabin cooling and also highlight the advantages of air cycle refrigeration for cabin cooling.	CO1	PO1	10
		b)	With the help of neat sketches explain the working of actual vapour absorption system.	CO1	PO1	10
			UNIT - II			
	3	a)	Draw the specific volume curves for air at the dry bulb temperature of 22°C .	CO1	PO2	10
		b)	What is dew point temperature? Explain the same with the help of $T-s$ diagram.	CO1	PO1	10
			OR			
	4	a)	Explain the different cooling load factors considered while designing the Air conditioning system.	CO1	PO1	10
		b)	Plot 80% relative humidity lines corresponding to dry bulb temperatures of 16°C , 20°C , 24°C , 28°C , 32°C , and 36°C .	CO1	PO2	10

		UNIT - III			
5	a)	Explain the working of an Air-water fan coil system and an induction-type unit used in HVAC setups.	CO2	PO1	10
	b)	Using suitable diagrams, explain the working principle of Air-to-water heat pump system.	CO2	PO1	10
		OR			
6	a)	What is multizone type of HVAC System? Explain with the help of neat sketch.	CO2	PO1	10
	b)	Classify heat pumps and explain the working of heat recovery type of HVAC System with the help of suitable neat diagram.	CO2	PO1	10
		UNIT-IV			
7	a)	Define the terms drop, spread, and entrainment ratio in the context of air distribution pattern.	CO3	PO1	10
	b)	Explain how the airflow distribution differ between cooling and heating processes in floor registers for the following cases: i) Vertical discharge. ii) Spread.	CO3	PO1	10
		OR			
8	a)	Explain the mechanism of flow through outlet of duct with the help of neat sketch and suitable equation.	CO3	PO1	06
	b)	Explain the distribution patterns for the outlet in HVAC.	CO3	PO1	04
	c)	How do you consider the location and selection of HVAC outlets?	CO3	PO1	10
		UNIT - V			
9	a)	List and explain the various types of pressure losses that occur in duct systems. Also, highlight the guidelines to be followed while designing ducts.	CO4	PO1	10
	b)	What is meant by index run in design of duct? Explain with help of schematic sketch.	CO4	PO1	10
		OR			
10	a)	Discuss the causes of dynamic pressure losses in duct bends and elbows. Suggest effective ways to reduce these losses.	CO4	PO1	10
	b)	With the of suitable neat sketches, explain how fans operate when installed in series and in parallel within a duct system.	CO4	PO1	10
