

Heating Ventilation Air Conditioning (315373)

MSBTE Diploma · K-Scheme · Semester 5 (Mechanical Engineering) · Important Questions

How this list was made: Based on MSBTE papers **W-2025** and **S-2026** available on msbte.ac.in (these are the only two K-scheme papers of this course so far, so the sample is small). Every question of both papers was grouped by topic. **High** = asked in both papers, **Medium** = asked in one paper, **Low** = in the K-scheme syllabus but not asked yet. Practice guidance only — not a prediction of the exam.

Most repeated topics

#	Topic	Unit	Times asked
1	Cooling load of classroom / laboratory – heat gain sources and estimation	4	4 (S-26, W-25)
2	Psychrometric processes on chart – sensible heating, cooling & dehumidification	1	3 (S-26, W-25)
3	Duct layouts – extended plenum, L-shaped building	5	3 (S-26, W-25)
4	Psychrometric terms – DPT, dew point depression, wet bulb depression	1	2 (S-26, W-25)
5	Psychrometric numerical – properties of air / dehumidification (chart or formulas)	1	2 (S-26, W-25)
6	Hermetically sealed compressor – advantages, comparison with open type	2	2 (S-26, W-25)
7	Flooded type evaporator	2	2 (S-26, W-25)
8	Thermostatic expansion valve (TEV)	2	2 (S-26, W-25)
9	Insulating materials – desirable properties	3	2 (S-26, W-25)
10	Automobile air conditioning system – layout	3	2 (S-26, W-25)

Unit I – Applied Psychrometry (10 M)

Question / topic	Marks	Asked in	Probability
Psychrometric processes on chart – sensible heating, cooling & dehumidification <ul style="list-style-type: none"> Represent cooling with dehumidification process on psychrometric chart. (W-25 Q.1c) What is sensible heating of air? Represent sensible heating process on psychrometric chart. (W-25 Q.2c) Represent on psychrometric chart – i) Sensible heating ii) Cooling with dehumidification. (S-26 Q.2b) 	2 M, 4 M	S-26, W-25	High
Psychrometric terms – DPT, dew point depression, wet bulb depression <ul style="list-style-type: none"> Define Dew point depression. (W-25 Q.1a) Define the terms – i) DPT ii) WBD. (S-26 Q.1g) 	2 M	S-26, W-25	High
Psychrometric numerical – properties of air / dehumidification (chart or formulas)	6 M	S-26, W-25	High

<ul style="list-style-type: none"> Find DPT, WBT, enthalpy and specific humidity of air at 26 °C DBT, 60 % RH. (W-25 Q.5a) Air dehumidified from 30 °C DBT, 80 % RH to 25 °C DBT, 18 °C WBT – find ω, DPT, change in enthalpy. (S-26 Q.5b) 			
Dalton's law of partial pressure <ul style="list-style-type: none"> State Dalton's law of partial pressure. (W-25 Q.1d) 	2 M	W-25	Medium
Sensible heat factor (SHF) <ul style="list-style-type: none"> Explain concept of 'SHF'. (S-26 Q.1d) 	2 M	S-26	Medium
Factors affecting human comfort <ul style="list-style-type: none"> List the factors affecting human comfort. (S-26 Q.3b) 	4 M	S-26	Medium
Heat pump concept / VCR cycle, COP, TR In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
Bypass factor, ADP; adiabatic mixing of air streams (numerical) In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
Comfort chart, indoor air quality, outdoor design conditions In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Unit II – Cooling System Components (14 M)

Question / topic	Marks	Asked in	Probability
Hermetically sealed compressor – advantages, comparison with open type <ul style="list-style-type: none"> Compare hermetically sealed compressor with open type reciprocating compressor (construction, capacity, application, lubrication). (W-25 Q.2a) State the advantages of hermetically sealed compressor. (S-26 Q.1f) 	2 M, 4 M	S-26, W-25	High
Flooded type evaporator <ul style="list-style-type: none"> Describe working of flooded type evaporator with neat sketch. (W-25 Q.2b) Explain with neat sketch working of flooded type evaporator. (S-26 Q.2c) 	4 M	S-26, W-25	High
Thermostatic expansion valve (TEV) <ul style="list-style-type: none"> Explain with neat sketch working of thermostatic expansion valve; two applications. (W-25 Q.5b) Explain with neat sketch thermostatic expansion valve. (S-26 Q.3a) 	4 M, 6 M	S-26, W-25	High
Classification of compressors <ul style="list-style-type: none"> Classify the compressor used in refrigeration. (W-25 Q.1e) 	2 M	W-25	Medium
Capillary tube – why used in domestic appliances <ul style="list-style-type: none"> Justify, the capillary tube is used in all domestic appliances as an expansion device. (W-25 Q.2d) 	4 M	W-25	Medium

Centrifugal compressor • Explain working of centrifugal compressor with neat sketch. (S-26 Q.4b)	4 M	S-26	Medium
Scroll compressor • Explain construction and working of scroll compressor. (S-26 Q.6a)	6 M	S-26	Medium
Condensers – air cooled, water cooled, evaporative In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low
Automatic expansion valve; rotary & screw compressors; other evaporator types In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Unit III – Air Conditioning Systems (16 M)

Question / topic	Marks	Asked in	Probability
Insulating materials – desirable properties • State four desirable properties of insulating material used in air conditioning. (W-25 Q.3a) • List any four desirable properties of insulating materials used in AC system. (S-26 Q.2a)	4 M	S-26, W-25	High
Automobile air conditioning system – layout • Draw layout of Automobile air conditioning system. (W-25 Q.3b) • Explain Automobile air conditioning system with sketch. (S-26 Q.3d)	4 M	S-26, W-25	High
Central vs unitary air conditioning system • Differentiate between central and unitary air conditioning system. (W-25 Q.3c) • Differentiate between central and unitary air conditioning system. (S-26 Q.4c)	4 M	S-26, W-25	High
Year-round air conditioning system • Illustrate with neat sketch the working of year round air conditioning system. (W-25 Q.3d) • Explain with neat sketch year round air conditioning system. (S-26 Q.5c)	4 M, 6 M	S-26, W-25	High
Installation requirements of HVAC system • State any four requirement for installation for HVAC. (W-25 Q.1b)	2 M	W-25	Medium
Summer / winter air conditioning systems • Explain summer air conditioning system with neat sketch for cold and dry outdoor conditions. (W-25 Q.5c)	6 M	W-25	Medium
Necessity of air conditioning • State the necessity of Air Conditioning. (S-26 Q.1a)	2 M	S-26	Medium
Window, split, cassette AC; direct & indirect central systems; heating coils In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Unit IV – Cooling Load Calculations (12 M)

Question / topic	Marks	Asked in	Probability
Cooling load of classroom / laboratory – heat gain sources and estimation <ul style="list-style-type: none"> Define sensible and latent heat gains. List the sources of sensible heat gain. (W-25 Q.4a) Cooling loads of a class-room – explain the various loads and calculations. (W-25 Q.6a) Estimate cooling load for a CAD/CAM laboratory of your institute. (S-26 Q.5a) Describe sources of heat gain considered in cooling load calculation for a class room. (S-26 Q.6c) 	4 M, 6 M	S-26, W-25	High
Occupant load calculation <ul style="list-style-type: none"> Describe how occupant load is calculated. (W-25 Q.4b) Describe how occupants load is calculated. (S-26 Q.1c) 	2 M, 4 M	S-26, W-25	High
Necessity of cooling load calculation <ul style="list-style-type: none"> What is the necessity of cooling load calculation. (W-25 Q.1f) 	2 M	W-25	Medium
Cooling load of auditorium; lighting & equipment load In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Unit V – Ventilation, Infiltration & Air Distribution Systems (18 M)

Question / topic	Marks	Asked in	Probability
Duct layouts – extended plenum, L-shaped building <ul style="list-style-type: none"> Draw layout of extended plenum system and explain it. (W-25 Q.4d) Sketch and explain extended plenum duct system for air distribution. (S-26 Q.2d) Suggest the duct system for L shape building. Explain with neat sketch. (S-26 Q.6b) 	4 M, 6 M	S-26, W-25	High
Supply air outlets – grilles, registers, diffusers <ul style="list-style-type: none"> Describe 'Grills' and Registers and state any two functions. (W-25 Q.4e) List out various supply air outlets used in air distribution system. (S-26 Q.4d) 	4 M	S-26, W-25	High
Duct pressure losses and duct numerical (friction, total pressure, air power) <ul style="list-style-type: none"> Rectangular duct $0.15 \text{ m} \times 0.12 \text{ m}$, 20 m, $0.3 \text{ m}^3/\text{s}$ – total pressure at inlet and air power, $f = 0.005$. (W-25 Q.6c) Explain in details any four losses in ducts. (S-26 Q.3c) 	4 M, 6 M	S-26, W-25	High
Duct classification and duct materials <ul style="list-style-type: none"> Give the classification of duct on the basis of supply and cross section. (W-25 Q.1g) 	2 M, 4 M	W-25	Medium

<ul style="list-style-type: none"> • Enlist four duct materials; state four desirable properties of duct material. (W-25 Q.4c) 			
Duct design factors <ul style="list-style-type: none"> • What factors are to be considered for duct designing. (S-26 Q.4a) 	4 M	S-26	Medium
Fans used in air conditioning <ul style="list-style-type: none"> • Enlist different types of fans used in AC system. Explain any one with sketch. (W-25 Q.6b) 	6 M	W-25	Medium
Air handling unit (AHU) <ul style="list-style-type: none"> • Define air handling unit (AHU). (S-26 Q.1b) 	2 M	S-26	Medium
Basement ventilation <ul style="list-style-type: none"> • Explain the concept of 'Base ventilation'. (S-26 Q.1e) 	2 M	S-26	Medium
Variable Air Volume (VAV) system <ul style="list-style-type: none"> • Explain the concept of Variable Air Volume (VAV). How does it work? (S-26 Q.4e) 	4 M	S-26	Medium
Natural & mechanical ventilation, infiltration; radial/perimeter ducts; dampers, filters; equivalent diameter In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	Low

Exam tips from the two papers

- **Cooling load** is the most repeated topic (4 times): sources of sensible/latent heat gain, occupant load and a full estimate for a classroom or laboratory. Learn the list of sources and practise one table-type estimate with assumed data.
- **Psychrometry**: both papers had a 6-mark property / dehumidification numerical and process sketches (sensible heating, cooling & dehumidification). Practise reading DPT, WBT, ω and h from the chart, and check with $\omega = 0.622 p_v / (p - p_v)$, $h = 1.005 t + \omega(2500 + 1.88 t)$.
- **Duct layouts**: extended plenum came in both papers and the L-shaped building question is the same idea — draw a clean plan with AHU, trunk, branches and outlets.
- Eight sketch topics came in both papers: hermetic compressor, flooded evaporator, TEV, insulation properties, automobile AC, central vs unitary, year-round AC, supply outlets. Prepare neat labelled figures for each.
- W-25 Q.6(c) had a duct friction numerical ($\Delta p_f = f L \rho V^2 / 2m$, total pressure and air power) — practise it with your own values.
- Unit I includes the heat pump concept and Unit II all condensers and expansion devices; these were not asked yet, so our model papers include them as surprise questions.
- Only two K-scheme papers are available, so 'High' simply means 'asked in both'. Study the whole syllabus.

Note: This is a **important-question list prepared by Ananda Technologies** only for practice and exam preparation, based on the pattern of previous MSBTE question papers and the K-scheme syllabus. It is **not an official MSBTE paper**, and it does **not** mean that these questions will come in the exam. Answers follow standard textbook points; marks shown are indicative. Free for students — anandatechnologies.in