

Power Engineering (315371)

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

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

Most repeated topics

#	Topic	Unit	Times asked
1	Heat balance sheet – numerical (engine trial) and need / format of heat balance sheet	1	3 (W-25, S-26)
2	Morse test – IP of multi-cylinder engine without indicator (theory and numerical)	1	3 (W-25, S-26)
3	Psychrometric processes on psychrometric chart	4	3 (W-25, S-26)
4	Psychrometric numerical – properties of air / sensible heat / adiabatic humidifier	4	3 (W-25, S-26)
5	Engine performance terms – BP, IP, BSFC, mechanical / indicated thermal efficiency	1	2 (W-25, S-26)
6	Engine exhaust emissions – BS-VI pollutants and their effects	1	2 (W-25, S-26)
7	Compressor terms – volumetric efficiency, isothermal efficiency, capacity / FAD	2	2 (W-25, S-26)
8	Air compressor numerical – power and isothermal efficiency (single / two stage)	2	2 (W-25, S-26)
9	Comparison of reciprocating compressor with centrifugal / rotary compressor	2	2 (W-25, S-26)
10	Refrigeration numerical – COP, capacity (ammonia cycle / reversed Carnot / ice plant)	3	2 (W-25, S-26)

Unit I – Performance Testing of I.C. Engines and Emission Control

Question / topic	Marks	Asked in	Probability
Heat balance sheet – numerical (engine trial) and need / format of heat balance sheet <ul style="list-style-type: none"> Single-cylinder 4-stroke oil engine trial (rope brake): BSFC, indicated thermal efficiency, heat balance sheet on minute basis. (W-25 Q.5c) Two-stroke engine, motored at 1.5 kW; torque 120 N·m, 600 rpm ...: BP, IP, heat balance sheet on minute and % basis. (S-26 Q.5c) 	4 M, 6 M	W-25, S-26	High

<ul style="list-style-type: none"> State the need of heat balance sheet. Plot the heat balance sheet and mention the items to be determined. (S-26 Q.2c) 			
Morse test – IP of multi-cylinder engine without indicator (theory and numerical) <ul style="list-style-type: none"> Four-cylinder petrol engine, cylinders cut off one by one: IP, mechanical efficiency; purpose of Morse test. (W-25 Q.6c) Explain the method of determining the IP of a multi-cylinder engine without using an indicator. (S-26 Q.3c) Four-cylinder engine 1200 rpm, 20 kW; torque with one cylinder cut 110 N·m: IP, BP, indicated thermal efficiency. (S-26 Q.6c) 	4 M, 6 M	W-25, S-26	High
Engine performance terms – BP, IP, BSFC, mechanical / indicated thermal efficiency <ul style="list-style-type: none"> Define brake power, BSFC, indicated power, mechanical efficiency. (W-25 Q.2c) Define indicated power and indicated thermal efficiency. (S-26 Q.1c) 	2 M, 4 M	W-25, S-26	High
Engine exhaust emissions – BS-VI pollutants and their effects <ul style="list-style-type: none"> List the major pollutants regulated under BS VI norms. (W-25 Q.1e) List any four effects of polluting emissions on environment in case of S.I. engine. (S-26 Q.1e) 	2 M	W-25, S-26	High
Exhaust Gas Recirculation (EGR) – purpose <ul style="list-style-type: none"> State the purpose of EGR system in I.C. engine. (W-25 Q.1c) 	2 M	W-25	Medium
Sensors used in Engine Control Unit (ECU) <ul style="list-style-type: none"> State the function of any four sensors used in ECU. (W-25 Q.3c) 	4 M	W-25	Medium
Catalytic converter (three-way) / emission control devices Related topic, not asked yet — revise the basics.	—	Not yet	Low
Willan's line method / motoring test for friction power Related topic, not asked yet — revise the basics.	—	Not yet	Low

Unit II – Air Compressors

Question / topic	Marks	Asked in	Probability
Compressor terms – volumetric efficiency, isothermal efficiency, capacity / FAD <ul style="list-style-type: none"> Define compressor capacity and volumetric efficiency. (W-25 Q.1d) Define volumetric efficiency and isothermal efficiency. (S-26 Q.1d) 	2 M	W-25, S-26	High
Air compressor numerical – power and isothermal efficiency (single / two stage) <ul style="list-style-type: none"> Single stage: 25 °C, 1.5 bar to 4 bar, 4 m³/min, n = 1.35: power and isothermal efficiency. (W-25 Q.4e) Two stage with perfect intercooling, 5 kg/min, 1 bar 15 °C to 15 bar, n = 1.3: IP and isothermal efficiency. (S-26 Q.4e) 	4 M	W-25, S-26	High

Comparison of reciprocating compressor with centrifugal / rotary compressor <ul style="list-style-type: none"> Compare reciprocating and centrifugal compressors (pressure range, mech. efficiency, capacity control, applications). (W-25 Q.3d) Compare reciprocating with rotary compressor on eight points. (S-26 Q.4a) 	4 M	W-25, S-26	High
Multistage compression – effect of intercooling on indicator diagram <ul style="list-style-type: none"> Explain with indicator diagram the effect of intercooling in a multistage reciprocating compressor. (S-26 Q.2d) 	4 M	S-26	Medium
Clearance volume in reciprocating compressor – need and effect <ul style="list-style-type: none"> "Clearance volume is purposely provided" – justify; is high clearance desirable? (S-26 Q.3d) 	4 M	S-26	Medium
Axial flow compressor – construction and working <ul style="list-style-type: none"> Explain with neat sketch construction and working of axial flow air compressor. (W-25 Q.4a) 	4 M	W-25	Medium
Selection of air compressor for given applications <ul style="list-style-type: none"> Select a suitable compressor for pneumatic tools, gas pipeline station, jet engine, CNC actuators. (W-25 Q.2d) 	4 M	W-25	Medium
Single-stage reciprocating compressor – construction and working Related topic, not asked yet — revise the basics.	—	Not yet	Low
Centrifugal and rotary (screw / vane) compressors – construction and working Related topic, not asked yet — revise the basics.	—	Not yet	Low

Unit III – Refrigeration

Question / topic	Marks	Asked in	Probability
Refrigeration numerical – COP, capacity (ammonia cycle / reversed Carnot / ice plant) <ul style="list-style-type: none"> Ammonia system 25 °C and –10 °C, dry at end of compression, 5 kg/min: COP and capacity. (W-25 Q.5a) 200 TR, –6 °C and 25 °C, reversed Carnot: ice produced per day from water at 25 °C and power. (S-26 Q.6a) 	6 M	W-25, S-26	High
Water cooler – construction, working, refrigeration circuit, specifications <ul style="list-style-type: none"> Construction and working of a storage-type water cooler; specifications. (W-25 Q.6a) Sketch the refrigeration system used in a 100 litre water cooler and explain its working. (S-26 Q.5a) 	6 M	W-25, S-26	High

Bell-Coleman (air refrigeration) cycle on P-V and T-s diagrams <ul style="list-style-type: none"> Represent the Bell-Coleman cycle on P-V and T-s diagram and name the processes. (W-25 Q.2a) Represent the Bell-Coleman air refrigeration cycle on PV and TS chart. (S-26 Q.1f) 	2 M, 4 M	W-25, S-26	High
Vapour absorption system – components; comparison with vapour compression system <ul style="list-style-type: none"> Name the components used in the vapour absorption refrigeration system. (W-25 Q.1f) Compare VCR with VAR on eight points. (S-26 Q.3a) 	2 M, 4 M	W-25, S-26	High
Unit of refrigeration (TR) and COP <ul style="list-style-type: none"> Define C.O.P. of refrigerating unit. (W-25 Q.1a) State the unit of refrigeration. Derive its value in SI unit. (S-26 Q.1a) 	2 M	W-25, S-26	High
Sub-cooling and superheating in vapour compression cycle <ul style="list-style-type: none"> Explain subcooling and superheating and their effect on performance of VCR cycle. (W-25 Q.3a) 	4 M	W-25	Medium
Desirable properties of an ideal refrigerant <ul style="list-style-type: none"> List any eight desirable properties of ideal refrigerant. (S-26 Q.2a) 	4 M	S-26	Medium
Domestic refrigerator / VCR cycle on p-h and T-s diagrams; refrigerant designation (R-134a, R-600a, R-32) Related topic, not asked yet — revise the basics.	—	Not yet	Low

Unit IV – Psychrometry and Air Conditioning

Question / topic	Marks	Asked in	Probability
Psychrometric processes on psychrometric chart <ul style="list-style-type: none"> Represent: sensible cooling, humidification, heating & dehumidification, cooling & humidification. (W-25 Q.2b) Represent: sensible cooling, cooling with dehumidification, heating with dehumidification, latent heating. (S-26 Q.3b) Sketch the psychrometric chart and show relative humidity and wet bulb temperature lines. (S-26 Q.1g) 	2 M, 4 M	W-25, S-26	High
Psychrometric numerical – properties of air / sensible heat / adiabatic humidifier <ul style="list-style-type: none"> Air at 30 °C DBT, 70 % RH: DPT, WBT, specific volume, enthalpy, specific humidity using chart. (W-25 Q.5b) Supply air 17 °C, 50 % RH, 0.8 m³/s; leaves at 25 °C: DPT, change in h and ω, sensible heat gain. (W-25 Q.6b) Adiabatic humidifier 200 m³/min, 40 °C / 15 % RH to 25 °C DBT / 20 °C WBT: DPT, water added, sensible heat. (S-26 Q.6b) 	6 M	W-25, S-26	High

Psychrometric terms – DBT, WBT, DPT (definitions) <ul style="list-style-type: none"> Define dry bulb temperature and wet bulb temperature. (W-25 Q.1g) Define wet bulb temperature and dew point temperature. (S-26 Q.1b) 	2 M	W-25, S-26	High
Factors affecting comfort air conditioning <ul style="list-style-type: none"> List any four factors affecting comfort air conditioning. (W-25 Q.1b) List any four factors affecting comfort air conditioning. (S-26 Q.2b) 	2 M, 4 M	W-25, S-26	High
Ceiling-mounted cassette air conditioner <ul style="list-style-type: none"> Construction and working of 2/4-way ceiling-mounted cassette air conditioner. (W-25 Q.3b) 	4 M	W-25	Medium
Selection and layout of air-conditioning system for a hall <ul style="list-style-type: none"> A 12' × 20' hall is to be air-conditioned: suggest the system, draw layout, explain working. (S-26 Q.5b) 	6 M	S-26	Medium
Window / split air conditioner; summer and winter air conditioning Related topic, not asked yet — revise the basics.	—	Not yet	Low

Unit V – Energy Conservation in Compressed Air, RAC and Water Cooler Systems

Question / topic	Marks	Asked in	Probability
Energy saving opportunities / checklist for air-conditioning system <ul style="list-style-type: none"> Recommend any four energy saving opportunities for an office AC system. (W-25 Q.4c) Checklist for energy saving opportunities in the AC system of a metrology laboratory. (S-26 Q.4c) 	4 M	W-25, S-26	High
Factors affecting performance / efficient management of compressed air and RAC systems <ul style="list-style-type: none"> Four factors affecting performance of i) compressed air system ii) refrigeration and AC system. (W-25 Q.4b) List the factors affecting efficient management in compressed air system. (S-26 Q.4b) 	4 M	W-25, S-26	High
Main components of a compressed air system and their role <ul style="list-style-type: none"> Explain the role of main component in a compressed air system. (W-25 Q.4d) 	4 M	W-25	Medium
Energy saving checklist for storage-type water cooler <ul style="list-style-type: none"> 100 litre storage type water cooler: checklist for energy saving opportunities. (S-26 Q.4d) 	4 M	S-26	Medium
Compressed air leakage test and FAD (capacity) test Related topic, not asked yet — revise the basics.	—	Not yet	Low

Exam tips from the two papers

- Most of Q.5 and Q.6 were numericals (5 of 6 in W-25, 4 of 6 in S-26), plus one 4-mark compressor numerical in Q.4 of both papers. The same four types came in both papers: **engine heat balance sheet, Morse test, refrigeration COP / capacity** and **psychrometric** problems. Practise these with units and a neat table.
- Compressor numerical: $W = \frac{n}{n-1} \cdot p_1 V_1 [(p_2/p_1)^{(n-1)/n} - 1]$, isothermal $W = p_1 V_1 \ln(p_2/p_1)$; for two stages with perfect intercooling use $p_2 = \sqrt{p_1 p_3}$ and multiply by 2.
- Psychrometric chart sketches came in both papers (processes, RH and WBT lines). Learn the direction of every process arrow on the chart.
- Unit V questions are checklist type (energy-saving opportunities for AC, compressed air, water cooler). Write 6–8 short, practical points.
- With only two papers, 'High' simply means 'asked in both papers'. 'Medium' topics (EGR, ECU sensors, cassette AC, axial compressor, clearance volume, sub-cooling) were asked once — do not skip them.

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