Advance Power Electronics (315340)

MSBTE Diploma · K-Scheme · Semester 5 (EJ / ET / EX / IE) · 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	Quadrant classification of choppers; Type A / B / C / D operation	2	5 (S-26, W-25)
2	SIT – advantages over BJT/SCR, comparison with MCT	1	3 (S-26, W-25)
3	Snubber circuit / dv/dt and di/dt protection of SCR	1	3 (S-26, W-25)
4	Step-up / step-down chopper using MOSFET (role of MOSFET, comparison)	2	3 (S-26, W-25)
5	Single-phase current source inverter (circuit, working, R load)	3	3 (S-26, W-25)
6	Three-phase VSI – 180° and 120° conduction modes (working, comparison)	3	3 (S-26, W-25)
7	Voltage stabilizer – definition, necessity, block diagram, types	4	3 (S-26, W-25)
8	MCT – symbol, V-I characteristics (also FCT symbol)	1	2 (S-26, W-25)
9	Thermal protection of SCR – need, thermal resistance, heat sink	1	2 (S-26, W-25)
10	PWM – types, advantages, how they differ	3	2 (S-26, W-25)

Unit I – Modern Power Devices and Protection Circuits (10 M)

Question / topic	Marks	Asked in	Probability
SIT – advantages over BJT/SCR, comparison with MCT • State any two advantages of SIT over BJT. *(W-25 Q.1a)* • State the advantage of SIT over SCR. *(S-26 Q.1b)* • Compare SIT & MCT: switching speed, advantages, disadvantage, application. *(S-26 Q.4a)*	2 M, 4 M	S-26, W-25	**High**
Snubber circuit / dv/dt and di/dt protection of SCR • List any two components used in a snubber circuit. *(W-25 Q.1b)* • Explain dv/dt protection using R-C snubber circuit. *(W-25 Q.3a)* • Compare di/dt and dv/dt protection circuits used for thyristors. *(S-26 Q.3d)*	2 M, 4 M	S-26, W-25	**High**
MCT – symbol, V-I characteristics (also FCT symbol) • Draw and explain the V-I characteristics of MCT. *(W-25 Q.2a)* • Draw the symbol of MCT and FCT. *(S-26 Q.1f)*	2 M, 4 M	S-26, W-25	**High**

Thermal protection of SCR – need, thermal resistance, heat sink • State the need of thermal protection in SCRs and define thermal resistance. *(W-25 Q.4a)* • Explain the role of heat sink in thermal protection of SCR. *(S-26 Q.2b)*	4 M	S-26, W-25	**High**
SIT / MCT / FCT construction and working In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	**Low**

Unit II – DC to DC Converters (16 M)

Question / topic	Marks	Asked in	Probability
Quadrant classification of choppers; Type A / B / C / D operation • Identify a suitable chopper for output in first and second quadrant and explain its operation. *(W-25 Q.3b)* • Explain the operation of a Type-C (two-quadrant Type-A) chopper with diagram. *(W-25 Q.4b)* • Classify the chopper on quadrant operation and explain second quadrant chopper. *(W-25 Q.5a)* • Explain Type A chopper with circuit & waveform. *(S-26 Q.2a)* • Draw a neat circuit of Type D chopper and explain its operation with waveform. *(S-26 Q.3c)*	4 M, 6 M	S-26, W-25	**High**
Step-up / step-down chopper using MOSFET (role of MOSFET, comparison) • State the role of MOSFET in chopper circuit. *(W-25 Q.1d)* • Compare step-up & step-down chopper: output voltage, duty cycle. *(S-26 Q.1g)* • Explain step-up chopper using MOSFET with waveform. *(S-26 Q.4b)*	2 M, 4 M	S-26, W-25	**High**
Chopper – functions, principle, block diagram • State the functions of chopper (any two points). *(W-25 Q.1c)* • Explain the function of a DC chopper with a neat block diagram. *(W-25 Q.2b)*	2 M, 4 M	W-25	**Medium**
Chopper control strategies (TRC, CLC) • State the control strategies used in chopper. *(S-26 Q.1d)*	2 M	S-26	**Medium**
SMPS – types, block diagram, advantages over linear supply • State the types of SMPS & explain block diagram of SMPS with its advantages over linear power supply. *(S-26 Q.6a)*	6 M	S-26	**Medium**
Type E (four-quadrant) chopper; flyback and push-pull converters In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	**Low**

Unit III – Multi Level Inverters (16 M)

Question / topic	Marks	Asked in	Probability
Single-phase current source inverter (circuit, working, R load) • Draw neat labelled circuit of a single phase CSI. *(W-25 Q.1e)* • Describe the working principle of current source inverter. *(W-25 Q.2c)* • Explain the working of single phase CSI with resistive load. *(S-26 Q.3a)*	2 M, 4 M	S-26, W-25	**High**
Three-phase VSI – 180° and 120° conduction modes (working, comparison) • Compare 120° conduction mode with 180° conduction mode of 3-phase VSI (any four points). *(W-25 Q.5b)* • Explain the difference in switching patterns between 180° & 120° conduction mode. *(S-26 Q.4c)* • Explain working of three phase VSI with resistive load for 180° conduction mode with circuit diagram. *(S-26 Q.5a)*	4 M, 6 M	S-26, W-25	**High**
PWM – types, advantages, how they differ • Name two types of PWM techniques and state any two advantages of PWM in inverters. *(W-25 Q.4c)* • What is pulse modulation? List various PWM techniques & state how they differ. *(S-26 Q.5b)*	4 M, 6 M	S-26, W-25	**High**
Inverter – definition, classification, applications • Define inverter & give the classification of the inverter. *(S-26 Q.1a)* • State the application of inverter. *(S-26 Q.1e)*	2 M	S-26	**Medium**
Comparison of VSI and CSI • Compare VSI & CSI: input source, output controlled, commutation circuit, protection. *(S-26 Q.2d)*	4 M	S-26	**Medium**
Sinusoidal PWM (SPWM) with waveforms • Explain the working of sinusoidal PWM (SPWM) with suitable waveforms. *(W-25 Q.6a)*	6 M	W-25	**Medium**
Multiple-pulse PWM (MPWM) In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	**Low**

Unit IV – AC Voltage Stabilizer and UPS (12 M)

Question / topic	Marks	Asked in	Probability
Voltage stabilizer – definition, necessity, block diagram, types • Define voltage stabilizer and state the necessity of stabilizer. *(W-25 Q.2d)* • Draw the basic block diagram of AC voltage stabilizer. *(S-26 Q.1c)*	2 M, 4 M	S-26, W-25	**High**

• List different types of stabilizers and explain servo type stabilizer. *(S-26 Q.2c)*			
Servo type voltage stabilizer • Explain the working principle of a servo stabilizer with neat diagram. *(W-25 Q.3c)* • ... explain servo type of stabilizer with suitable diagram. *(S-26 Q.2c)*	4 M	S-26, W-25	**High**
UPS specifications / on-line vs off-line UPS • Describe the specification of UPS: response time, output frequency, load power factor. *(W-25 Q.6b)* • Compare online & offline UPS on six specifications. *(S-26 Q.6c)*	6 M	S-26, W-25	**High**
Relay type voltage stabilizer • Explain the relay type stabilizer with neat diagram. *(S-26 Q.4d)*	4 M	S-26	**Medium**
Rechargeable batteries – Li-ion, NMC, NCA classification • Explain the classification of Li-Ion, NMC and NCA batteries. *(W-25 Q.4d)*	4 M	W-25	**Medium**
Static voltage stabilizer; battery backup time and transfer time In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	**Low**

Unit V – Electric Drives and Industrial Applications (16 M)

Question / topic	Marks	Asked in	Probability
Variable frequency drive (VFD) – definition, necessity, block diagram • Define VFD and state necessity of VFD. *(W-25 Q.1f)* • What is VFD? Explain the block diagram of VFD. *(S-26 Q.3b)*	2 M, 4 M	S-26, W-25	**High**
Charge controller in PV system – function, block diagram • Draw the block diagram of a charge controller and explain. *(W-25 Q.3d)* • State the function of charge controller in PV systems; explain its block diagram. *(S-26 Q.4e)*	4 M	S-26, W-25	**High**
AC-to-AC converter with DC link in wind power generation • Explain the block diagram of AC to AC converter using DC link in wind power generation. *(W-25 Q.4e)* • Explain the use of AC-to-AC converter in wind power generation with suitable diagram. *(S-26 Q.5c)*	4 M, 6 M	S-26, W-25	**High**
Electric vehicles – PHEV / PEV block diagram, comparison • With neat block diagram explain construction and working of PHEV. *(W-25 Q.6c)* • Explain the block diagram of PEV; compare PEV & PHEV. *(S-26 Q.6b)*	6 M	S-26, W-25	**High**

Electrical traction system – working, applications • State any two applications of electrical traction system. *(W-25 Q.1g)* • Explain the working of an electrical traction system with neat labelled diagram. *(W-25 Q.5c)*	2 M, 6 M	W-25	**Medium**
EV control unit and drive mechanism In syllabus, not asked yet — prepare for a surprise question.	—	Not yet	**Low**

Exam tips from the two papers

- **Choppers carry the most marks:** quadrant classification and Type A / B / C / D circuits came 5 times in two papers. Practise each circuit with its output voltage and current waveforms and the quadrant it works in.
- Both papers asked the **single-phase CSI**, **three-phase VSI (180° / 120°)** and **PWM types**. Learn the gating sequence S1-S6 and draw the six-step waveform neatly.
- Unit V is all block diagrams: **VFD, PV charge controller, wind AC-DC-AC converter, PEV / PHEV** — each was asked in both papers. Draw clean labelled blocks with arrows.
- **Servo stabilizer** and **UPS specifications (on-line vs off-line)** appeared in both papers; prepare the comparison table on at least six points.
- Neither paper had numericals. Simple calculations (duty cycle, Vo = D·Vs, Vo = Vs/(1−D), junction temperature, SPWM modulation index) are included in our model papers only for practice of concepts.
- One S-26 question (Q.2c) covers both 'types of stabilizer' and 'servo stabilizer', so it is counted in both topics.

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