

Electrical Circuits and Network (313332)

MSBTE K-Scheme · Electrical Engineering (EE) · Sem III · Important Questions

Based on MSBTE papers S-2024...S-2026 available on msbte.ac.in (papers analysed: W-24, S-25, W-25, S-26). Practice guidance only — not a prediction of the exam.

Probability: **High** = asked in 3 or 4 of the 4 papers · **Medium** = asked in 2 papers · **Low** = asked once, or in syllabus but not asked yet. Questions asked in different wording are grouped together.

Paper pattern (all 4 papers): Q.1 attempt any FIVE of 7 (2 marks each, 10); Q.2 and Q.3 attempt any THREE of 4 (4 marks each, 12); Q.4 attempt any THREE of 5 (4 marks each, 12); Q.5 and Q.6 attempt any TWO of 3 (6 marks each, 12); total 70 marks, 3 hours.

Unit 1: Single Phase A.C. Series Circuits (incl. series resonance)

Question / topic	Marks	Asked in (Q. no.)	Times	Probability
Series AC circuit numericals (R-L / R-C / R-L-C): X_L , X_C , Z, I, p.f., P, Q, S, voltage drops, $i(t)$ from $v(t)$, find R & C/L from readings	4, 6	W-25 (5a), S-25 (5a), W-24 (2a/3a/4a)	5	High
Phasor (vector) diagram, impedance / voltage / power triangle of R-L, R-C, R-L-C series circuits ($X_L > X_C$, $X_C > X_L$); three conditions of RLC	2, 4, 6	S-26 (5a), W-25 (1b/2a), S-25 (1a/3a)	5	High
Series resonance numericals: f_r , current, power, Q-factor, bandwidth, voltage magnification, V_C at resonance	4, 6	S-26 (2a), W-25 (3a), W-24 (5a)	3	High
Graphical representation of series resonance (X_L , X_C , Z, I vs f) - explain each term	4, 6	W-25 (6a), S-25 (6a), W-24 (4b)	3	High
Active, reactive, apparent power and power factor - define with units, power triangle	2, 6	S-26 (6a), S-25 (1b)	2	Medium
Purely resistive / inductive / capacitive circuit: circuit, waveforms, phasor diagram, equations	2, 4	S-26 (4a), W-24 (1b)	2	Medium
AC terms: cycle, frequency, time period, phase, phase difference	2	W-25 (1a), W-24 (1a)	2	Medium
Resonant frequency and Q-factor - definitions; identify type of circuit from a diagram	2	S-26 (1a/1b)	2	Low
Phasor representation of sinusoidal quantities	4	S-25 (2a)	1	Low
RMS / average value, form factor, peak factor of sine wave (syllabus)	—	Not asked yet (syllabus)	0	Low

Unit 2: Single Phase A.C. Parallel Circuits (incl. parallel resonance)

Question / topic	Marks	Asked in (Q. no.)	Times	Probability
Two parallel impedances numericals (impedance / admittance / phasor method): branch currents, total current, p.f., power of each branch, phasor diagram	4, 6	S-26 (2b), W-25 (2b/4a), S-25 (2b/4b), W-24 (2b/3b)	7	High
Conductance, susceptance, admittance - define with units	2	W-25 (1c), S-25 (1c), W-24 (1c)	3	High
Compare series resonance and parallel resonance (impedance, current, magnification, f_r , type of circuit)	4	S-26 (3a), W-25 (4b), S-25 (4a)	3	High
Parallel resonance theory: derive f_r , dynamic impedance, current magnification, features, resonance curve	4, 6	S-26 (5b), W-25 (3b), S-25 (3b)	3	High
Parallel resonance numericals (coil in parallel with C): f_r , Q, Z_D , current, power, value of C for resonance	4, 6	S-26 (4b), W-24 (5b)	2	Medium

Unit 3: Three Phase Circuits

Question / topic	Marks	Asked in (Q. no.)	Times	Probability
Balanced star / delta load numericals: V_{ph} , I_{ph} , I_L , p.f., P, Q, S; find R, X, L/C from P and I_L	4, 6	S-26 (4c), W-25 (2c/6b), S-25 (5c/6b), W-24 (3c/6a)	7	High
Relation between line and phase values ($V_L = \sqrt{3} V_{ph}$ in star, $I_L = \sqrt{3} I_{ph}$ in delta) - derive with phasor diagram / state	2, 4, 6	S-26 (2c), W-25 (5b), S-25 (1d/2c), W-24 (2c)	5	High
Compare star and delta connection	4	S-26 (3b), S-25 (3c)	2	Medium
Three-phase voltages: waveforms, phasor diagram, equations, polar form	2, 4	W-25 (1d), S-25 (4c)	2	Medium
Advantages of 3-phase over 1-phase / compare single-phase and three-phase	2, 6	S-26 (5c), W-24 (1d)	2	Medium
Phase sequence, balanced and unbalanced supply/load (syllabus)	—	Not asked yet (syllabus)	0	Low

Unit 4: Network Simplification: Sources, Star-Delta, Mesh and Node Analysis

Question / topic	Marks	Asked in (Q. no.)	Times	Probability
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Mesh analysis numerical (find current in a resistor)	4, 6	S-26 (4d), W-25 (3c), S-25 (3d), W-24 (6b)	4	High
Source transformation: explain V-to-I conversion / numerical by source conversion	4, 6	S-26 (6b), W-25 (4c), S-25 (2d), W-24 (2d)	4	High
Ideal and practical voltage / current sources (concept, internal resistance, difference)	2	W-25 (1e), S-25 (1g), W-24 (1e)	3	High
Node (nodal) analysis numerical	4	W-25 (3d), W-24 (3d)	2	Medium
Star-delta / delta-star transformation (equations, numerical)	2, 4	S-26 (1c), W-25 (2d)	2	Medium
Network terms: node, branch, mesh, loop	2	S-26 (1d), S-25 (1e)	2	Medium
Steps of mesh analysis	4	S-26 (3c)	1	Low
Active/passive, linear/non-linear, unilateral/bilateral elements (syllabus)	—	Not asked yet (syllabus)	0	Low

Unit 5: Network Theorems

Question / topic	Marks	Asked in (Q. no.)	Times	Probability
Maximum power transfer theorem: state, condition, prove $P_{\max} = V_{th}^2/4R_L$, numerical find R_L	2, 4, 6	S-26 (1f/3d), W-25 (1f/4e), S-25 (1f), W-24 (6c)	6	High
Norton's theorem: state / numerical (Norton equivalent, current in a resistor)	2, 4, 6	S-26 (1e/2d), W-25 (6c), S-25 (6c), W-24 (4e)	5	High
Superposition theorem: state / numerical	2, 4, 6	S-26 (1g), W-25 (5c), S-25 (5b), W-24 (4c)	4	High
Reciprocity theorem: state / explain / verify numerically	2, 4, 6	S-26 (6c), W-25 (1g), S-25 (4e), W-24 (1f)	4	High
Thevenin's theorem: state, equivalent circuit, stepwise procedure	4	S-26 (4e), W-25 (4d), W-24 (4d)	3	High
Thevenin's theorem numerical	4, 6	S-25 (4d), W-24 (5c)	2	Medium
Differences between DC and AC network theorems	2	W-24 (1g)	1	Low

Top repeated topics (all units)

1. Two parallel impedances numericals (impedance / admittance / phasor method): branch currents, total current, p.f., power of each branch, phasor diagram — in 4 of 4 papers (7 times)
2. Balanced star / delta load numericals: V_{ph} , I_{ph} , I_L , p.f., P, Q, S; find R, X, L/C from P and I_L — in 4 of 4 papers (7 times)
3. Maximum power transfer theorem: state, condition, prove $P_{max} = V_{th}^2/4R_L$, numerical find R_L — in 4 of 4 papers (6 times)
4. Relation between line and phase values ($V_L = \sqrt{3} V_{ph}$ in star, $I_L = \sqrt{3} I_{ph}$ in delta) - derive with phasor diagram / state — in 4 of 4 papers (5 times)
5. Norton's theorem: state / numerical (Norton equivalent, current in a resistor) — in 4 of 4 papers (5 times)
6. Mesh analysis numerical (find current in a resistor) — in 4 of 4 papers (4 times)
7. Source transformation: explain V-to-I conversion / numerical by source conversion — in 4 of 4 papers (4 times)
8. Superposition theorem: state / numerical — in 4 of 4 papers (4 times)
9. Reciprocity theorem: state / explain / verify numerically — in 4 of 4 papers (4 times)
10. Series AC circuit numericals (R-L / R-C / R-L-C): X_L , X_C , Z, I, p.f., P, Q, S, voltage drops, $i(t)$ from $v(t)$, find R & C/L from readings — in 3 of 4 papers (5 times)

How to use: prepare every High topic fully (statement + circuit + phasor diagram), then Medium topics. Numericals (series/parallel AC, resonance, 3-phase power, mesh/node, network theorems) come with new values and new circuits every time — practise the method, not the answer.

Note: This is a **important-questions 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