Strength of Materials (313308)

Most repeated questions — MSBTE K-scheme papers S-2026, W-2025, S-2025, W-2024

How to read: **Asked in** shows the MSBTE papers where the same question came (same idea, any wording or values). **High** = came in 3 or 4 of the 4 papers, **Medium** = 2 papers, **Low** = 1 paper. Prepare High ones first. Unit weightage as per K-scheme: Unit I – 12, II – 18, III – 16, IV – 12, V – 12 marks.

Top questions (came in all 4 papers)

1. Define moment of inertia / radius of gyration (MI of semicircle about centroid) *(2 marks)*
2. MI of composite section: I-section (symmetrical / unsymmetrical), channel, angle *(4/6 marks)*
3. Simply supported beam with point loads and / or partial UDL — SFD & BMD, max BM, zero shear *(4/6 marks)*
4. Euler's and Rankine's formula with meaning of terms; effective length for end conditions *(2/4 marks)*
5. Eccentric load on column / pier — σmax, σmin and stress distribution diagram *(4/6 marks)*

Also note: Each of the 4 papers offered 22 marks of SFD & BMD questions (within the options of Q.2–Q.6). Euler/Rankine formulas are theory only in K-scheme (no numericals as per syllabus).

Unit I — Moment of inertia

Question / topic	Marks	Asked in	Probability
Define moment of inertia / radius of gyration (MI of semicircle about centroid)	2	S-26, W-25, S-25, W-24 **(4/4)**	**High**
MI of composite section: I-section (symmetrical / unsymmetrical), channel, angle	4/6	S-26, W-25, S-25, W-24 **(4/4)**	**High**
State parallel axis theorem (with formula)	2/4	W-25, S-25, W-24 **(3/4)**	**High**
Polar moment of inertia — define / calculate (square, semicircle, hollow circle)	4	S-26, W-25, W-24 **(3/4)**	**High**
State perpendicular axis theorem (with expression)	2/4	S-26, W-25 **(2/4)**	**Medium**
MI of circle / hollow circle about a tangent	4	W-25, S-25 **(2/4)**	**Medium**
MI of hollow square / rectangle with semicircle removed, about base or side	4/6	S-25, W-24 **(2/4)**	**Medium**

Unit II — Simple stresses, strains and elastic constants

Question / topic	Marks	Asked in	Probability
Define stress & strain terms: normal, direct, bending, shear stress; linear / lateral / shear strain; E, G; Hooke's law; rigid / plastic body	2/4	S-26, W-25, W-24 **(3/4)**	**High**

Stress–strain curve for mild steel (and Tor steel) with important points	4/6	S-26, W-25, S-25 **(3/4)**	**High**
Elastic constants: relation between E, G, K — statement / numerical (find G and K)	4	W-25, S-25, W-24 **(3/4)**	**High**
Axial bar: stress, strain, elongation, E, change in diameter / minimum wire diameter	4	W-25, S-25, W-24 **(3/4)**	**High**
Stepped bar / bar with forces at intermediate sections — net deformation, find P	4/6	S-26, S-25, W-24 **(3/4)**	**High**
Volumetric strain — cube under tri-axial or all-round force, change in volume, K	4	S-25, W-24 **(2/4)**	**Medium**
Single shear vs double shear; punching shear force	2/4	S-26, S-25 **(2/4)**	**Medium**
Define ultimate stress, yield stress, plastic strain, factor of safety	4	S-26 **(1/4)**	**Low**
Composite bar (rod inside tube) — stresses and extension	4	S-26 **(1/4)**	**Low**

Unit III — Shear force and bending moment

Question / topic	Marks	Asked in	Probability
Simply supported beam with point loads and / or partial UDL — SFD & BMD, max BM, zero shear	4/6	S-26, W-25, S-25, W-24 **(4/4)**	**High**
Cantilever with point loads and UDL — SFD & BMD	4/6	S-26, S-25, W-24 **(3/4)**	**High**
Overhanging beam — SFD & BMD with point of contraflexure	4/6	S-26, S-25, W-24 **(3/4)**	**High**
Define point of contraflexure and point of contra-shear	2	S-26, S-25 **(2/4)**	**Medium**
Standard cases: SS beam with full UDL / central point load — SFD, BMD, max values	4	W-25, S-25 **(2/4)**	**Medium**
Define shear force and bending moment / relation between SF and BM	2	W-25, W-24 **(2/4)**	**Medium**

Unit IV — Bending and shear stresses in beams

Question / topic	Marks	Asked in	Probability
Assumptions in theory of pure bending	2/4	S-26, W-25, W-24 **(3/4)**	**High**
Bending stress numerical — max stress and bending stress distribution diagram (rectangle, T-section)	4/6	W-25, S-25, W-24 **(3/4)**	**High**
Design of beam section by flexure formula (find b × d or diameter)	4/6	S-26, W-25, S-25 **(3/4)**	**High**
Shear stress distribution numerical — rectangle, circle, hollow rectangle; ratio τmax / τavg	4/6	S-26, W-25, W-24 **(3/4)**	**High**

Shear stress equation / relation between average and maximum shear stress	2	S-26, W-24 **(2/4)**	**Medium**
Draw bending / shear stress distribution diagrams for T, hollow rectangular sections	2	S-26, W-25 **(2/4)**	**Medium**
Section modulus and neutral axis — define	2	S-25 **(1/4)**	**Low**
Safe load on beam from permissible bending and shear stresses	6	S-25 **(1/4)**	**Low**

Unit V — Direct and bending stresses (eccentric loads, columns)

Question / topic	Marks	Asked in	Probability
Euler's and Rankine's formula with meaning of terms; effective length for end conditions	2/4	S-26, W-25, S-25, W-24 **(4/4)**	**High**
Eccentric load on column / pier — σmax, σmin and stress distribution diagram	4/6	S-26, W-25, S-25, W-24 **(4/4)**	**High**
Define direct (axial) load and eccentric load	2	S-26, W-25 **(2/4)**	**Medium**
Condition of no tension / middle third rule / core of section / limit of eccentricity	2/6	S-25, W-24 **(2/4)**	**Medium**

Note: Based on MSBTE papers S-2024…S-2026 available on msbte.ac.in (K-scheme; papers used: W-2024, S-2025, W-2025, S-2026). Practice guidance only — not a prediction of the exam. Prepared by Ananda Technologies; not an official MSBTE document. Study the full syllabus. Free for students — anandatechnologies.in