

What Are Steel Construction Systems?

Worksheet

A steel construction system is a structural framework of steel columns and beams, connected by welding or bolting, that carries a building's loads; common types include moment frames, braced frames and trusses.

Questions

1. Which steel system relies on rigid beam-column connections instead of diagonal braces?
 - A) Braced frame
 - B) Truss
 - C) Moment frame
 - D) Shear wall
2. What is the main advantage of diagonal braces in a braced frame?
 - A) They open up floor plans
 - B) They efficiently resist lateral loads using tension/compression
 - C) They eliminate the need for columns
 - D) They reduce fire resistance
3. A steel truss spans long distances mainly by:
 - A) Using solid steel plates
 - B) Triangulated members in tension and compression
 - C) Concrete infill
 - D) Deep foundations only
4. What structural property makes steel ideal for tall buildings?
 - A) Low cost only
 - B) High strength-to-weight ratio
 - C) High thermal mass
 - D) Natural fire resistance
5. A 40-storey office tower needs open floor plans with no visible diagonal braces. Which steel system fits?
6. A warehouse needs a roof to span 30 meters column-free. What steel system works?
7. An earthquake-prone building uses X-shaped diagonal steel braces between columns. What is their function?
8. Define: What is a steel moment frame?
9. Define: What is a braced frame?
10. Define: What is a steel truss?

Answer Key

1. C) Moment frame - Moment frames resist lateral loads through rigid connections and bending, not diagonal braces.
2. B) They efficiently resist lateral loads using tension/compression - Braces work in tension/compression, which is very material-efficient for lateral loads.
3. B) Triangulated members in tension and compression - Triangulated chords and web members efficiently carry loads across long spans.
4. B) High strength-to-weight ratio - Steel's strength relative to its weight allows tall, efficient structures.
5. Moment frames use rigid beam-column connections instead of diagonal braces Lateral (wind/seismic) loads are resisted through bending in beams and columns This keeps floor plans open, though it typically uses more steel than a braced frame
6. A steel truss uses triangulated members to span long distances efficiently Top and bottom chords resist compression and tension, web members transfer shear Trusses can span 30m+ using far less material than a solid beam
7. Braces resist lateral (sideways) forces from wind or seismic shaking They work primarily in tension and compression, which is very material-efficient This bracing lets beam-column connections stay simple (pinned) and cheaper
8. A frame with rigid beam-column connections that resists lateral loads through bending, without diagonal braces.
9. A steel frame that uses diagonal braces to resist lateral loads, with simple pinned connections.
10. A triangulated steel structure that spans long distances efficiently using tension and compression members.

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