What is a Structural System?

Worksheet

A structural system is the network of load-bearing elements that carries a building's gravity and lateral loads along a load path - from slab to beam to column to foundation to soil.

Questions

1. A beam supports a tributary area of 20 m with a distributed load of 3 kN/m. What is the total load?

A) 60 kN
B) 23 kN
C) 6.7 kN
D) 17 kN

2. Which best describes a load path?

A) The route a load travels from application to the ground
B) The horizontal distance between columns
C) The weight of the building material only
D) The colour of structural elements

3. In a typical building, loads generally travel in this order:

A) Foundation column beam slab
B) Slab beam column foundation
C) Column slab beam foundation
D) Beam foundation slab column

4. Which load type is NOT permanent?

A) Dead load
B) Live load
C) Self-weight of walls
D) Self-weight of slab

5. A floor slab carries a distributed load of 4 kN/m over a tributary area of 15 m for one beam. Find the total load on the beam.

6. A roof beam has a tributary width of 3 m and span of 6 m (tributary area = 18 m), carrying a distributed load of 2.5 kN/m. Find the load transmitted to the supporting column.

7. Two identical columns share a floor bay of 40 m equally, with load intensity 6 kN/m. Find the load on each column.

8. Define: What is a structural system?

9. Define: What is a load path?

10. Define: What is tributary area?

Answer Key

1. A) 60 kN - W = wA = 320 = 60 kN.

2. A) The route a load travels from application to the ground - A load path traces how forces travel from where they're applied down to the ground.

3. B) Slab beam column foundation - Loads start at the slab and move down through beams, columns, and finally the foundation.

4. B) Live load - Live load varies over time (occupants, furniture, snow); dead loads are permanent.

5. W = w A W = 4 15 = 60 kN

6. A = 3 6 = 18 m W = w A = 2.5 18 = 45 kN

7. Total load = w A = 6 40 = 240 kN Each column = 240 / 2 = 120 kN

8. An arrangement of structural elements (beams, columns, walls, slabs) that work together to transfer loads safely to the foundation and ground.

9. The route a load follows from where it's applied (roof/floor) down through beams, columns and foundation into the soil.

10. The portion of a floor or roof that delivers its load to a specific structural member.