

What is Reinforced Concrete?

Worksheet

Reinforced concrete is concrete embedded with steel reinforcing bars (rebar) that resist tensile stresses the concrete alone cannot handle, measured by the reinforcement ratio = $A_s/(bd)$.

Questions

1. What does reinforced concrete combine?

- A) Concrete's tension + steel's compression
- B) Concrete's compression + steel's tension
- C) Wood strength + concrete
- D) Only steel properties

2. Formula for reinforcement ratio?

- A) $=Asbd$
- B) $=As/(bd)$
- C) $=bd/As$
- D) $=As+b+d$

3. $A_s=1000$ mm, $b=250$ mm, $d=400$ mm. What is ?

- A) 0.01
- B) 0.1
- C) 0.001
- D) 1.0

4. Why does code require a MINIMUM reinforcement ratio?

- A) To save money
- B) To prevent sudden brittle failure
- C) To reduce weight
- D) To speed up construction

5. A beam has width $b=300$ mm, effective depth $d=500$ mm, and steel area $A_s=1500$ mm. Find the reinforcement ratio.

6. A slab needs $=0.008$ with $b=1000$ mm and $d=150$ mm. Find the required steel area.

7. A column has 8 bars of 20 mm diameter. Find the total steel area ($A = D/4$).

8. Define: What is reinforced concrete?

9. Define: What is the reinforcement ratio formula?

10. Define: Why does concrete need steel?

Answer Key

1. B) Concrete's compression + steel's tension - Concrete resists compression well; steel rebar handles tension.
2. B) $=A_s/(bd)$ - $=A_s/(bd)$, steel area over cross-section area to the steel centroid.
3. A) $0.01 = 1000/(250400) = 1000/100000 = 0.01$.
4. B) To prevent sudden brittle failure - Minimum ensures the beam yields ductile-ly rather than failing suddenly at first crack.
5. $=A_s/(bd) = 1500/(300500) = 1500/150000 = 0.01$ (1%)
6. $A_s = bd = 0.0081000150$ $A_s = 1200$ mm
7. Area of one bar = $20/4 = 314.16$ mm Total $A_s = 8314.16 = 2513.3$ mm
8. Concrete embedded with steel rebar to resist tension, combined with concrete's compressive strength.
9. $=A_s/(bd)$ - steel area over the beam's width times effective depth.
10. Concrete is strong in compression but weak in tension; steel rebar carries the tensile stresses.

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