



PDHonline Course S221 (4 PDH)

**Framed, One-Way Conventionally
Reinforced, Concrete Slab, Joist and
Beam Systems**

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2020

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Quiz Questions

Note: All solutions for this test, unless noted otherwise, are based on Appendix B and C of ACI 318-05.

- The ultimate load factors for dead and live loads, respectfully, allowed by Appendix C of ACI 318-05 are _____. The ultimate load factors for dead and live loads, respectfully, allowed by Chapter 9 of ACI 318-05 are _____.
 - 1.2 and 1.7; 1.4 and 1.6
 - 1.2 and 1.6; 1.4 and 1.7
 - 1.4 and 1.7; 1.2 and 1.6
 - None of the above
- The strength reduction factor (Φ) for tension, compression (without spiral reinforcement) and shear, respectfully, allowed by Appendix C of ACI 318-05 are _____. The strength reduction factor (Φ) for tension, compression (without spiral reinforcement) and shear, respectfully, allowed by Chapter 9 of ACI 318-05 are _____.
 - 0.90, 0.65 and 0.75; 0.90, 0.70 and 0.85
 - 0.90, 0.70 and 0.85; 0.90, 0.65 and 0.75
 - 0.85, 0.75 and 0.80; 0.90, 0.70 and 0.75
 - None of the above
- A rectangular concrete beam 24 inches wide, 36 inches deep must resist an imposed ultimate moment of 750 kip-feet. Assuming the distance from the extreme compression face to the center of the tensile reinforcement is $33\frac{1}{2}$ inches, $f'_c = 4.0$ ksi and $f_y = 60$ ksi the required tensile reinforcement is most nearly:
 - 2.3 in²
 - 3.3 in²
 - 4.3 in²
 - 5.3 in²

4. A concrete T-beam 18 inches wide, 30 inches deep must resist an imposed ultimate moment of 1500 kip-feet. The thickness and width of the T-beam flange is 4 inches and 54 inches, respectfully. Assuming the distance from the extreme compression face to the center of the tensile reinforcement is 27½ inches, $f'_c = 4.0$ ksi and $f_y = 60$ ksi the required tensile reinforcement is most nearly:
- 13.2 in²
 - 11.2 in²
 - 9.2 in²
 - 8.2 in²
5. The same rectangular beam from Question #3 must resist an imposed ultimate moment of 2500 kip-feet. The respective required tensile and compression reinforcement is most nearly:
- 16.0 in² and 0.8 in²
 - 18.0 in² and 1.8 in²
 - 20.0 in² and 2.9 in²
 - None of the above
6. ACI 318-05 states that if the actual A_s provided is _____ greater than that required by analysis, the minimum flexural requirements of the same Code do not have to be satisfied.
- 1/2
 - 2
 - 1/3
 - 3
7. The same rectangular beam from Question #3 must resist an imposed ultimate shear of 175 kips. Assuming that a #4 single “U” spaced stirrup is to be used, the required spacing of the stirrup is most nearly:
- 6¾ inches
 - 7¾ inches
 - 8¾ inches
 - 9¾ inches

8. Where torsional reinforcement is required, the minimum area of closed stirrups is equal to:
- a. $(A_v + 2A_t)$
 - b. $(A_v/2 + A_t)$
 - c. (A_b)
 - d. None of the above
9. When using the moment and shear coefficients for continuous one-way construction allowed by ACI 318-05, the unfactored live load cannot exceed _____ times the unfactored dead load.
- a. 2.0
 - b. 2.5
 - c. 3.0
 - d. 3.5
10. ACI 318-05 requires that the engineer establish the most demanding set of effects of the imposed live load by:
- a. analyzing for pattern loading conditions.
 - b. not reducing the minimum loads as allowed by ASCE 7-05.
 - c. Both a and b
 - d. None of the above
11. The minimum thickness of a conventionally reinforced, one-way, simply supported solid concrete slab per ACI 318-05 is:
- a. $\ell/16$
 - b. $\ell/20$
 - c. $\ell/24$
 - d. None of the above

12. If $M_{cr} \geq M_a$ then the moment of inertia used for the calculation of related deflections shall be:

- a. I_{cr}
- b. I_e
- c. I_g
- d. None of the above

13. In the absence of any compression reinforcement the maximum long-term (5 years or more) deflection multiplier is equal to:

- a. 1.0
- b. 1.2
- c. 1.4
- d. 2.0

14. Large openings in rectangular reinforced concrete beams behave similar to a:

- a. strut and tie model
- b. Vierendeel panel
- c. truss
- d. None of the above

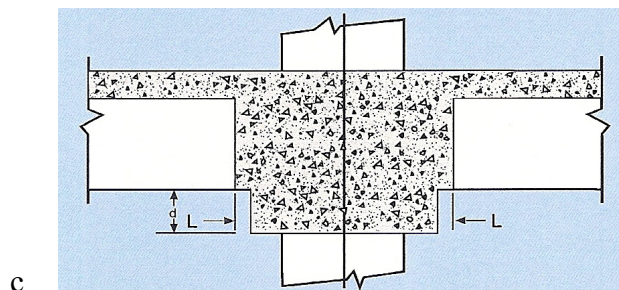
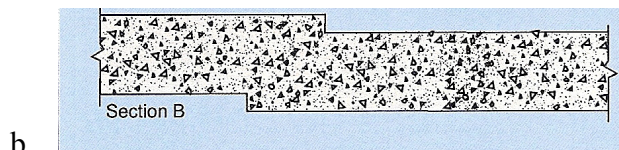
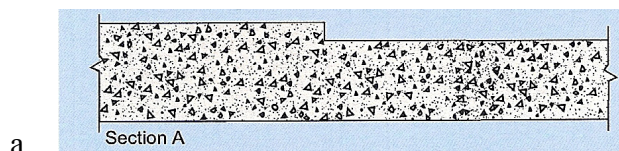
15. A reinforced beam that occurs at the right hand end span of a continuous frame is represented by beam Diagram _____ as shown in Figures 13a through 13h of the lecture notes.

- a. 1
- b. 2
- c. 3
- d. 4

16. Formwork comprises approximately _____ percent of the total cost of constructing a reinforced concrete structure.

- a. 35%
- b. 45%
- c. 55%
- d. 65%

17. The most efficient and cost effective way of constructing a slab depression is shown in:



- d. None of the above

18. The minimum thickness required by the 2006 IBC for a 2-hour fire resistance rating is _____ greater for a concrete slab constructed with limestone aggregate as opposed to lightweight aggregate.

- a. 0.75 inch
- b. 0.80 inch
- c. 1.0 inch
- d. 1.4 inch

19. The ASTM specification that covers reinforcing bars that are manufactured with enhanced weldability characteristics is:
- a. A615
 - b. A706
 - c. Both of the above
 - d. None of the above
20. The minimum area of vertical reinforcement for a column with a cross section that is larger than that required by the actual loading is:
- a. $0.08A_g$
 - b. $0.01A_g$
 - c. $.005A_g$
 - d. None of the above
21. Section _____ of ACI 318-05 provides the requirements for the temperature reinforcement in structural slabs.
- a. 8.12.3.1
 - b. 7.12.2.1
 - c. 9.13.2.3
 - d. None of the above.
22. If the torsional moment in a member _____ then the maximum design T_u can be reduced to $4(\Phi(f'_c)^{1/2})(A_{cp}^2/p_{cp})$.
- a. can be ignored
 - b. cannot be redistributed
 - c. can be redistributed
 - d. exceed $(\Phi(f'_c)^{1/2})(A_{cp}^2/p_{cp})$

23. Using the moment and shear coefficients for continuous one-way construction allowed by ACI 318-05, the minimum number of spans cannot be less than:
- a. 1
 - b. 2
 - c. 3
 - d. 4
24. The influence area for a column is _____ the tributary area of the same column.
- a. greater than
 - b. less than
 - c. equal to
 - d. less than or equal to
25. The growth factor for dead load deflection of a concrete beam can be reduced by:
- a. adding tension reinforcement
 - b. adding compression reinforcement
 - c. cambering the beam
 - d. None of the above