Continuing Education Course #252
Fundamentals of Foundation Design

1. A comprehensive foundation design involves both a geotechnical study of the soil conditions to determine the most suitable type of foundation and a structural design to determine the proportions of the foundation elements.
   - a. True
   - b. False

2. The two basic soil types that are defined by particle size are:
   - a. Gravels and Sands
   - b. coarse-grained soils and fine-grained soils
   - c. Silts and Clays
   - d. None of the above

3. The particles in a non-cohesive soil typically stick together unless sufficient moisture is present.
   - a. True
   - b. False

4. The USDA classifies soil types according to a soil texture triangle chart which gives names to twelve combinations of clay, sand, and silt.
   - a. True
   - b. False

5. Classify a soil sample that is 38% clay, 27% silt, and 35% sand.
   - a. Silt Loam
   - b. Sandy Clay
   - c. Silty Clay
   - d. Clay Loam

6. An axially loaded footing on a cohesive soil with the base of the footing a small distance below grade produces higher stresses at the perimeter than at the center of the footing.
   - a. True
   - b. False

7. Factors are used when calculating soil pressures.
   - a. True
   - b. False

8. The solution for determining $\rho$, the ratio of area of steel to area of concrete is the solution of a quadratic equation.
   - a. True
   - b. False

9. $A_{s,\text{min}}$ is the larger value of
   \[
   \text{(a)} \quad \frac{3 \sqrt{f'c}}{f_y} bd \quad \text{or} \quad \text{(b)} \quad \frac{200}{f_y} bd
   \]
   - a. True
   - b. False
10. If development length is found to be inadequate the possible alternatives are:
   C a. Increase the width of the footing
   C b. Use smaller rebar spaced more closely
   C c. Use hooks to provide the required development length
   C d. All of the above

11. From Table 25.3.1- Minimum hook geometry for development of deformed bars in tension, for a No. 9 reinforcing bar, the minimum inside bend diameter is ___ and the minimum extension length for a 180° hook is ___
   C a. 2.5 in & 3 in.
   C b. 9 in. & 4.5 in
   C c. 9 in. & 2.5 in
   C d. 6 in. & 4.5 in

12. The terms “punching shear” and “two-way shear” refer to the same thing.
   C a. True
   C b. False

13. From Table 22.6.5.2- Calculation of $V_c$ for two-way shear, the formula which would be correct for a normal weight concrete, a square column located at the center of the footing and having a $d$ value of 11 in. and a punching shear perimeter distance of 76 in. is formula
   C a. (a)
   C b. (b)
   C c. (c)

14. Using the information given in question 13 and a $f'c$ value of 4,000 psi, which of the three formulas in Table 22.6.5.2 gives the least value for $v_c$
   C a. Formula c
   C b. Formula b
   C c. Formula a
   C d. None of the above

15. Punching shear is calculated based on:
   C a. the magnitude of the load
   C b. the length of the perimeter at a distance of $d$ from the column
   C c. the length of the perimeter at a distance of $d/2$ from the column
   C d. None of the above

16. The Table used to determine the value in the calculation of two-way shear is:
   C a. Table 22.6.5.2
   C b. Table 25.3.1
   C c. Table 21.2.2
   C d. None of the above

17. The expression $\phi v_u \geq v_c$ is correct
   C a. True
   C b. False

18. The formula for one-way shear is
   C a. $(2 + 4/\beta)\lambda\sqrt{f'c}$
   C b. $4\lambda\sqrt{f'c}$
   C c. $(2)\sqrt{f'c} bwd$

19. In a rectangular footing the value for $v_u$ is the same for short and long direction shear
   C a. True
   C b. False
20. The soil pressure under a portion of an eccentrically loaded footing can be zero
   □ a. True
   □ b. False