

I. Multiple Choice: Circle the *best* answer for each question; 2 pts. each.

1. The best definition for the term "soil" from a soil scientist's point of view is--
 - A. the zone affected by specific soil-forming processes
 - B. any material that can support plant growth
 - C. any weathered geologic material
 - D. any fine material found at the surface of the earth
 - E. disintegrated rock
2. Which of the following is a result of weathering of parent materials in humid climates over geologic time?
 - A. soluble minerals (calcite, gypsum) accumulating in the regolith
 - B. the solum of soils becoming thicker and more well-developed
 - C. primary minerals being unaffected by weathering and remaining in the solum
 - D. clay minerals breaking down and being removed by hydrolysis
 - E. none of the above are correct
3. The soil property that most affects management and plant growth potential of soils is--
 - A. bulk density
 - B. color of the soil
 - C. density of soil minerals
 - D. structure of soil peds
 - E. soil texture
4. Which of the following is true concerning a soil horizon that contains *mottles* (redox features) with a chroma of 2?
 - A. it is saturated (underwater) for long periods of time
 - B. it will have a "g" horizon suffix
 - C. it shows evidence of a seasonal high water table
 - D. all the iron in this horizon is reduced
 - E. all of the above are true
5. The *two* major minerals that weather by hydrolysis to form clay minerals are (circle TWO)--
 - A. calcite
 - B. quartz
 - C. iron oxide
 - D. feldspar
 - E. muscovite
6. Which of the following is a true statement about soil colloids?
 - A. they have positive electric charges on their surface
 - B. they are composed mostly of primary minerals
 - C. they do not settle appreciably when suspended in water
 - D. they have surface areas of millions of square meters per gram
 - E. they have diameters of 0.05-2 mm
7. Which of the following is/are function[s] of *micro-pores* in soils?
 - A. drain excess infiltrated water from the soil profile
 - B. store water for later use by plants
 - C. allow root growth, especially in subsoils
 - D. provide aeration and gas exchange
 - E. *all* of the above are functions of micro-pores

8. Compacting a soil by running large equipment over it when wet would--
 - A. cause a lower overall bulk density
 - B. not affect the macro-porosity of the soil
 - C. increase the amount of micro-pores in the soil
 - D. not occur if the soil was well-structured
 - E. be a problem largely on silty and clayey soils
9. Buffaloes helped form the deep, dark soils of the American Great Plains by--
 - A. having their manure and dead bodies incorporated into the soil
 - B. being hunted by Indians, who burned the prairies during their hunts
 - C. eating tree seedlings, thereby favoring the prairie grasses
 - D. churning up the soil with their hooves, thereby mixing in more humus
 - E. none of the above (or maybe all of them...?)
10. Probably the best clue to look for in identifying most types of B horizons is--
 - A. a bright red color
 - B. low Munsell value
 - B. redoximorphic features, especially concentrations
 - C. blocky structure development
 - D. high clay content

II. Fill-in: Write the best term or response in the blank; 1 pt each.

- 11 _____ diagnostic subsurface horizon with structure, Fe but no clay increase
- 12 _____ parent material often found on footslope locations in the Piedmont
- 13 _____ silty parent material carried by wind
- 14 _____ millions of years ago that Africa and N. America collided
- 15 _____ term for dark-colored igneous or metamorphic rocks
- 16 _____ in the Munsell system, what the dominant spectral color ("10YR") is called
- 17 _____ weathering reaction that causes goethite (yellow) to turn into hematite (red)
- 18 _____ the most common soil order in Georgia
- 19 _____ a primary mineral found in granite
- 20 _____ mineral that weathers by solution reaction, forms karst topography (caves)
- 21 _____ term for highly weathered residual rock in C horizon
- 22 _____ movement of water vapor from earth's surface back into the atmosphere

III. Matching: Write the letter of the best response in the blank; use each response only once; 1 pt. each

23. *Soil Orders*

- | | |
|--|--------------|
| _____ ochric over C profiles; no B horizon | A. Entisols |
| _____ soils of the Great Plain formed under prairie grass | B. Alfisols |
| _____ old, weathered soils of tropical regions | C. Mollisols |
| _____ soils formed under pines on sandy parent material | D. Spodosols |
| _____ found under hardwoods on glacial till in upper Midwest | E. Oxisols |
| | F. Ultisols |

24. Georgia Regions

- | | |
|---|-------------------|
| _____ igneous and metamorphic rocks with rolling topography | A. Coastal Plain |
| _____ nearly level topography on old marine sediments | B. Flatwoods |
| _____ folded sedimentary rocks with relatively steep topography | C. Sand Hills |
| _____ has Spodosols, Histosols on recent marine parent materials | D. Piedmont |
| _____ aeolian parent material on the ancient shoreline of the continent | E. Valley & Ridge |
| | F. Blue Ridge |

25. Textural Classes

- | | |
|--|--------------------|
| _____ forms ball, but no ribbon | A. silt loam |
| _____ forms strong (> 2) inch ribbon; very gritty | B. clay |
| _____ forms moderate ribbon; neither smooth nor gritty | C. sandy clay loam |
| _____ very smooth, weak (<1 inch) ribbon | D. loam |
| | E. clay loam |
| | F. loamy sand |

IV. Short Essay: Write a concise, to-the-point, legible answers to the following questions; *show* your calculations for any partial credit 3 pts. each.

26. On a topographic map with a scale of 1:48,000 and a contour interval of 40', a stream crosses 5 contour lines over a length of 5" on the map. What is the average gradient or % slope of that section of stream channel?

27. Describe how the "bioturbation" theory of soil profile formation explains the creation of sandy A and E horizons overlying a clayey Bt.

28. Compare soils that form on *shoulder* positions to those that form on *footslopes* in Piedmont landscapes, considering solum thickness and Bt horizon properties, and explain briefly why these differences occur.

V. Soil Profile: Write the full, correct horizon designations in the blanks next to each horizon, and answer the questions following the soil description. 1 pt. per blank

29. *Augusta loam: on stream terrace, in Piedmont, in pasture; nearly level (0-2%) slopes.*

____--0 to 12 inches; brown (10YR 4/3) loam; weak fine granular structure; very friable; many fine roots; few fine pebbles; common fine flakes of mica; strongly acid; abrupt wavy boundary.

____--12 to 20 inches; pale brown (10YR 6/3) clay loam; many medium distinct yellowish brown (10YR 5/6), and common medium faint light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few distinct clay films on faces of peds; few fine roots; few fine flakes of mica; strongly acid; gradual smooth boundary

____--20 to 29 inches; light brownish gray (10YR 6/2) clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

____--29 to 52 inches; light brownish gray (10YR 6/2) clay loam; many medium distinct yellowish brown (10YR 6/6) mottles; moderate medium subangular blocky structure; firm; common prominent clay film on faces of peds; common fine flakes of mica; few fine pebbles; strongly acid; gradual wavy boundary.

____--52 to 60 inches; gray (5Y 6/1) sandy loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; common fine flakes of mica; strongly acid; gradual irregular boundary

____--60 to 70 inches; gray (5Y 6/1) coarse sandy loam; many medium prominent dark yellowish brown (10YR 4/4) mottles; massive; friable; about 5 percent by volume of fine rounded pebbles; strongly acid.

30. For this profile, list the: diagnostic surface horizon--_____
diagnostic subsurface horizon--_____
soil order--_____

31. Give the drainage class of this soil, or depth to seasonal high water table:_____

32. Identify the parent material of this soil:_____

33. Discuss briefly what you think are the potential uses of this soil. Do you see any major "limiting factors" that would affect the use of this soil for agricultural or urban use? (2 pts)

BONUS (+2): What is a stream terrace? Describe how one forms.