Study Questions Exam 1

1. What are the four general components of soil?

2. Define *regolith* and *solum.*

3. What are the five master horizons? Give distinguishing features of each.

4. What is meant by an Ap horizon? Bt? Bg?

5. List three means by which plant roots come into contact with nutrients.

6. Soil color is defined in reference to what standard?

7. Black or brown color near the soil surface is usually due to what?

8. Red in the subsoil is due to what? Yellow? Gray?

9. What do the above soil colors indicate about aeration and drainage? Does mottling indicate good or poor aeration and drainage?

10. What does *gley* mean?

11. Define sand, silt and clay according to the USDA classification system.

12. What does soil texture mean?

13. What are the two general approaches to determining soil texture?

14. Explain what is meant by *dispersion* and *flocculation* of soil colloids.

15. Given data for percents sand, silt and clay, use a textural triangle to give the textural class name of a soil.

16. Contrast sandy and clay soils in terms of:

    a) ease of tillage
    b) aeration and water movement
    c) stickiness when wet
    d) bulk density
    e) surface area of particles

17. What is the general relationship between texture and surface area of soil solids per unit mass? How does surface area per unit mass affect such soil properties as water holding capacity and nutrient (chemical) adsorption capacity?

18. What is soil structure?

19. Name the four general types of soil structure (geometries) and two types of structureless condition.

20. When Ca^{2+} is the dominant adsorbed cation, the soil is likely to be (more / less) aggregated than when Na^{+} is the dominant adsorbed cation.

21. What texture of soil would be most likely to have a single-grain structure? Massive?

22. How does soil structure affect aeration, infiltration and drainage?

23. What is the relationship between soil organic matter and the formation and stability of soil aggregates, especially near the soil surface?

24. Define particle density.

25. Why is the particle density of mineral soils usually about 2.65 g / cm^3?

26. Define bulk density.

27. Define porosity and show how it can be calculated based on particle density and bulk density.

28. What is air-dry moisture content of soil?

29. Define volumetric water content.

30. Work a bulk density and porosity problem. Here's an example: 1339 g of air-dry soil filled a 1000 cm^3 container. The particle density of the soil was 2.60 g / cm^3 and the air-dry moisture content was 3.00 %. What was the porosity? What was the volumetric water content?

31. Here's an easier one: A 200 cm^3 sample of soil weighed 300 g. After drying at 105 C for 24 h, it weighed 260 g. What was the bulk density of the soil? What was the volumetric water content of the field-moist soil?

33. Is the bulk density of clay generally higher or lower than the bulk density of sand? Why?

34. What effect does high bulk density have on root penetration?

35. What long-term effect does tillage have on soil porosity? Give two reasons why.

36. Is the effect of tillage on porosity more important with respect to soil macro- or micropores?

37. What effect would each of the following have on bulk density?

    a) repeated passes with heavy machinery
    b) increasing depth in the profile

38. What happens to infiltration rate if surface aggregates slake? The resulting surface feature is referred to a crust (True / False).

39. Distinguish between physical and chemical weathering.

40. What are the five factors of soil formation?

41. Define soils from the perspective of soil formation.

42. List 7 types of parent material.

43. The effects of residual parent material on soil properties are more clearly seen on an old, rather than young, soil (True / False).

44. What is *colluvial* parent material?

45. What are the three types of alluvial parent materials?

46. Describe how a natural levee forms.

47. How does soil texture vary with position on a natural levee and why?

48. What is the material comprising local eolian deposits called? It is composed primarily of what size soil particles? Why?

49. What is *peat*? Where in the landscape are these deposits generally found? What general environmental conditions are needed for the accumulation of peat?

50. Contrast the morphology of soils formed under forest and grassland vegetation. Which is commonly more fertile?

51. What effect do precipitation and temperature have on soil weathering and depth of development?

52. High rainfall and / or temperature accelerate

Leaching of fairly soluble constituents like $CaCO_3$	(True / False)
Weathering of primary minerals to secondary clays	(True / False)
Translocation of clay from A and E horizons to B	(True / False)

53. Soil depth and profile development are generally greater on side-slopes than on summits or foot-slopes (True / False). Give a couple of reasons why or why not.

54. What effect does a water table very near the soil surface have on drainage? So, what effect does it have on soil development?

55. What effect does slope direction have on soil development?

56. In comparing two soils that formed from the same general parent material, in the same climatic region, under the same type of vegetative cover and in very similar landscape positions (i.e., a chronosequence), you observe that profile development is deeper in one of the soils. Which one has likely be subject to pedogensis longer?

57. What are the four processes of soil formation? Give an example of each.

58. The youngest, most elementary soil is characterized by what? Or, in other words, what is the first step in soil formation?

59. What is a pedon? Polypedon?

60. List and very briefly describe five different epipedons.

61. List and very briefly describe five different subsurface diagnostic horizons.

62. What is the most general level of classification used in Soil Taxonomy? The most specific?

63. Name the 12 soil orders and very briefly describe each (diagnostic horizons and / or other major distinguishing properties).

64. Which of the above are found in Louisiana?

65. Give two possible reasons why there is little profile development in Entisols and Inceptisols.

66. Why is profile development limited in Aridisols?

67. Why does pedoturbation occur in Vertisols? Explain how it slows pedogenesis.

68. Give the typical horizon sequence found in Alfisols and Ultisols. What is the dominant pedogenic process in soils of these orders?

69. At what depths are the E and Bt horizons found in the below profile?

Depth (cm)	% Clay	% Organic Matter
0 - 15	4	2.0
15 - 30	8	0.3
30 - 45	25	0.2
45 - 60	23	0.1
60 - 75	15	0.1

70. Give the horizon sequence found in Spodosols. What soil and environmental conditions are necessary for the development of a spodic horizon?

71. What is the mineralogy of an oxic subsurface horizon? Where are Oxisols found (topographically as well as geographically)?

72. What conditions are necessary for the development of a histic epipedon? What happens when a Histosol is drained?

73. What is cryoturbation? What other factor limits profile development in Gelisols?

74. If given the Soil Taxonomy name of a soil, be able to say to which order it belongs. In other words, recognize final suffixes, like with the Stough series soil,coarse-loamy, siliceous, thermic Fragiaquic Paleud**ults**, an **Ult**isol.

75. Delineations on a general soils map show soil associations. What are soil associations?

76. Delineations on a detailed soils map (aerial photo) show mapping units. What types of mapping units are there? What is a phase of a soil series? What is the difference between a consociation and a complex?

77. Which land capability class, I or IIIe, can be more intensively produced?

78. You were cutting timber on two tracts of land but had to stop because it rained cats and dogs for two weeks. Now, fair weather is predicted for several days and you can go back to work. One of the tracts has soil of land capability class IIe and the other has soil of land capability class IVw. Do you immediately continuing harvesting both tracts?