HOURLY EXAM #1 **NAME**_____
CRSS/FORS 3060: Soils and Hydrology **Lab Section #**_____
Spring 2007

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

1. The best definition for the term "soil" (or *solum*) from a soil scientist's point of view is--
   A. any material that will support adequate plant growth.
   B. the zone affected by specific soil-forming processes (translocation).
   C. any weathered geologic material.
   D. any fine material found at the surface of the earth.
   E. disintegrated rock.

2. The most important process in the formation of old, mature landscapes is--
   A. earthquakes and volcanic events
   B. tectonic (mountain-building) activity
   C. deposition of geologic material by wind and water
   D. the effect of glaciers and other agents in importing new parent material
   E. loss of soluble materials from the regolith, coupled with surficial erosion

3. The soil property that most affects management as well as classification of soils is--
   A. bulk density
   B. particle size distribution
   C. density of soil minerals
   D. structure of soil peds
   E. color of the A horizon

4. Buffaloes contributed to formation of Mollisols in the Great Plains by--
   A. depositing their manure to building up the A horizons.
   B. eating the grass down so it would regenerate faster.
   C. trampling tree seedlings so forests would not regenerate.
   D. encouraging the Indians to burn the prairies to hunt them, thereby killing trees.
   E. enticing Europeans to hunt them and later plow up the prairie, adding more humus.

5. In the Munsell color “10YR 4/3”, the “4” stands for the
   A. hue B. matrix C. chroma D. value E. none of the above

6. Which of the following is NOT a true statement about *soil colloids*?
   A. they have diameters from 0.002 up to 0.5 mm
   B. they are composed mostly of secondary minerals
   C. they do not settle appreciably when suspended in water
   D. they have surface areas of up to 100 square meters per gram
   E. they typically have electric charges on their surface

7. Which of the following is NOT a function of *macro-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 macro-pores

8. Compacting a soil by running large equipment over it when wet would--
   A. not occur if the soil was well-structured.
   B. only be a problem on sandy soils
   C. result in a reduction in micro-pores in the soil
   D. cause a lower overall bulk density
   E. crush aggregates and collapse the macro-pores

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

9 _____ an eluvial horizon low in humus content
10_____ organisms that may help form Bt horizons due to their activities
11_____ parent material laid down in ancient lakebeds
12_____ movement of water (rainfall) into the surface of the soil
13_____ % pore space of a soil with a bulk density of 1.3 g/cm^3
14_____ the "agent" responsible for transporting the parent material called *till*
15_____ movement of water vapor from earth's surface back into the atmosphere
16_____ soil structural type common in A horizon, stabilized by humus
17_____ German-American soil scientist who wrote "Factors of Soil Formation"
18_____ rock that weathers to form caves and sinkholes (karst topography)

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

19.. soil orders
_____ young soils found on alluvial parent materials
_____ soils of the Midwest formed under hardwood trees
_____ old, weathered soils of tropical regions
_____ soils formed under pines on sandy parent material

A. Oxisols
B. Alfisols
C. Mollisols
D. Spodosols
E. Entisols

20. Ga regions
_____ igneous and metamorphic rocks; rolling topography
_____ gently rolling topography on old marine sediments
_____ sedimentary rocks; relatively steep topography
_____ Histisols on recent marine parent materials

A Piedmont
B Blue Ridge
C Coastal Plain
D Flatwoods
E Valley & Ridge

21. Textural Classes
_____ forms only a weak ball; no ribbon
_____ forms strong (>2") ribbon
_____ moderate ribbon (1-2"), very smooth
_____ weak (<1") ribbon, intermediate gritty/smooth
_____ not a textural class name

A. sandy loam
B. loamy sand
C. clay loam
D. silt loam
E. silty clay loam
F. sandy silty loam
G. loam
H. clay

22. Soil Minerals
_____ weathers very slowly by solution; common as sands
_____ weathers rapidly by oxidation to clays and Fe oxide
_____ stable in soils; yellow color common some Bt horizons
_____ soluble in water, rarely occurs in humid region soils

A. goethite
B. gypsum
C. feldspar
D. ferromagnesians
E. quartz

***IV. Soil Profiles**:* Write the full, correct horizon designations in the blanks next to each horizon, and answer the questions following the soil descriptions. 1 pt. per blank

23. CHESTNUT SERIES, Blue Ridge uplands, 25-35% slopes, forested.

_____--0 to 2 inch; partially decomposed organic matter and leaves and roots.
_____--2 to 8 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak medium granular structure; very friable; many fine and medium roots; common gravel fragments; few fine flakes of mica; very strongly acid; clear wavy boundary.
_____--8 to 32 inches; yellowish brown (10YR 5/6) gravelly loam; weak medium subangular blocky structure; very friable; common fine roots; common gravel; few fine flakes of mica; very strongly acid; clear wavy boundary.
_____--32 to 74 inches; multicolored weathered granite gneiss that can be dug with difficulty with a spade; rock structure; partly consolidated in place; very strongly acid.
_____--74 inches; hard granite gneiss.

24. HAYESVILLE SERIES, Blue Ridge uplands, 6-10% slopes, in pasture

_____--0 to 2 inch; dark brown (10YR 3/3) loam; moderate fine granular structure; very friable; many fine and medium roots; moderately acid; abrupt smooth boundary.
_____--2 to 7 inches; brown (10YR 5/3) loam; weak medium granular structure; very friable; many fine and medium roots; moderately acid; gradual smooth boundary.
_____--7 to 12 inches; yellowish red (5YR 5/8) clay loam; weak medium subangular blocky structure; friable; common medium and fine roots; few fine flakes of mica; strongly acid; clear smooth boundary.
_____--12 to 38 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; common distinct clay films on faces of peds; few soft fragments of rock; few fine flakes of mica; strongly acid; gradual smooth boundary.
_____--38 to 48 inches; yellowish red (5YR 5/6) and red (2.5YR 4/6) sandy clay loam; weak subangular blocky structure; friable; many grayish and whitish streaks of soft gneiss; common flakes of mica; few hard fragments of gneiss; strongly acid.
_____--48 to 60 inches; strong brown (7.5YR 5/8) saprolite that is fine sandy loam; massive (rock structure); common fine flakes of mica; strongly acid.

For each soil:	CHESTNUT	HAYESVILLE
25. Diagnostic A horizon:	_____	_____
26. Diagnostic B horizon:	_____	_____
27. Soil order:	_____	_____
28. Drainage class:	_____	_____
29. Parent material:	_____	_____

Rate each soil GOOD or BAD for the following uses:

30. General agriculture/horticulture:	_____	_____
31. Houses with septic system:	_____	_____

V. Short essay/calculation: Be brief but clear; do NOT restate the question. You MUST show your calculations to receive full credit. 3 pts. each.

32. On a topographic map with a scale of 1:24,000 and a contour interval of 50', a stream crosses 5 contour lines over a length of 14" on the map. What is the average gradient or % slope of that section of stream channel?

33. What is the most common soil order that occurs in the state of Georgia? Which *one or two* of the Five Factors do you think is most responsible for this occurrence? Explain briefly why.

34. Assume you take a road trip from Atlanta to northern Minnesota to visit a long-lost relative. What soil orders (3, at least) are you likely to pass on the way? Describe briefly where you would see them, and (if you want) which soil-forming Factors are responsible for forming them.

BONUS (+ 1 or 2 each; be BRIEF):

A. What is the difference between a *mafic* rock and a *felsic* rock?

B. Briefly describe how a soil formed on mafic rock would ***differ*** from one formed on felsic rock.