2024 Regional Iowa Envirothon Test – Soils

(25 total points)

1. Why does soil erosion matter?
A. The loss of soil particles reduce soil productivity and degrade water quality.
B. It causes the removal of topsoil from the soil surface which is generally high in organic matter and plant nutrients.
C. It results in lost nutrients that need to be replaced for crop production purposes which adds extra costs for farmers.
D. All of these are correct.

2. The five soil-forming factors include:
A. parent material, climate, living organisms, landscape position, and time
B. climate, living organisms, landscape position, time, and texture
C. living organisms, landscape position, texture, time, and parent material
D. time, parent material, climate, living organisms, and radiation

3. Micro-organisms that live in the soil, feed on fresh organic matter and change it into_____.
A. calcium carbonate (CaCO3)
B. clay and silt
C. humus
D. mycorrhizae

4. _____ in the surface layer of a soil, influences the availability of plant nutrients, such as phosphorus, molybdenum, iron, boron, zinc, and manganese.
A. Calcium carbonate
B. Entisols
C. RUSLE2
D. Topography

5. Land capability classes _____.
A. will in most cases have subclasses are assigned to each soil
B. suggest the suitability of the soil for field crops or pasture
C. provide a general indication of the need for conservation practices and management
D. all of these are correct

6. If a soil has an optimum pH for the microbial group of bacteria, the soil pH would be classified as _____. (see to Table 2)
A. acidic
B. alkaline
C. neutral
D. calcarious

Table 2: Maximum, minimum, and optimum pH values for microbial groups. (adapted from Smith and Doran 1996)

Microorganisms	Range	Optimum
Bacteria	5 - 9	7
Actinomycetes	6.5 - 9.5	8
Fungi	2 - 7	5
Blue green bacteria	6 - 9	> 7
Protozoa	5 - 8	> 7

7. A "pH of 7" is considered _____.
A. Acidic
B. Basic
C. Neutral
D. 7 ppm

8. Earthworms found in North American are classified into three groups based on their preferred habitat. Which of the following is NOT one of the three habitat groups?
A. Tree-dwellers live under the bark of dead trees, in the litter of moss and bromeliads and sometimes in the crooks of tree branches
B. Litter-dwellers live in the litter, ingest plant residues, and may be absent in plowed, litter-free soil
C. Mineral soil-dwellers live in topsoil that is rich in organic matter. They burrow narrow channels and feed on a mixture of soil and plant residues
D. Deep soil-burrowers (night crawlers) dig long, large burrows into deep soil layers. They carry with them plant residues for consumption

9. What conservation practice utilizes strips of grass or a mixture of grasses and legumes that run along the contour of a farmed field? (These strips alternate down the slope of a field with wider cropped strips).
A. Contour buffer strips
B. Crop rotation
C. No-till/Strip-till
D. all of these are correct

10. What are the two surface features that influence soil development and may limit the ways in which soil can be used?
A. Internal drainage and depth of soil profile
B. Landscape position and depth of soil profile
C. Slope and depth of soil profile
D. Slope and landscape position

11. Which landscape position refers to the current area of flood risk near a stream or river?
A. Flood plain
B. Footslope
C. Intermittent drainageway
D. Stream terrace

12. Steepness of slope is measured on a percentage scale which tells how many feet the elevation rises or falls per ____ feet of slope length.
A. 10
B. 60
C. 100
D. 1000

13. The percent of slope for a nine-foot fall over a ninety feet distance would be ___ %.
A. 4.5
B. 9.0
C. 10.0
D. 12.0

14. A soil profile is defined as _____.
A. a horizontal layer of soil with similar properties that usually run parallel to the soil surface
B. a vertical section through the layers that make up the soil
C. the landscape position of the soil
D. the surface features of the soil

15. A soil horizon is _____.
A. formed roughly parallel to the land surface
B. a vertical layer that makes up part of a soil profile
C. not affected by the nature of the parent material that it is developed from
D. not influenced by physical, chemical and biological processes
E. all of these are correct

16. Which of the following usually contains the most plant roots and organic matter and has the darkest color of any horizon that makes up a soil?
A. A horizon
B. B horizon
C. C horizon
D. R horizon
E. E horizon

17. The proportions of sand, silt, and clay determine the _____ of the soil.
A. consistency
B. texture
C. structure
D. stoniness

18. What class of soil parent material is predominately silt-sized particles transported and deposited by wind?
A. Alluvium
B. Colluvium
C. Glacial sediments
D. Loess
E. Residuum

19. Shrink-swell of the soil relates to the percent of volume change during wetting and drying. Soils whose volume changes by more than nine percent will affect the stability of basement walls, the foundation, patio, sidewalks, and concrete floors anchored to the ground. **Table 3** shows shrink-swell ratings and values for percent volume changes. What texture group represents the greatest shrink-swell risk for supporting a concrete structure?

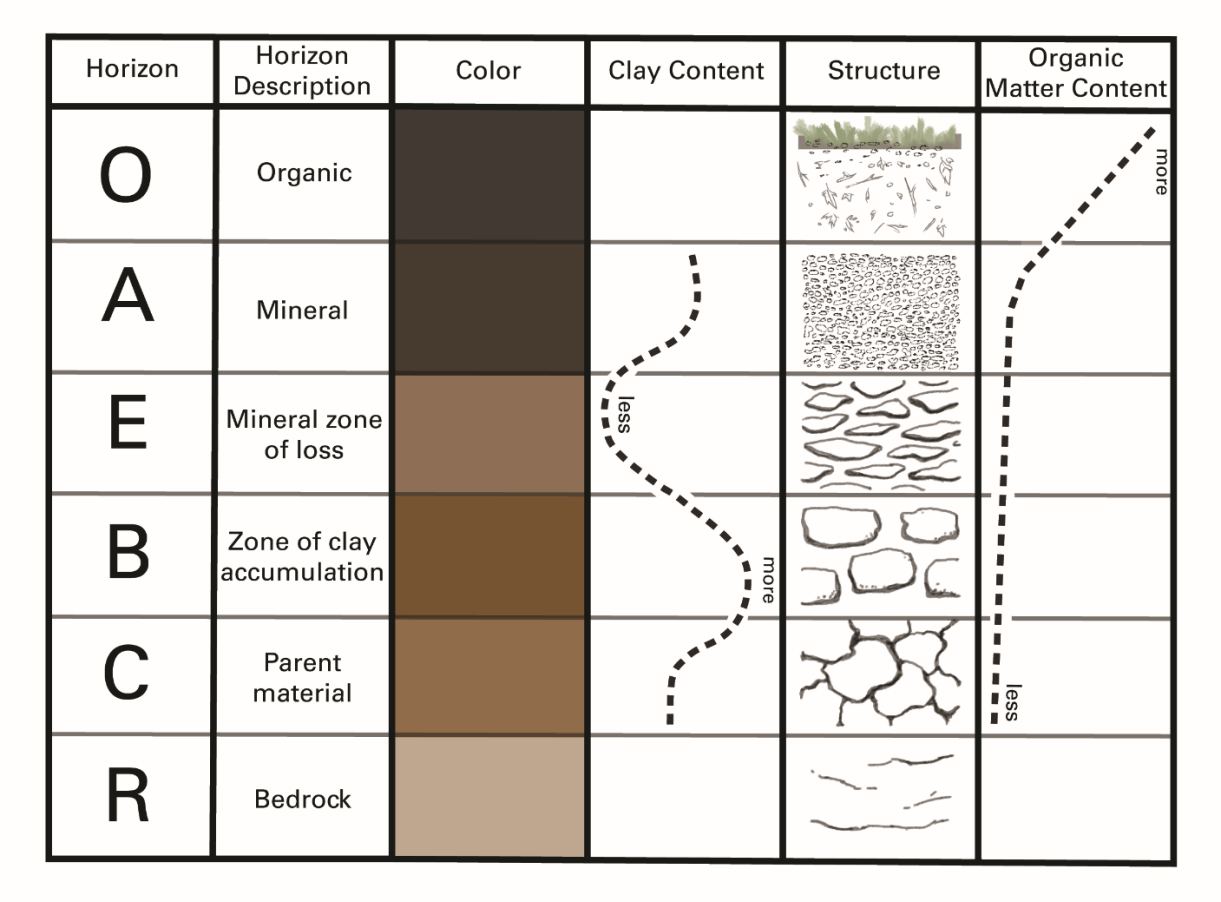
A. Course
B. Moderately course
C. Medium (silt loams and silts)
D. Moderately fine
E. Fine

Table 3. Shrink-swell ratings and values for Percent Volume Change*

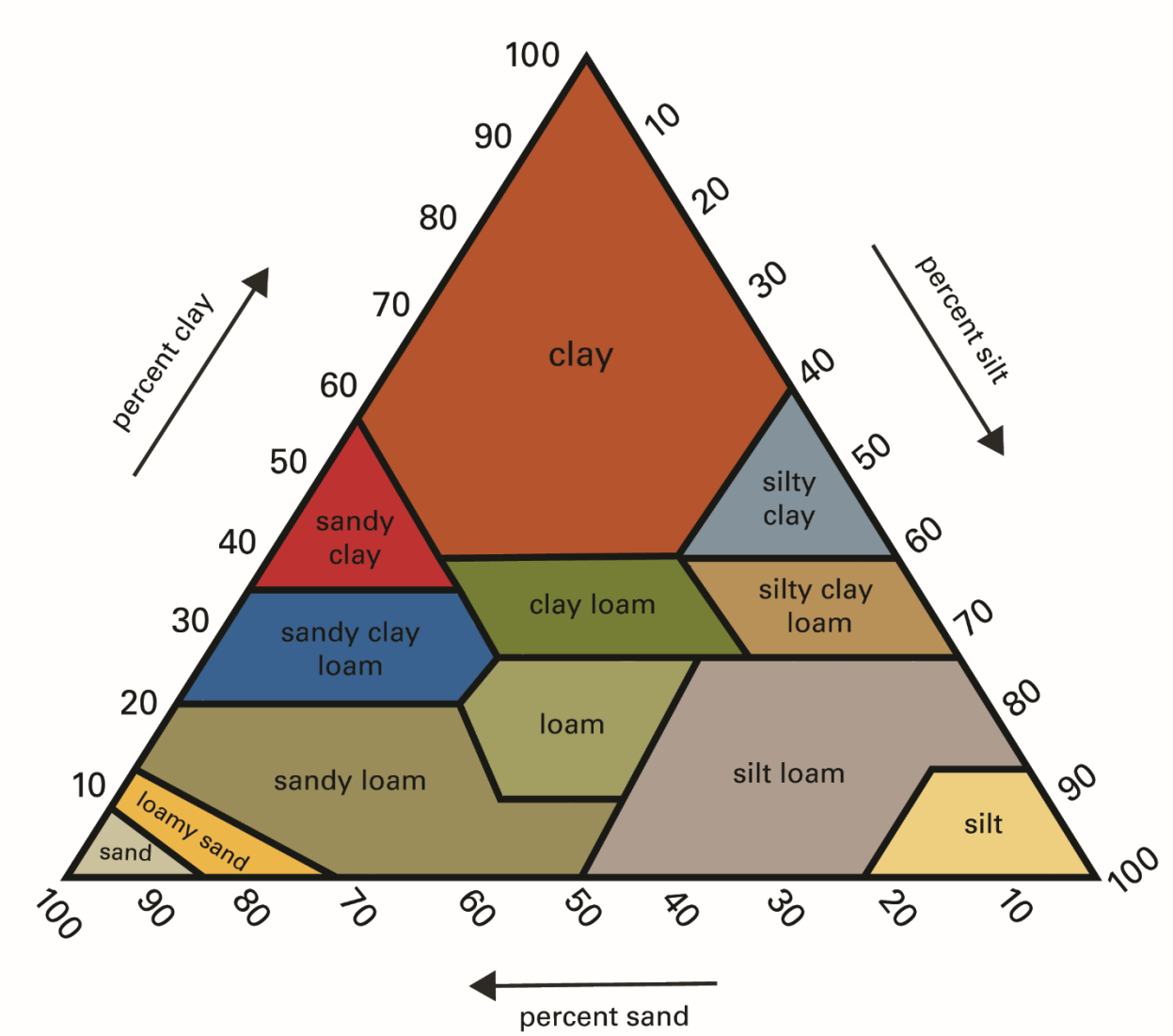
RATINGS USED IN SOIL SURVEY REPORTS	TEXTURAL GROUPS (CLASSES) FOR IOWA SOILS	PERCENT VOLUME CHANGE
Very low	Coarse, mod. coarse	0-3
Low	Mod. coarse, medium (loams)	3-9
Moderate	Medium (silt loams, silts), mod. fine	9-19
High	Mod. fine, fine	19-33
Very high	Fine	> 33

* George R. Hallberg. The Use of COLE values for sell engineering evaluation. Soil Sci. Sec. Amer J. 41 775-77T 1977.

20. Which soil profile horizon will typically have the highest clay content? (see profile chart)
A. A horizon
B. B horizon
C. C horizon
D. E horizon



21. What is the texture classification for a soil that is 20% sand, 70% silt, and 10% clay? (see texture chart)
A. Silty clay loam
B. Silt
C. Silt loam
D. Loam



22. Prior to the mid-1800s, Iowa's land was primarily covered with what three major natural ecosystems?

A. Tallgrass prairie, deciduous forest, and taiga
B. Tallgrass prairie, shortgrass prairie, and deciduous forest
C. Tallgrass prairie, coniferous forest and deciduous forest
D. Tallgrass prairie, savanna and deciduous forest

23. One teaspoon of soil has millions of _____.

A. bacteria and fungi cells
B. grains of sand
C. peds
D. all of these are correct

24. What are “Soil Ecosystem Services”?
A. A new branch of the USDA’s “Natural Resources Conservation Service”
B. Iowa Department of Agriculture and Land Stewardship’s program for soil conservation
C. The numerous important benefits that soil provides
D. ISU’s program to monitor Agriculture’s ecological impact on Iowa’s soil productivity

25. The Iowa loess hills are found in _____.
A. Eastern Iowa near the Mississippi river
B. Western Iowa near the Missouri river
C. North Central Iowa in the Des Moines lobe
D. nearly every county in Iowa

2024 Regional Iowa Envirothon Test KEY – Soils

(25 total points)

1. D
2. A
3. C
4. A
5. D
6. C
7. C
8. A
9. A
10. D
11. A
12. C
13. C
14. B
15. A
16. A
17. B
18. D
19. E
20. B
21. C
22. D
23. A
24. C
25. B