2024 Iowa Envirothon State Soils Exam Team Name_____

Each Question is worth three points – 75 points possible

Select and circle the one best answer for each of the following questions.

Questions 1-6:
Soil Survey Books of Polk County, Iowa - Part I & Part II

1. Which of the following is "True" regarding the series description for the Palms Soils Series in Polk County? (See Part one, page 102)
   A. The Palms Series is a very poorly drained, organic material soil.
   B. The Palms Series is a somewhat poorly drained, organic material soil.
   C. The Palms Series is a moderately well drained, loess soil.
   D. The Palms Series is a well drained, alluvial soil.
   E. The Palms Series is a very poorly drained, aeolian sand soil.

2. A farmer is building a new house on a country acreage in Polk County and is concerned about the limitations for installing a septic tank on the acreage. The Polk County Soil Survey indicates that the area where the septic system will likely be installed has a 138C2 soil type. Using the engineering soil interpretations for sanitary facilities (See Part 2, pgs. 121-132) and the description of how to use the sanitary facilities information (See Part 2, page 104), what would be the risk for the septic tank failing for this location?
   A. The limitations should be recognized but generally can be overcome by good management or a special design.
   B. Overcoming the limitations is difficult or impractical and increased maintenance may be required.
   C. This soil type has no limitations, or the limitations can be easily overcome.
   D. Good performance and low maintenance can be expected when installing a septic field.
   E. C and D are both correct

3. There fifty-five soil maps included with the Polk County Soil Survey. Use Soil Map Sheet #14 - Elkhart SW Quadrangle, to answer this question. Soil Map Sheet #14 is found on the back side of Soil Map Sheet #13. What is the Soil Map Unit (SMU) symbol for the area that is diamond shaped along Interstate 35 on the map in sections 30 and 31 of the Elkhart SW Quadrangle ?
   A. 507
   B. 55
   C. 138B
   D. 4946
   E. 107

4. What is the name of the soil series for the Soil Map Unit (SMU) symbol "107"?
   (Hint: The actual soil names are found in the soil legend section)
   A. Canisteo clay loam, moderately coarse substratum, 0 to 2 percent slopes
   B. Clarion loam, moderately coarse substratum, 2 to 5 percent slopes
   C. Orthents-Urban land complex, 0 to 5 percent slopes
   D. Nicollet loam, 1 to 3 percent slopes
   E. Webster silty clay loam, moderately coarse substratum, 0 to 2 percent slopes

5. What properties did the field soil scientists note when evaluating the Polk County soil profiles as they were completing the soil survey? (Part 1, page 13)

A. color, texture, size, and shape of soil aggregates
B. scientists name, address, favorite color, and phone number
C. kinds and abundance of livestock as well as other animal species
D. hydric soils, hydrology, and water quality
E. All of the above

6. In the block diagram on page 22 of Part 1, what soil is most likely found in the toeslope / drainageway landscape position for a typical Downs-Fayette soil association, that is pictured?

A. Tama
B. Loess
C. Fayette
D. Colo-Judson
E. Downs

Questions 7-10:
Use the soil sample buckets, the Guide to Texture by Feel chart at this station, as well as two stakes marking two locations, to answer these questions.

7. What is the texture of the A Horizon from a location in Northern Iowa? **(Use bucket A)**

A. sandy loam
B. clay loam
C. silty clay loam
D. loam
E. silt loam

8. What is the texture of the B Horizon from a location in Northern Iowa? **(Use bucket B)**

A. sandy loam
B. clay loam
C. silty clay loam
D. loam
E. silt loam

9. Between soil samples in buckets "A", "B" and "C", which soil has the highest silt content?

A. bucket "A"
B. bucket "B"
C. bucket "C"
D. The silt content of these three soil samples is about the same

10. The distance between the two stakes is twenty-five feet and the ground elevation above sea level is given at each stake. What is the percent slope for the area between these two stakes?

A. 0 – 2 percent
B. 2 – 5 percent
C. 5 – 9 percent
D. 9 – 14 percent
E. 14 – 20 percent

F. Greater than 20 percent

11. Which of the following is **NOT** considered to be a human induced change to soils found in urban areas?

A. soil texture
B. dredge materials
C. land filling and leveling
D. surface removal
E. windblown deep plowing/logging

12. _____ is the ability of a soil to hold and exchange cations. This is one of the most important chemical properties in soil and generally is closely related to soil fertility.

A. Calcium carbonate (CaCO3)
B. Cation-exchange capacity
C. Soil fertility index
D. Soil ped

13. Regarding the Revised Universal Soil Loss Equation (RUSLE2), the T factor is _____.

A. the soil loss tolerance and is defined as an estimated maximum rate of annual soil erosion that will permit crop productivity to be sustained economically and indefinitely
B. the soil erosion factor and is a relative index of the susceptibility of bare, cultivated soil to particle detachment and removal and transport by rainfall
C. the soil erosion factor and is a relative index of the susceptibility of bare, cultivated soil to particle detachment and removal and transport by wind
D. an index relating to topography based on slope gradient and slope length

14. _____ are formed under conditions of saturation, flooding, or ponding that occur long enough during the growing season to develop anaerobic conditions (lack of oxygen) in the upper 6 to 10 inches of the soil profile. These soils are common in wetland areas.

A. Calcium carbonate soils
B. Carbonate soils
C. Hydric soils
D. Sandy soils

15. Earthworm _____ is digested material that is excreted back into the soil. This material is enriched with nutrients (N, P, K, and Ca) and microorganisms during its passage through the worm's digestive system.

A. cast
B. hypoxia
C. mast
D. particulate

16. Even though it is not officially designated by the Iowa state legislature, the highly productive soils of the _____ soil series are widely regarded as the State Soil of Iowa.

A. Clarion
B. Muscatine
C. Monona
D. Tama

17. What soil pH level appears to be the most desirable for an Iowa row crop farmer who is using a corn-soybean crop rotation? (see to Table 1)
A. 4.7
B. 5.0
C. 5.7
D. 6.8
E. 7.5

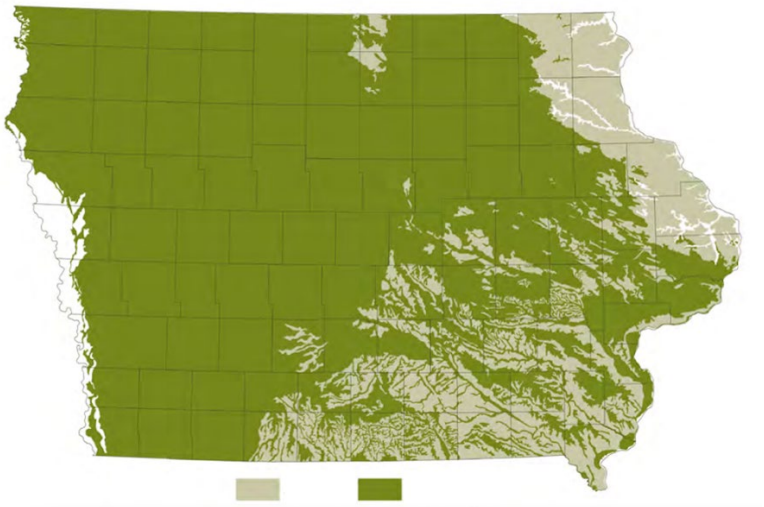
Table 1. Relative yield of selected crops grown in a corn, small grain, legumes or timothy rotation at different pH levels. (adapted from Smith and Doran 1996)

	pH				
	4.7	**5**	**5.7**	**6.8**	**7.5**
Crop	**Relative Average Yield**				
Corn	34	73	83	100	85
Wheat	68	78	89	100	99
Oats	77	93	99	98	100
Barley	0	23	80	95	100
Alfalfa	2	9	42	100	100
Soybean	65	79	80	100	93
Timothy	31	47	66	100	95

18. Forested soils and certain other intensely leached soils commonly contain a (an) ___ horizon located at the surface or a few inches below the surface. This horizon is usually lighter in color, lower in organic matter, and contains less clay than the topsoil or the overlying horizon, if one is present.
A. A
B. B
C. C
D. R
E. E

19. Which of the following describes the distribution of the two dominant soil orders in Iowa? (see diagram)

A. Mollisols are the most common and are found in areas that were historically prairie (green) and Alfisols are more abundant in the south and east where forests were more common (tan).
B. Entisols are the most common and are found in areas that were historically prairie (green) and Mollisols are more abundant in the south and east where forests were more common (tan).
C. Histosols are the most common and are found in areas that were historically prairie (green) and Mollisols are more abundant in the south and east where forests were more common (tan).
D. Alfisols are the most common and are found in areas that were historically prairie (green) and Mollisols are more abundant in the south and east where forests were more common (tan).



Soil Horizon Definitions (Matching)
Select the correct (A-F) to for each question (#20-#25). Write the letter in the blank.

A. A horizon	D. O horizon
B. B horizon	E. E horizon
C. C horizon	F. R horizon

_____ 20. Bedrock layer, rarely exposed in Iowa

_____ 21. Intensely weathered zone without significant organic or clay material

_____ 22. Layer relatively unchanged from deposition, also called parent material

_____ 23. Mineral enriched with organic material, zone of highest expected biological activity

_____ 24. Primarily organic material, commonly accumulating on forest floors or wetland areas

_____ 25. Zone transformed by additions like clay, calcium, or minerals from other horizons