2023 Iowa Envirothon State Soils Exam Team_____
Each Question is worth three points – 75 points possible

Questions 1-2:
Use the "Soil Web Survey" on the computer at the back lower entrance to the Jester Park Nature Center

Use the "Soil Web Survey" on the provided computer, to answer questions 1-2.
On the "Soil Web Survey" identify the AOI located at this address: 2134 West Tama Road, Buckingham, Iowa 50612. Select an AOI at this address that includes the farmstead area that is not tilled which should be about 20 acres in size and view the soil map of this AOI.

1. What is the map unit name for the soil type that is the most common for this acreage identified on this AOI?
A. Colo-Ely complex
B. Dinsdale silty clay loam
C. Dinsmore silty clay loam
D. Kenyon loam

2. What is the map unit symbol for the Colo-Ely complex soil that is located at the pond area of this AOI?

_____

Questions 3-8:
Use the soil samples, the Guide to Texture by Feel chart, and Munsell color book at this station, as well as two flags marking several locations, to answer these questions.

Use the Soil Sample Buckets, the Guide to Texture by Feel chart, and the Munsell color chart to answer questions 3-6.
3. What is the texture of the A Horizon from this location? **(Use bucket A)**
A. sandy loam
B. clay loam
C. silty clay loam
D. loam
E. silt loam
F. none of these

4. What is the texture of the A 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
F. none of these

5. Between bucket A or bucket B, which soil has a courser texture?
A. A Horizon from this location (bucket A)
B. this cannot be determined without further tests
C. A Horizon from a location in Northern Iowa (bucket B)
D. The texture of these two soil samples is the same

6. What is the matrix color of the B Horizon from this location using the Munsell Color Book? Choose the color chip which fits the best. **Hint:** Always moisten the soil before determining the color! **(Use bucket C)**
A. 10YR 2/1
B. 10YR 4/4
C. 2/5Y 4/2
D. 5Y 4/1
E. none of these

Use the two flags marking two locations to answer questions 7-8

7. The two flags are located seventy-five feet apart. Assuming an elevation difference of 29 inches, what is the slope between these two flags?
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

8. The two flags are located on what landscape position?
A. bottomland
B. footslope
C. intermittent drainageway
D. terrace
E. upslope

Questions 9-13:
Soil Survey Books of Polk County, Iowa - Part I & Part II

Use the Soil Survey Book of Polk County, Iowa - Part I to answer questions 9-12

9. What is the most common soil in Polk County? (One point per blank)

Soil name _____

Map Symbol _____

Total acres _____

10. Refer to the colorful center fold which is the "General Soil Map of Polk County, Iowa" and determine which of the following soil association area is most likely to be located on a flood plain?
A. Canisteo-Clarion-Nicollet association
B. Hayden-Storden-Lester association
C. Nodaway-Colo-Nevin association
D. Ladoga-Gara-Lindley association
E. Sharpsburg-Shelby-Lamoni association

11. Refer to the black and white center fold which is the "Index to Map sheets for Polk County, Iowa" and determine the map number for Ankeny, Iowa which is located toward the center of Polk county? (The maps are outlined in light gray and each map has a difference map number).

Map Number _____

12. According to the "Formation and Classification of Soils" section of this survey book, what is the most common parent material in Polk County?
A. alluvium
B. eolian sand
C. glacial till
D. loess
E. residuum

Use the Soil Survey Book of Polk County, Iowa - Part II to answer question 13

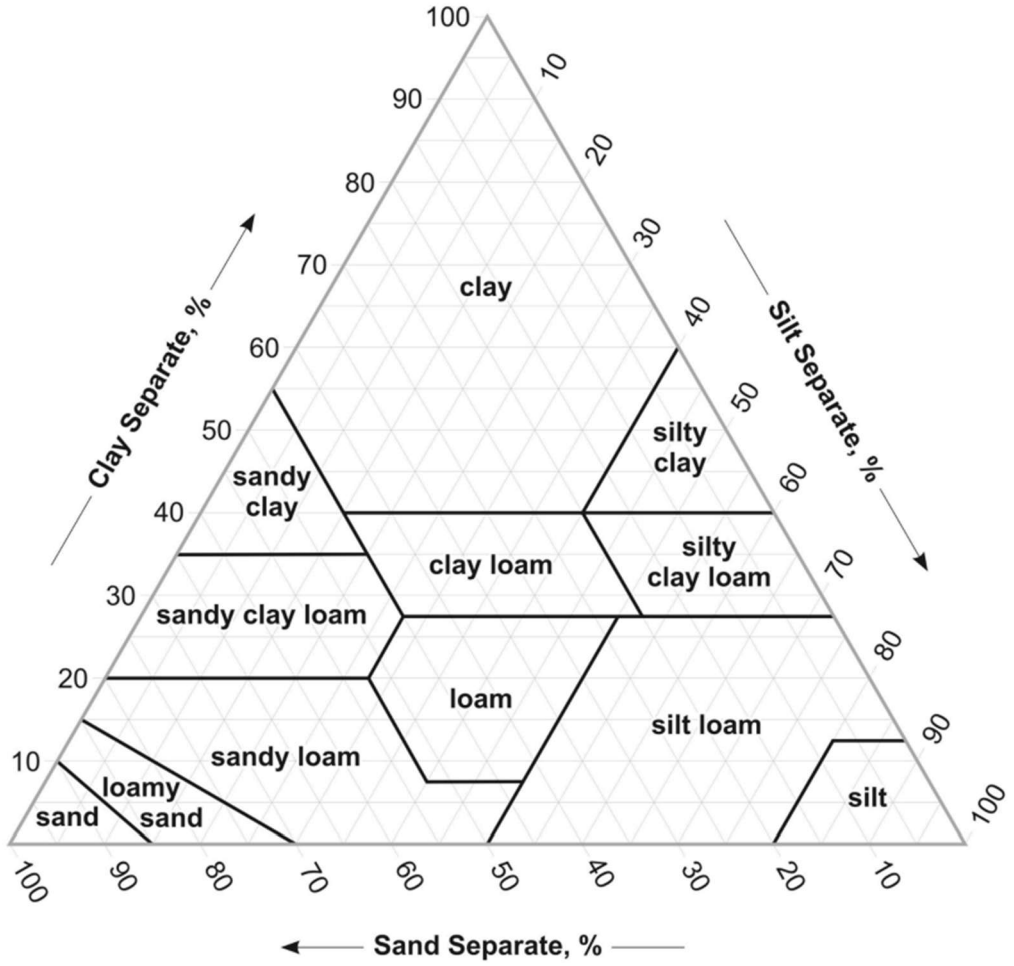
13. Which of the following Polk County soils has the most desirable "Corn Suitability Rating" productivity Index?
A. 55 – Nicollet
B. 107 – Webster
C. 138B – Clarion
D. 163F – Fayette
E. 168B – Hayden

14. Which soil profile horizon is mineral enriched with organic material and considered the zone of highest expected biological activity?
A. A horizon
B. B horizon
C. C horizon
D. E horizon

15. If all the soil organisms from one acre of a typical Iowa soil were placed on a scale, they would roughly equal the weight of two
A. African elephants
B. blue whales
C. domestic cats
D. white tail deer

16. What is the texture classification for a soil that is 30% sand, 35% silt, and 35% clay? (see texture chart)

A. Clay loam
B. Clay
C. Silt loam
D. Loam



17. The pH of Iowa's soils are typically

A. alkaline and measuring around nine
B. alkaline and measuring around five
C. acidic and measuring around five
D. close to neutral and measuring around seven

18. The most common soil order in Iowa and are generally prairie-derived soils known for their thick, dark, fertile topsoil.

A. Alfisols
B. Entisols
C. Histosols
D. Mollisols

19. The four major processes that change parent material into soil are
A. additions, losses, transpiration, and transformations
B. additions, losses, translocations, and transformations
C. subtractions, losses, translocations, and transformations
D. subtractions, loess, translocations, and transformations

20. _____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

21. What biota are easy to count by personnel regardless of special training and are considered usable as biological indicators?
A. bacteria, fungi, and protozoa
B. earthworms
C. gravel and pebbles
D. all of these are correct

22. If a soil has an optimum pH for the microbial groups of blue green bacteria and protozoa the soil pH would be classified as _____. (see to Table 2)
A. acidic
B. alkaline
C. neutral
D. all of these are correct

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

23. Cover Crops
A. include grasses, legumes and forbs
B. reduce soil erosion and increases soil organic matter
C. improves soil biology and water infiltration.
D. all of these are correct

24. A layer of slightly decomposed organic material on the surface of the soil is refer to as
A. mineral matter
B. humus
C. litter
D. loess

25. The _____uses a tested and proven soil erosion model to estimate soil erosion and water runoff occurring on hill slopes in Iowa, Nebraska, Minnesota, and parts of Illinois, Missouri, Kansas and Wisconsin.
A. Daily Erosion Project (DEP)
B. Light Detection and Ranging Program (LiDAR)
C. Revised Universal Soil Loss Equation (RUSLE)
D. Universal Soil Loss Equation (USLE)