Exam #1
SOILS 4463
Soil and Water Conservation and Management

#1. List three functions of soil. (3)

#2. Does the management of soil influence the availability of water in aquifers? (3)

#3. Provide an example of how soil management influences air quality? (3)

#4. List three functions of water. (3)

#5. Rank the following uses of water from highest to lowest use in **Oklahoma** by placing a 1 by the highest and a 3 by the lowest. (3)
Industrial use_____
Crop irrigation____
Livestock production_____

#6. The dust bowl was the result of poor soil management driven by various factors. One factor that caused the dust bowl was abnormally wet weather in the years prior to the onset of the dust bowl. Provide another factor **except for tillage** that contributed to the dust bowl. (4)

#7. List three on-site problems resulting from erosion by water. (6)

#8. List two off-site problems resulting from erosion by water. (4)

#9. List and briefly describe three types of erosion by water. (4)

#10. Can erosion change the texture of soil? If so, briefly describe how. (4)

#11. Which of the following factors influence erosion by water? (4)

a. Rainfall
b. Soil properties
c. Topography
d. All of the above.

#12a. The kinetic energy of runoff is much lower than the kinetic energy of rainfall. True or false? (4)

#12b. Based on your answer to 14a, which of the following is the most effective at reducing erosion? (4)

a. Maintaining permanent vegetative/residue cover
b. Increasing infiltration using deep tillage
c. Increasing surface ponding using chisel plow
d. Reducing slope length by installing terraces

#13. Briefly describe one reason why you might want to estimate runoff. (3)

#14. When designing an erosion control structure such as a terrace or grass waterway, which is more important when determining the capacity of the structure? (Circle one) (3)

a. Peak Discharge
b. Total runoff

#15. List three factors that influence runoff. (3)

#16. Sands and Loamy sands with **no restrictive layers** are in which of the following hydrologic soil group? (4)

a. Group A
b. Group B
c. Group C
d. Group D

#17. Curve numbers are used to: (4)

a. Estimate runoff
b. Estimate the peak discharge rate
c. Estimate erosion by water
d. Determine the geometry of a terrace

#18. Which of the following influences the erodibility of a soil? (4)

a. Tillage
b. Texture
c. Crop type
d. Geographic location

#19. Sand sized soil particles are easily detached by the impact of rainfall. However, they are less erodible than silt size particles. Briefly provide at least one reason why? (4)

#20. A surface soil with stable soil aggregates is: (4)

a. Less susceptible to crusting
b. More susceptible to erosion
c. Less susceptible to erosion
d. Both a and c

#21. Slaking will cause macropores to plug with soil particles and reduce infiltration? True or False. (3)

#22. Is it appropriate to use the USLE or Revised USLE equation to estimate watershed scale sediment delivery to a water body? (5)

#23. Can the water erosion prediction project (WEPP) be used to estimate erosion from a single rainfall event? (4)

#24. Which of the following is the most common form of terrace found in Oklahoma? (4)

a. Broad based terrace
b. Flat top terrace
c. Subsurface drainage terrace
d. None of the above

#25. Attached you will find a factsheet and an isoerodent map. Use these resources and the following information to determine if erosion control measures are needed to prevent a decrease in the productivity of the hill slope described. (6)

The hill slope is located in Payne County and mapped as a Port silt loam. It is in continuous winter wheat under mulch tillage and is contour farmed.
A=R*K*LS*C*P
The T factor for the Port silt loam is 5 tons/acre
The K factor for the Port silt loam is 0.37
The slope 1 % and is 100 ft long

Don’t miss the Bonus on the next page.

Bonus(5):

The average T value for soils in Oklahoma is approximately 2 tons per acre.

Based on the brief description and typical profile provided below for the Port silt loam, provide an explanation for why the T value for the Port silt loam is generally high.

The Port series consist of very deep, well drained, moderately permeable flood plain soils that formed in calcareous loamy alluvium of Recent age. These nearly level to very gently sloping soils are on narrow flood plains in the Central Rolling Red Prairies (MLRA-80A) and the Central Rolling Red Prairies (MLRA 78C). Slopes range from 0 to 3 percent. Mean annual precipitation is 32 inches. Mean annual temperature is 63 degrees F.

TAXONOMIC CLASS: Fine-silty, mixed, superactive, thermic Cumulic Haplustolls

Ap--0 to 9 inches; reddish brown (5YR 4/3) silt loam, dark reddish brown (5YR 3/3) moist; moderate medium granular structure; soft, very friable; neutral; clear smooth boundary. (0 to 11 inches thick)

A--9 to 27 inches; dark reddish brown (5YR 3/3) silt loam, dark reddish brown (5YR 2/2) moist; moderate coarse granular structure; slightly hard, friable; neutral; gradual smooth boundary. (10 to 30 inches thick)

Bk--27 to 42 inches; reddish brown (5YR 4/4) silty clay loam, dark reddish brown (5YR 3/4) moist; weak fine subangular blocky structure; hard, firm; few thin strata of darker material; common masses and films of calcium carbonate; strongly effervescent; moderately alkaline; diffuse smooth boundary. (0 to 25 inches thick)

C--42 to 72 inches; reddish brown (2.5YR 5/4) silt loam, reddish brown (2.5YR 4/4) moist; massive; hard, firm; few thin strata of dark reddish brown silty clay loam; common masses and films of calcium carbonate; strongly effervescent; moderately alkaline.