BIE 5150/6150
SURFACE IRRIGATION DESIGN

Exam No. 1 Name_____

(7) 1. Draw the time-space description of surface irrigation and show three important phases that characterize surface irrigation.

(3) 2. What is the most important difference between a surface irrigation system and a sprinkle or drip irrigation systems in terms of how water is distributed over the field?

(3) 3. What are three recognized forms of surface irrigation?

(7) 4. How are the three forms of surface irrigation in Problem 3 distinguished one from another?

(3) 5. What are three advantages generally associated with surface irrigation?

(3) 6. What are three disadvantages generally associated with surface irrigation?

(4) 7. A grad student wishes to determine the status of water in a 30 cm long by 2.5 cm diameter undisturbed soil sample. After extracting it from the field, he found that it weighed 260 grams. He assumed the specific weight of the soil particles is 2.65 gm/cm^3. He then completely dries the sample and then completely saturates it with water. He found at it required 58.9 cm^3 of water to saturate the sample. What is the bulk density of the soil sample?

(5) 8. Define application efficiency, requirement efficiency, distribution uniformity, and absolute distribution uniformity for surface irrigation systems.

(10) 9. Furrow cross-section measurements have been made in the field. The values of Tmax, Tmid, Base, and Ymax are as follows:

Tmax =		43 cm
Tmid	32 cm	
Base =	9 cm	
Ymax =	12 cm	

Compute the values of rho1, rho2, sigma1, sigma2, gamma1 and gamma2.

Rho1 _____
Rho2 _____

Sigma1 _____ Gamma1 _____
Sigma2 _____ Gamma2 _____

(20) 10. A flow of 1.5 lps is introduced into a unit width of a sloping border (So = .0005). The soil is a clay loam. The flow reaches the midpoint of the 400 m border in 102 min and the end of the field in 292 min. Volume balance computations reveal that the infiltration coefficients are: a = .437; k = .0033. These numbers are based on assuming a fo value of 0.000078 from tables.

Now suppose on the same field we introduced a flow of 1.0 lps and found the flow reached the midpoint in 76 min and the end of the field in 179 min. Would the a, k, and fo values be the same?

If you told me that you had actually conducted this test and these were the results, how do you suppose I would react?

(20) 10. Find the hydraulic section parameters for: (a) a furrow with Tmax = 31 cm, Tmid = 25.5 cm, Base = 7 cm, and Ymax = 5 cm; and (b) a canal with Tmax = 31 m, Tmid = 25.5 m, Base = 7 m, and

Ymax = 5 m. Assume the Manning Coefficient in both cases is 0.04 and the slope of furrow or canal is 0.0001. Compute the discharge in both cases when each channel is 80% full.