UVA WELLASSA UNIVERSITY OF SRI LANKA
FACULTY OF ANIMAL SCIENCE & EXPORT AGRICULTURE

Uva Wellassa University

BSc in Export Agriculture
Third Year First Semester Examination – June/July 2017

Advanced Irrigation Technologies (EAG 341-1)
Essay Questions

Instructions:

Answer all questions in the given booklet
No. of questions : Two (02)
No. of pages : Two (02)
Time : One (01) hour
Total marks allocated : 100%

01. Briefly discuss the followings (use suitable sketches when necessary);

(10 marks x 4 = 40 marks)

(I). Cumulated infiltration and infiltration rate.

(II). Diameter of coverage in sprinkler irrigation.

(III). Estimation of friction loss of a pipe which is with openings along its length.

(IV). 'Twenty percent rule' used in hydraulic design of sprinkler irrigation.

02. (I). Discuss the factors considered in designing a sprinkler irrigation system.

(20 marks)

(II). A level field (400 m x 400 m) is to be irrigated using aluminum lateral pipes which are fed by a sub-main pipe that is running through the center of the field. Use following hydraulic design criteria and the table for designing the lateral pipes for the sprinkler irrigation system.

Hydraulic Design Criteria

- The first sprinkler is located 10 m from the lateral inlet.
- The sprinklers are spaced 10 m apart along the lateral pipe.
- The discharge of selected sprinkler is 1.5 m^3/hr and pressure is 25 m.
- The sprinkler irrigation system is to be designed for Option No.01 applying the 'Twenty percent rule'.
- The diameter of the selected aluminum pipe is 75 mm and the friction loss of this pipe without openings (J) is 25 mm/1000 mm pipe.

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Table: Co-efficient F for Plastic and Aluminum Laterals

n	Plastic Lateral, r = 1.760			Aluminum Lateral, r = 1.852		
	(X) F1	(Y) F2	(Z) F3	(X) F1	(Y) F2	(Z) F3
5	0.469	0.337	0.410	0.457	0.321	0.396
10	0.415	0.350	0.384	0.402	0.336	0.371
12	0.406	0.352	0.381	0.393	0.338	0.367
15	0.398	0.355	0.377	0.385	0.341	0.363
20	0.389	0.357	0.373	0.376	0.343	0.360
25	0.384	0.358	0.371	0.371	0.345	0.358
30	0.381	0.359	0.37	0.368	0.346	0.357
40	0.376	0.360	0.368	0.363	0.347	0.355
50	0.374	0.361	0.367	0.361	0.348	0.354
100	0.369	0.362	0.366	0.356	0.349	0.352
200	0.366	0.363	0.365	0.353	0.350	0.352

(X) F1 is to be used when the distance from the lateral inlet to the first outlet is equal to the spacing of sprinklers.

(Y) F2 is to be used when the first outlet is near the lateral inlet.

(Z) F3 is to be used when the distance from the lateral inlet to the first outlet is equal to half of the spacing of sprinklers.

Calculate;

a) Number of sprinklers needed to be set along a lateral pipe. (10 marks)

b) Required discharge at the inlet of a lateral pipe in m^3/hr. (10 marks)

c) Maximum allowable head loss (friction loss) along a lateral pipe in m. (10 marks)

d) Possible head loss (friction loss) along the lateral pipe with above calculated number of openings (a) in m. (10 marks)

[End of the paper]