ELIZADE UNIVERSITY, ILARA – MOKIN

FACULTY OF ENGINEERING
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
First Semester 2019/2020 Session

Course Title: Drainage and Irrigation Engineering Course Code: CVE 403 Units: 3
Instruction: Answer Questions 1 and any other three Time Allowed: 3 hours

Question 1 (30 marks)

a. Write a detailed note on characteristics of wastewater and water (6 marks)

b. Write a short note on drainage. (6 marks)

c. In short sentences, briefly explain the following terms as related to crop-water requirements: duty of water, base period, delta, irrigation requirement of crops, and effective depth (6 marks)

d. Water flows in a rectangular concrete open channel that is 4.0 m wide at a depth of 0.5 m. The channel slope is 0.0012. Find the water velocity and flow rate. (6 marks)

e. Mention 3 methods of distribution of irrigation water and explain them (6 marks)

Question 2 (10 marks)

a. Write a short note on types of soil. (5 marks)

b. A trapezoidal channel, bottom width 1.5.0 m and side slopes 45^0, flows 0.4 m deep on a slope of 0.0012. For a value of n = 0.015, what is the uniform discharge? (5 marks)

Question 3 (10 marks)

a) What are the climatic factors affecting consumptive use of water by plant (2marks)

b) State and define the all the parameters of Blaney-Criddle's equation used for the determination of evapo-transpiration. (2marks)

c) By Blaney-Criddle method, the following data were obtained (Table Q3). Deduce the seasonal consumptive use for Beans for each of four months. (6marks)

Table Q3: Average monthly day light

Months	April	May	June	July
Mean T^0C	20	16	14	15
% Monthly day light (P)	7.03	7.3	7.4	7.19

Take K= 0.7

Question 4 (10 marks)

a. Explain in detail the term irrigation and type of irrigation. (5 marks)

b. Soil samples from a farm land were analyzed the results are as follows:

i. sand 51%, silt 37%, clay 9%;

ii. 35% clay,10% silt, 55 % sand;

Use these results to classify the soil texture based on US Department of Agriculture (USDA) classifications. (5 marks)

Question 5 (10 marks)

Given the following details:

i) Intake family, IF = 0.3

ii) Furrow length, L = 275m

iii) Furrow slope, S = 0.004m/m

iv) Roughness coefficient = 0.004 and Net irrigation depth i_n = 75mm

v) Furrow spacing = 0.02m and Inflow rate, $Q = \frac{0.6l}{s}$. Answer as the case may be

a) Compute the adjusted wetted perimeter under the cut-back conditions (4 marks)

b) Determine the net infiltration time at furrow length of 275m. (4 marks)

c) Mention 4 components of irrigation system. (2 marks)

Question 6 (10 marks)

A stream size of 120 l /s was released from the diversion headwork to irrigate a land of area 1.2 hectares. The stream size when measured at the delivery to the field channels is 80 l/sec. The stream continued for 4 hours. The effective root zone depth is 1.80 m. The application losses in the field are estimated to be 420 m^3. The depth of water penetration was 1.80 m and 1.20 m at the head and tail of the run respectively. The available water holding capacity of the soil is 20cm/m and irrigation was done at 70% depletion. The stream size delivered to the plot was 80 l /sec. Determine:

i. Water Distribution Efficiency (Ed),

ii. Field Canal Efficiency (Eb)

iii. Water storage efficiency (Es)

iv. Water application Efficiency (Ea)

v. Water Conveyance efficiency (Ec) (10 marks)

Table Q5: Intake family and advanced coefficients for depth of infiltration in mm, time in minutes and length in m.

Intake family	a	b	c	f	g $x10^{-4}$
0.05	0.5334	0.618	0.7	7.16	1.088
0.10	0.6198	0.661	0.7	7.25	1.251
0.15	0.7110	0.683	0.7	7.34	1.414
0.20	0.7772	0.699	0.7	7.43	1.578
0.25	0.8534	0.711	0.7	7.52	1.741
0.30	0.9246	0.720	0.7	7.61	1.904
0.35	0.9957	0.729	0.7	7.70	2.067
0.40	1.064	0.736	0.7	7.79	2.230
0.45	1.130	0.742	0.7	7.88	2.393