W1-2-60-1-6

JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY
UNIVERSITY EXAMINATIONS 2017/2018

END OF SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN LAND RESOURCES PLANNING AND MANAGEMENT

ALP 2305: AGRO METEOROGY AND CROPWATER REQUIREMENTS

DATE: JANUARY 2018 **TIME: 2 HOURS**

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER THREE QUESTIONS

Question 1(30 marks)

a)(i) Draw a well labeled sketch of a standard agro meteorological station. (6 marks)

(ii) List four major factors to consider when establishing a meteorological station. (2 marks)

b) The psychometric equation is given as

$(e_w - e_a) = \gamma(T_a - T_w)$

(i) Define the parameters in the equation (2.5 mks)

(ii) Given T_a and T_w as 30^0 C and 20^0C respectively. Calculate

- e_w
- e_a
- Relative Humidity
- Specific Humidity (6mks)

c) (i)Define Relative Humidity and explain its diurnal variation. (3.5 marks)

(ii) Outline the effects of Relative humidity on crop production (5marks)

(iii) Outline the factors which control the transpiration process (5 marks)

Question 2 (20 marks)

a) Discuss the electromagnetic spectrum and explain how its components affect crop production. (5 marks)

b) Discuss in details the factors which control temperature of a place. (9marks)

c) Discuss the effect of low temperature on crop production (6 marks)

Question 3 (20 marks)

a) Discuss the major climate system components. (7.5 marks)

b) (i)Define the following terms?

- Global warming
- Climate variability
- Climate change (1.5 marks)

(ii) Discuss the causes of climate variability and climate change (6mks)

c) What mitigation, coping and adaptation mechanisms can you advise your county to undertake against climate variability and change? Discuss. (5mks)

Question 4(20 marks)

a) (i) Explain what you understand by the term 'crop water requirements'. (2mks)

(ii) Outline the reasons for estimation of crop water requirements. (3mks)

b) (i) Define the following terms

- Evapotranspiration
- Consumptive water use
- Reference crop evapotranspiration
- Actual crop evapotranspiration (4mks)

(ii) Explain how the following factors affect evapotranspiration

- Climatic factors (2.5 mks)
- Growing season (1.5 mks)
- Crop characteristics (1.5 mks)
- Soil characteristics (1.5 mks)

c) Discuss the use of the water balance method in estimation of the crop water requirements of maize.

$$e_w = 611 exp\left(\frac{17.27T}{237.3+T}\right) \text{Pa}$$