

GWANDA STATE UNIVERSITY



FACULTY OF LIFE SCIENCES

DEPARTMENT OF CROP SCIENCES

BACHELOR OF SCIENCE HONOURS DEGREE IN CROP SCIENCE

Agricultural Water Resources Management

LCS2213

Second Semester Final Examination Paper

Jan/Feb 2021

This examination paper consists of 3 pages

Time Allowed: 3 hours
Total Marks: 100
Special Requirements: None
Examiner's Name: R. Mapuranga

INSTRUCTIONS

1. Answer any **five** questions
2. Start each question on a new page

MARK ALLOCATION

QUESTION	MARKS
EACH QUESTION	20
TOTAL ATTAINABLE MARKS	100

Copyright: Gwanda State University 2021

1. (a) Outline the factors considered when choosing a water harvesting technique [8]
- (b) Describe any four (4) in-field (*in-situ*) water harvesting techniques which can be used by smallholder farmers in semi arid regions of Zimbabwe. Use diagrams to illustrate your answer were possible [12]
2. Irrigation scheduling is the process of determining when to apply water, how much to apply and how to apply it. There are different approaches used for irrigation scheduling, some are direct while others are indirect.
 - (a) List any two (2) advantages and any four (4) disadvantages of using visual inspection as a method of irrigation scheduling [6]
 - (b) Discuss in detail plant based methods of irrigation scheduling under the following sub types:
 - i. Stem diameter monitoring [4]
 - ii. Heat pulse technique [4]
 - iii. Sap flow method [4]
 - (c) List any other two (2) methods of irrigation scheduling (not covered in (a) and (b) above) [4]
3. (a) State and explain any three challenges resulting from using poor quality irrigation water [6]
- (b) Discuss the use of the following criteria in determining the quality of irrigation water
 - i. Boron concentration/content [4]
 - ii. Sodium absorption ratio (SAR) [4]
 - iii. Total soluble salt concentration as measured by electrical conductivity [5]
4. Discuss soil moisture conservation techniques to combat climate change and mid season droughts in natural regions IV & V of Zimbabwe. [5]
5. Identify challenges (and gaps) faced by several community managed irrigation schemes in Zimbabwe and suggest solutions and recommendations which can be adopted by the irrigation facilities to improve crop production [20]
6. (a) A farmer in Gwanda district wishes to establish an irrigation facility at her citrus farm. Assuming that you are an irrigation officer in the ministry of agriculture, she consults you on the best irrigation type to use. Write an essay detailing the factors which she should consider when choosing an irrigation type to use [16]

- (b) The farmer in (a) above has decided to use drip irrigation, give her further advise on the advantages (2) and disadvantages (2) of using this type of irrigation [4]
7. (a) A farmer in Gokwe growing groundnuts, maize and wheat under irrigation used Class A pan to estimate Epan. His pan reading (Epan) was 22 mm/day.
- i. Given that K_p (Pan coefficient) was 0.65 calculate ET_o (reference crop evapotranspiration) for each crop [6]
 - ii. It is further given that Crop coefficients (K_c) for the three crops are 0.6, 0.8 and 0.72 respectively for the growth stages under review, calculate ET_{crop} (Crop water requirements) for each crop [3]
- (b) Write down the word equation for irrigation requirement (IR) and explain how each component contributes to net irrigation requirements [11]

End Of The Examination Question Paper
