MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2016/2017

SECOND YEAR SECOND SEMESTER EXAMINATIONS FOR THE DEGREE OF MASTER OF SCIENCE IN PLANT BREEDING

MAIN CAMPUS

AAG 801: RESEARCH METHODOLOGY

Date: 10th April, 2017   Time: 2.00 - 5.00pm

INSTRUCTIONS:

Answer ALL Questions in section A and ANY THREE from section B.

Instructions: Answer ALL Questions in section A and ANY THREE from section B.
Duration 3 hrs.
SECTION A: Answer ALL questions

1. Define the following terms as used in the research process (**1 mark each**)
i)   Research hypothesis
ii)   Local Control
iii)   Research Rationale
iv)   Sample mean
v)   Experimental Unit

2. Briefly explain the three (3) main types of research (**3 marks**)
3. Outline the four (4) procedures used to verify a hypothesis? (**4 marks**)
4. Define the term Experimental Error and outline how it can be measured. (**2 marks**)

5. (a)What are the two (2) major considerations for obtaining an optimum plot size for experimentation? (**2 marks**)
   (b)What are the major appropriate methods necessary to cope with soil heterogeneity in an experimental field? (**2 marks**)

6. Define the term sampling unit (**1 mark**) and outline the three (3) main features of an appropriate sampling unit. (**1.5 mark**)
7. Differentiate between simple random sampling and stratified random sampling (**1 mark**)
8. In an experiment to evaluate forms of urea and their mode of application, 9 treatments were used and replicated four times. Data on tiller count was collected from six randomly selected plants (hills) per plot. If t = treatments, r = replications and s = sampling units per plot, construct a format for the ANOVA table. (**4 marks**)

9. An experiment was conducted to evaluate the effect of nine grain legume varieties on N content of the soil. The experiment was a RCBD with five

replications and data collected at the 10th 16th and 20th days after emergence of the legume crop. Outline the format for the ANOVA table for the measurements over time where t=number of replications, r = number of treatments and p = number of times of observation. **(2 marks)**

10. Briefly describe the four (4) main types of competition effects between plants within an experimental unit. **(4 marks)**

11. Briefly discuss the major distinctive features of the farmers' field as an experimental test site, relative to a research station. **(5 marks)**

SECTION B: Answer ANY THREE Questions (15 marks each).

10.
  a) Define the term Conceptual Framework **(1 mark)**
  b) What are the main components of a conceptual framework **(3 marks)**
  c) Develop a conceptual framework for **ANY ONE** of the following research titles. **(6 marks)**
      i. Evaluation of Biological Nitrogen Fixation between fodder legumes and grain legumes in Western Kenya
      ii. Evaluation of Cassava Inbred Lines for Cyanide Content
  d) Using one of the titles above
      i. Present three specific objectives to the realization of your overall. **(2 marks)**
      ii. For each Specific Objective outline any two activities that you will carry out. **(3 marks)**

11. The purpose of the methodology section is to show how the research questions previously raised in the proposal will be answered in the most rigorous way possible. In order to enable this process to effectually take place, a project/research proposal must present clear and succinct methodology and methods that will be employed.
  a. Describe the proposed research methodology and methods for **ONE of the titles** in **Q10(c)** and justify their use. **(6 marks)**
  b. What are the 3 main features of a Latin Square Design **(3 marks)**
  c. Under what circumstances is Latin Square Design **NOT** useful **(2 marks)**
  d. Briefly discuss advantages and disadvantages of Latin Square Design. **(4 marks)**

12.

a) Differentiate between population and sample mean. (**2 marks**)
b) Experimentation is a procedure used to verify a hypothesis and consists of 10 steps. Outline the steps. (**5 marks**)
c) Define the term randomization. (**1 mark**)
d) What two (2) advantages of a factorial experiment (**2 marks**)
e) Outline the steps to be followed during the randomization for a factorial experiment arranged as a split plot design (**5 marks**).

13

a) (a) Why does experimental error increase with the number of treatments? (**2 mark**).
b) (b) What are the two (2) major guidelines to consider on whether to use a Split Plot experimental design? (**2 marks**).
c) Identify objectives of a field, greenhouse or laboratory experiment and outline the scientific methods that would be used to meet those objectives. (**5 marks**)
d) Describe approaches that a researcher can use to reduce experimental error in agricultural experiments. (**4 marks**)
e) Determine when blocking is needed and demonstrate how blocks are arranged in field experiments. (**2 marks**)