BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE

MFS 511/518

Department of Agricultural Economics, Education and Extension
MSc in Food Security and Sustainable Agriculture Part I Examination
Applied Research Methods/ Biometry and Experimental Designs

3 HOURS (100 Marks)

JUN 2024

INSTRUCTIONS TO CANDIDATE
Answer question ONE from SECTION A and any TWO questions from SECTION B.

SECTION A (COMPULSORY)

1) Assuming that your consultant firm have being shortlisted to submit a proposal for end of project evaluation for a Cash transfer project that was implemented post-Cyclone Idai period in Chimanimani District of Manicaland Province, Zimbabwe. Giving practical examples, describe in detail all the sections that you would include in the proposal. **[50 marks]**

SECTION B

2) Suppose the BUSE farm has eight different plots of land. The farm manager randomizes and applies two fertilization "schemes" ("control" and "new") to the eight plots. In addition, each plot is divided into four subplots. In each plot, four different maize varieties are randomized to the subplots. The BUSE farm manager is interested on the effect of fertilization scheme and maize variety on cob mass. Per subplot, he records the fruit mass after a certain amount of time.

   (a) What is the experimental design used by the BUSE farm manager? **[2 Marks]**
   (b) The BUSE farm manager has decided to use the mixed effect model to Model the data in R. He has written the following code and is getting an error message. Fix the error for the BUSE farm manager. **[5 Marks]**

```
library(lmerTest)
fit <- lmer(mass ~ fertilizer * mass + (1 | plot), data = mhofu)
```

   (c) Write code you would use to do an F-test from the model **[5 Marks]**

   (d) After running the F- test, the BUSE farm manager got the following Output:

```
## Type III Analysis of Variance Table with Satterthwaite's method
##                  Sum Sq    Mean Sq NumDF      DenDF      F value
      Pr(>F)
## fertilizer       137.413   137.413   1        6 68.2395   0.0001702   ***
## variety          96.431    32.144    3        18 15.9627  2.594e-05   ***
## fertilizer:variety 4.173    1.391    3        18  0.6907  0.5695061
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Interpret the results for the BUSE farm manager giving him advice on any further analysis that could be required to answer the objectives. **[13 Marks]**

3) Suppose you have been tasked to conduct a survey in Mashonaland Central Province of Zimbabwe on the impact of one of the government input support schemes on household food security. Giving a clear justification for selection of the sampling method, discuss how you would select:
   i. The programme. **[6 marks]**
   ii. Two (2) districts. **[9 marks]**
   iii. One hundred (100) study participants. **[10 marks]**

4) Using examples where possible, differentiate between:
   a) Quantitative and qualitative data analysis. **[7 marks]**
   b) Key Informant Interviews and Focus Group Discussion. **[8 marks]**
   c) Descriptive and analytical research. **[10 marks]**

END OF PAPER