BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE

AGC225

Department of Animal Science
BSc Agricultural Science Part II Examination
Statistical Methods and Experimental Designs

2 HOURS (70 Marks)

INSTRUCTIONS TO CANDIDATES

Answer question number 1 from SECTION A, and any two from SECTION B.

SECTION A (COMPULSORY)

1. Read the following abstract from a research paper and answer the questions that follow.

Limited information is available on trace element-water contamination and health risk assessment of small-scale intensive fish farming in low-income settings. Such information creates awareness among fish consumers, policy makers and the scientific community, regarding dietary exposure and health risks for not well-reported settings. The concentrations of potentially toxic trace elements in water, sediment and fish (T. rendalli, O. nitloticus and M. salmoides) were determined by spectrometry. The ecological and potential human health risks were assessed for Magobo dam, NE Zimbabwe, using the Hakanson ecological approach and the United States Environmental Protection Agency risk-assessment model, respectively. Concentrations in water and sediment appeared to increase in the order: cadmium<arsenic<lead. The potential ecological risk factors for individual trace elements were below the index range for low risk. The potential ecological risk index for the dam (7.20) did not constitute ecological risk. The concentrations of trace elements in fish significantly varied with species, length and tissue ($p<0.05$). The concentrations of arsenic and lead in gills, liver and muscle for O. niloticus and arsenic in M. salmoides were greater than international maximum permissible limits for fish. The target cancer risk due to dietary exposure to arsenic in the three fish species was in the range 10–6. There is no obvious cancer risk to the exposed population.

A.Kanda, F. Ncube, R.R. Mabote, T. Mudzamiri, K. Kunaka and M. Dhliwayo.

a) Formulate an appropriate research title for the study. **[2 marks]**

b) Justify the undertaking of this study. **[4 marks]**

c) Formulate two research questions for this study. **[2 marks]**

d) Formulate the main objective of the study. **[2 marks]**

e) Identify two specific objectives appropriate for the study. **[4 marks]**

f) Identify appropriate hypotheses of the study. **[4 marks]**

g) Describe the appropriate sampling designs to employ. **[6 marks]**

h) Discuss three ethical issues that you will consider in this study. **[6 marks]**

SECTION B (CHOOSE ANY TWO QUESTIONS)

1. Identify and explain the sampling method employed in the following descriptions and justify your answer,

   a) Youth against drug abuse organization conducts a survey to determine the factors contributing to increased illicit drug trafficking and abuse among the homeless elderly people residing in urban areas. **[10 marks]**

   b) Study to determine effect of storage period on nutritional composition of infant foods. Sampling done on foods for different age groups. It is common knowledge that infant foods for different age groups also differ in nutritional composition because of the different nutritional requirements expressed by the particular age groups. **[10 marks]**

2. Discuss the role played by the following principles in designing effective experiments.

   a) Randomization. **[5 marks]**

   b) Replication. **[5 marks]**

c) Blocking. **[5 marks]**

d) Control treatment. **[5 marks]**

3. Describe the specific situations whereby the following research techniques are the most ideal to employ;
   a) Interview. **[5 marks]**
   b) Case Study. **[5 marks]**
   c) Observational Study. **[5 marks]**
   d) Focus Group Discussion. **[5 marks]**

4. The table below is a presentation of data obtained for a 2 by 2 factorial run in an RCBD.

	Treatments			
Blocks	**a0b0**	**a0b1**	**a1b0**	**a1b1**
1	148	176	1116	1128
2	160	188	1108	1140
3	152	184	1120	1148

Test at 5% level of significance main and interaction effects of factors A and B. **[20marks]**

END OF PAPER