NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCE
DEPARTMENT OF FOREST RESOURCES AND WILDLIFE MANAGEMENT
BACHELOR OF SCIENCE HONOURS DEGREE
MAIN EXAMINATIONS

RESEARCH METHODS: EFW 2204

May 2014 **Time Allowed: 3 Hours** **Total Marks: 100**

INSTRUCTIONS TO CANDIDATES:
Answer **QUESTION ONE** and any other **THREE.** Each question carries **25 marks.**

1. (a) The following data are the number of mistletoes in a random sample of 15 trees (*A. karroo*). The data are 21.9, 19.8, 21.0, 21.4, 22.1, 20.8, 15.6, 16.4, 14.6. Test the hypothesis that the mean number of mistletoes is equal to 18.3. **[10 marks]**

   (b) Explain the difference between the following terms:
   (i) Correlation and regression **[5 marks]**
   (ii) Sub-sampling and replication **[5 marks]**
   (iii) dependent variable and independent variable **[5 marks]**

2. Write short notes on the following experimental designs:
   (a) Repeated measures **[8 marks]**
   (b) Factorial **[9 marks]**
   (c) Nested **[8 marks]**

3. Data in Table 1 shows the weights of lion cubs (kg) fed on two different diets.

Table 1 Weight (kg) of feed consumed by lion cubs at different times of the year

Diet 1	Diet 2
14.7	14.6
14.9	19.4
15.0	21.3
14.8	17.4
14.7	20.1
15.1	24.2
17.2	22.4
18.3	20.5
	20.4
	22.1

(a) State null (H_0) and alternative (H_A) hypotheses that could be tested using data in

Table 1 **[3 marks]**

(b) Use a Mann-Whitney test to test the null hypothesis stated in (a) **[10 marks]**

(c) Describe three techniques used in data transformation **[12 marks]**

4. In communal areas of Zimbabwe where *Berchemia discolor* trees are abundant, many farmers harvest the bark for a variety of uses. Forest Ecologists believe that this practice increases the incidence of fungal diseases and causes high tree mortality. You are required to investigate into this problem by conducting a scientific inquiry. Explain how you would collect the data to test the hypothesis that *Berchemia discolor* bark harvesting increases tree mortality and reduces fruit yield.

5. Data in Table 2 (with ranks of the data in parentheses) were collected by a forest entomologist in order to estimate the abundance of insects in rock pools of different sizes.

Table 2. Numbers of insects per m^3 of water

Small	Medium	Large
14.0 (15)	8.4 (11)	6.9 (8)
12.1 (14)	5.1 (2)	7.3 (9)
9.6 (12)	5.5 (4)	5.8 (5)
8.2 (10)	6.6 (7)	4.1 (1)
10.2 (13)	6.3 (6)	5.4 (3)

(a) State null (H_0) and alternative (H_A) hypotheses that could be tested using data in Table 1 **[4 marks]**

(b) Use Kruskal-Wallis single factor analysis of variance by ranks to test H_0 hypothesis **[13 marks]**

(c) Briefly discuss any two types of errors in hypothesis testing **[8 marks]**

6. Citing strengths and weaknesses, explain the methods you would use to estimate visual cover of the following:

(a) Grasses **[12 marks]**

(b) Trees **[13 marks]**

***** END OF PAPER *****