(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS 2023/2024 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER EXAMINATIONS FOR THE DEGREE OF MASTER OF SCIENCE IN AGRICULTURAL EXTENSION AND RURAL DEVELOPMENT

COURSE CODE: AED 800

COURSE TITLE: STATISTICAL METHODS IN EDUCATION AND EXTENSION

DATE: 18/12/2023 **TIME: 8-11 am**

INSTRUCTIONS TO CANDIDATES

Answer question **ONE** and any other **TWO** questions.

TIME: 3 Hours

MMUST observes ZERO tolerance to examination cheating

Question one (20 marks)

a) Distinguish between census and sample survey as methods of data collection. (2mks)

b) Outline the stages involved in design and analysis of experiments (4mks)

c) A physician wishes to know whether there is a relationship between a father's weight (in kg) and his son's weight (in kg). The data are given here.

Father's weight x	65	63	67	64	68	62	70	66	68	67	69	71
Son's weight y	68	66	68	65	69	66	68	65	71	67	68	70

i) Draw a scatter plot to represent the data (2mks)

ii) Fit a regression line y on x on the set of data (12mks)

Question two (20 marks)

a) Define the following terms as used in experimental designs

i) Experimental unit

ii) Treatment (4mks)

b) Three popular weight loss programs are considered. The first is a low calorie diet, the second is a low fat diet and the third is a low carbohydrate diet. For comparison purposes, a fourth group is considered as a control group. Participants in the fourth group are told that they are participating in a study of healthy behaviors with weight loss as the only component of interest. The control group is included here to assess the placebo effect (i.e., weight loss due to simply participating in the study). A total of twenty patients agree to participate in the study and are randomly assigned to one of the four diet groups. Weights are measured at baseline and patients are counseled on the proper implementation of the assigned diet (with the exception of the control group). After 8 weeks, each patient's weight is again measured and the difference in weights is computed by subtracting the 8 week weight from the baseline weight. Positive differences indicate weight losses and negative differences indicate weight gains. For interpretation purposes, we refer to the differences in weights as weight losses and the observed weight losses are shown below.

Low Calorie	Low Fat	Low Carbohydrate	Control
8	2	3	2
9	4	5	2
6	3	4	-1
7	5	2	0
3	1	3	3

Is there a statistically significant difference in the mean weight loss among the four diets at 5% level of significance? (16mks)

Question three (20 marks)

a) Distinguish between:

i. Statistical methods and applied statistics (2mks)

ii. Descriptive statistics and inferential statistics (2mks)

iii. Population and sample

a) A poultry farmer categorized his broilers based on age and subjected them to three different feed varieties. After three months, their average weights (kgs) were determined as recorded in the table below:

	AGE IN DAYS			TOTAL
FEED VARIETIES	0-7	7-14	14-21	
V1	0.8	1.2	2.0	
V2	0.6	1.2	2.2	
V3	0.6	1.0	1.8	

b) Is there any difference between the three varieties of feeds? Test at 5% level of significance. (14mks)

Question four (20 marks)

a) A new dairy feed concentrate was introduced to dairy animals and its impact on milk production assessed. The concentrate was administered at four different concentration levels; 5%, 10%, 15%, and 20%. Milk production was then monitored for 24 dairy animals, six of which subjected to each concentration level at a time. The data from milk production is shown in the table below

Hard wood concentration (%)	Observations					
	1	2	3	4	5	6
5	7	8	15	11	9	10
10	12	17	13	18	19	15
15	14	18	19	17	16	18
20	19	25	22	23	18	20

Test at 5% significance level whether or not the feed concentration causes a significant difference in the milk production. (15mks)

b) A child welfare officer asserts that the mean sleep of young babies is 14 hours a day. A random sample of 64 babies recorded a mean sleep of 13hours 20 minutes, with a standard deviation of 3 hours. At 5% level of significance, test the assertion that the mean sleep of babies is less than 14 hours a day. (5mks)

Question five (20 marks)

a) A medical survey was conducted in Kakamega town to establish the number of people who boil drinking water before consumption. The respondents' ages varied between 8 and 45 years as shown in the table below

Respondents' age	0-10	10-20	20-30	30-40	40-50
Frequency	3	2x+1	14	9	5

i) Construct a frequency distribution table (3mks)

If the mean age of respondents is 26 yrs, find

ii) The value of x (3mks)

iii) The quartile deviation (4mks)

iv) The standard deviation (4mks)

b) The table below gives ages of husbands (Y) and wives (X).

x	50	58	35	86	76	43	40	60
y	65	72	54	82	32	74	40	53

Find Spearman's rank correlation coefficient between the two sets of ages, and interpret the results. (6mks)