



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR**

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

**COURSE CODE: AEX 800
COURSE TITLE: STATISTICAL METHODS IN EDUCATION AND
EXTENSION**

DATE: 20/04/2022 TIME: 2.00 - 5.00 PM

INSTRUCTIONS TO CANDIDATES

Answer any **TREE** questions.

TIME: 3 Hours



MMUST observes ZERO tolerance to examination cheating

Question one (20 marks)

- a) Distinguish between:
- i. A population and a sample (2mks)
 - ii. Descriptive statistics and inferential statistics (2mks)
 - iii. A census and a sample survey (2mks)
- b) The table below shows scores obtained by students in an exam. Study the information and answer the questions that follow.

Marks	10-14	15-19	20-24	25-29
Number of students	4	12	10	5

- i) Construct a frequency distribution table for the data (2mks)
- ii) Use the frequency distribution table to estimate the
 - I. Mean mark (2mks)
 - II. Mode (2mks)
 - III. The median (2mks)
 - IV. The mean shelf life of a sample of 100 drugs produced by a company is found to be 1,570 hours with a standard deviation of 80 hours. Test the hypothesis that the mean shelf life of the drugs produced by the company is 1,600 hours (6mks)

Question two (20 marks)

- a) Below are scores of a student in a course in relation to time in hours committed to reading every week

Score (y)	4	12	18	21	25
Time (x)	5	7	12	16	20

- i) Draw a scatter diagram for this data (2mks)
- ii) Compute the Product-Moment correlation coefficient, r , and comment on its value (12mks)
- iii) Fit a regression line y on x on this set of data (6mks)

Question three (20 marks)

- a) State and explain any three applications of the chi- square test. (6mks)
- b) A sample of 200 people with a particular disease was selected. Out of these, 100 were given a drug and the others were not given any drug. The results are as follows:

Result	Number of people		Total
	Drug	No drug	
Cured	65	55	120
Not Cured	35	45	80
Total	100	100	200

Formulate suitable null and alternative hypotheses and test at $\alpha= 5\%$ whether the drug is effective or not. (14mks)

Question four (20 marks)

In an agricultural station an experiment was performed to determine whether there was any difference in the yield of five varieties of maize from five different manufacturers. The yield in kgs per plot obtained in the experiment is given below.

Manufacturers	Varieties				
	V ₁	V ₂	V ₃	V ₄	V ₅
M ₁	30	23	34	25	20
M ₂	39	22	28	25	28
M ₃	56	43	43	31	49
M ₄	38	45	36	35	32
M ₅	44	51	23	58	40

- i) Use Kruskal-Wallis test at 1% level of significance to establish whether or not the varieties differ with respect to Manufacturers (10mks)
- ii) Is there consistency with Friedman test at 5% level of significance? (10mks)

Question five (20 marks)

- a) A manufacturer of paper used for making grocery bags is interested in improving the tensile strength of the product. Product engineers think that tensile strength is a function of the hardwood concentration in the pulp and that the range of hardwood concentrations of practical interest is between 5% and 20%. A team of engineers responsible for the study decide to investigate four levels of hardwood concentration: 5%, 10%, 15%, and 20%. They decide to make up six test specimens at each concentration level, using a pilot plant. All 24 specimens are tested on a laboratory tensile tester in a random order. The data from this experiment are 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 hard wood concentration causes a significant difference in the tensile strength. (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)