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**UNIVERSITY EXAMINATIONS**

**2022/2023 ACADEMIC YEAR**

**SUPPLEMENTARY/SPECIAL EXAMINATION**

**FOR THE DEGREE OF BACHELOR OF SCIENCE IN; AGRICULTURE  
AND BIOTECHNOLOGY, AGRICULTURE EXTENSION AND  
EDUCATION AND AGRICULTURE ECONOMICS AND NATURAL  
RESOURCE MANAGEMENT**

**COURSE CODE: ARE 321/SAB 390**

**COURSE TITLE: RESEARCH METHODS**

**DATE: 23<sup>RD</sup> AUGUST 2023**

**TIME: 11 – 1 PM**

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**INSTRUCTIONS TO CANDIDATES**

Answer Question One and Any other TWO (2)

TIME: 2 Hours

This Paper Consists of 2 Printed Pages. Please Turn Over. 

**QUESTION ONE: (COMPULSORY)****(30 MARKS)**

- a) Define the following terms as used in Research (1 MARKS)
- i. Research (2 MARKS)
  - ii. Treatments (2 MARK)
  - iii. Hypothesis (2 MARKS)
  - iv. Experimental Unit(s) (9 MARKS)
- b) Outline any THREE principles of experimental designs (4 MARKS)
- c) Differentiate between Quantitative and Qualitative approaches to research (10 MARKS)
- d) Explain any FIVE factors to consider when selecting the source of data for use in research

**QUESTION TWO**

Describe the following types of research

- i. Correlational research design (4 MARKS)
- ii. Diagnostic research design (4 MARKS)
- iii. Experimental research (4 MARKS)
- iv. Applied Research (4 MARKS)
- v. Fundamental Research (4 MARKS)

**QUESTION THREE**

- a) Explain any FIVE importance of research (10 MARKS)
- a) Describe sampling as used in research, giving its FOUR advantages and FOUR disadvantages (10 MARKS)

**QUESTION FOUR**

Explain THREE advantages and TWO disadvantages of secondary data. (10 MARKS)

Discuss any FIVE precautions to consider when using secondary data in research (10 MARKS)

**QUESTION FIVE**

The following is data weight of bean pods harvested from two different parts of the same plant. Perform a paired t-test for weight of bean pods obtained from the top and bottom part of the plant after treatment with a TSP fertilizer. (20 MARKS)

Plant	Bottom	Top
1	90	85
2	92	86
3	87	82
4	83	79
5	78	82
6	82	75
7	83	88
8	91	82
9	83	78
10	87	82
11	91	93
12	89	84
13	85	82

$CF = \frac{T^2}{N}$	$CF = \frac{(\sum x)^2}{(rn)}$	$E = \frac{R \times C}{N}$
$CF = \frac{G^2}{rt}$	$MST = \frac{SST}{df(T)}$	$\chi^2 = \frac{\sum(O - E)^2}{E}$
$SST = \frac{\sum(T)^2}{(r)} - CF$	$S^2 = \frac{(\sum x^2 - \frac{(\sum x)^2}{n})}{(n - 1)}$	$\rho = 1 - \frac{6\sum D^2}{N^3 - N}$
$SED = Sp - \left\{ \sqrt{\left[ \frac{1}{n_1} + \frac{1}{n_2} \right]} \right\}$	$S^2 = \frac{(\sum d^2 - \frac{(\sum d)^2}{n})}{(n - 1)}$	$S_{xy} = n\sum xy - \sum x \sum y$
$S_{xx} = n \sum x^2 - (\sum x)^2$	$S_{yy} = n \sum y^2 - (\sum y)^2$	$r = \frac{S_{xy}}{\sqrt{S_{xx} S_{yy}}}$
$S^2 = \frac{(\sum d^2 - \frac{(\sum d)^2}{n})}{(n - 1)}$	$t_{critical} = t(n-1, \alpha/2)$	$\chi^2 = \frac{\sum(O - E)^2}{E}$
$SED = \frac{S}{\sqrt{n}}$	$Sp = \sqrt{S^2 p}$	$S^2 = \frac{(\sum d^2 - \frac{(\sum d)^2}{n})}{(n - 1)}$
$SE = \frac{\sigma}{\sqrt{n}}$	$\%CV = \sqrt{\frac{MS}{X}} \times 100\%$	$SED = \sqrt{\frac{2MSE}{r}}$