

COURSE: ABE322- STATISTICAL ANALYSIS IN ENGINEERING RESEARCH TIME: 3Hrs  
 Instruction: Answer question Q2 and any other (5) questions with at least one from each section.

SECTION A

- Q1. (a) As an Agricultural and Bioresources Engineer, what limitations have you encountered in the use of statistics to analyze your data before use? *find find some etc*
- (b) Define the following concepts with regards to statistical approach:  
 (i) Variable (ii) Population (iii) Sample (iv) Attribute.
- (c) The following data relates the distribution of yield of maize cobs in Kg/plot of a maize variety from 60 experimental plots:

CLASS(X)	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120
No. of plots	3	6	7	10	12	9	8	5

Obtain the cumulative frequency, relative frequency and plot the frequency polygon.

- Q2. (a) (i) What do you understand as *descriptive statistics*? *f<sub>1</sub> c*  
 (ii) Name and define the types of sampling.
- (b) Given the following values are the random distribution of eggs laid in a poultry, calculate the mean, mode, median, mean deviation and standard deviation.

Values (X)	61-65	66-70	71-75	76-80	81-85	86-90	91-95	96-100
Frequency(f)	5	2	4	1	5	6	5	4

- Q3. (a) Give at least four characteristics of a good average.
- (b) The following are yields of corn as obtained in Kg/plot from 10 plots:  
 20, 24, 26, 31, 34, 42, 46, 52, 62, and 69.  
 Compute the 25<sup>th</sup>, 50<sup>th</sup> and 75<sup>th</sup> percentiles.
- (c) If the number of bags of farmyard manure dropped in seven plots are 4, 6, 10, 11, 14, 17 and 19 respectively, find the mean deviation for this array.

SECTION B

- ✓ Q4 (a) Distinguish between the following:  
 (i) Point estimation and Interval estimation.  
 (ii) Type I error and Type II error
- (b) Which is more serious, a Type I or Type II error. Explain.
- Q5 (a) The procedure of testing hypothesis requires a researcher to adopt several steps. State and explain the steps.
- (b) Give the general formula for determining the test statistic for means and proportions.
- Q6. (a) The major diameter of 36 potato tubers selected at random were measured. The mean and standard deviation of these measurements were 18.70 cm and 1.25cm respectively. At 5% level of significance, test whether the mean major diameter of the tubers is 19cm.

SECTION C

Q7(a) What is experimental design?

- (b) List any five steps in experimentation.
- (c) Define response variable and factor giving examples of each.
- (d) Define the following: treatment, level, experimental unit and experimental error.

Q8(a) List the basic principles of experimental design and discuss any one of them.

- (b) List the functions of replication
- (c) In an experimentation where the number of replication ( $r$ ) carried out was 6 giving a standard deviation ( $S$ ) of 2;
  - (i) provide an estimate of the experimental error  $SE(\bar{Y})$  in decimal or percentage
  - (ii) if the experimental error  $SE(\bar{Y})$  is high, how can it be reduced to 20%.