"Investing in Africa's Future"

COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

NACP 202: BIOMETRY

END OF FIRST SEMESTER EXAMINATIONS

NOVEMBER / DECEMBER 2021

LECTURER: MR. E. CHIKAKA

DURATION: 5 HOURS

INSTRUCTIONS

ANSWER **ANY ONE** QUESTION

PLEASE STICK TO THE STANDARD HOUSE STYLE i.e.

- TIMES NEW ROMAN
- FONT SIZE 12
- DOUBLE SPACING
- APA REFERENCING
- SEND YOUR ANSWER AS A PDF DOCUMENT

THE MARK ALLOCATION FOR EACH QUESTION IS INDICATED AT THE END OF THE QUESTION

Question 1

a. What do you understand by Biometry? What are the roles of a Biometrician in your field of study? [10]

b. Discuss the data types that know. Why is it important to know the type of data in any agriculture decision making process? [10]

c. List ANY FOUR (4) methods of collecting data in agriculture. For each method, give the merits and demerits [10]

d. The following is the distribution of Fat (percentage) in 100 samples collected from different milk centres in villages

Fat(%)	1-3	3-5	5-7	7-9	9-11
Samples	40	26	30	2	2

Compute Mean, Median, Mode, Geometric Mean and Harmonic Mean of Fat content per sample. Comment on the answers that you obtained. [20]

e. What are the properties of a normal probability distribution? What are the uses of normal distribution in your area of specialisation in agriculture? [10]

f. Your country's food grains output (in million tons) for the past 20 years are given as : 75, 74, 80, 81, 85, 86, 84, 81, 90, 87, 92, 94, 95, 93, 98, 96, 94, 99, 109, 110. Obtain the values of Range, Interquartile Range, Standard deviation, Standard error, and Coefficient of Variation. [10]

g. Distinguish between ‘skewness’ and ‘kurtosis’ in relation to their application in agricultural statistics. Compute coefficients of 'skewness' and 'kurtosis' for the following data on rainfall (cm) in the month of August at a Regional Agricultural Research Station in Manicaland Province.
2, 0, 6, 8, 13, 7, 2, 2, 4, 10, 11, 2. 0, 5, 11, 0, 0. 8, 7, 9, 6. 5, 12, 3, 4, 5, 0, 6, 1, 2, 4 [10]

h. The height of barley plants in a field is assumed to follow a normal distribution with mean height *35’’* and standard deviation 4.0". A sample of 150 plants was selected from a plot. Find the number of plants:
(i) having height more than 40"
(ii) between the heights 32" and *38’*
(iii) below the heights 30". [10]

i. The average daily milk production of a particular variety *of cow* was found to be 12 kgs. The distribution of daily milk yield in a dairy farm was given as follows:

Daily milk yield (kgs)	7-8	9-10	11-12	13-14	15-16	17-18
No. of cows	9	20	35	42	17	7

Test whether the performance of dairy farm was in agreement with the record. [5]

j. In an experiment on chillies, the following results were obtained:

Shape	Pungent	Not-Pungent
Long	48	27
Short	32	73

Test whether there is any association between taste and shape of chillies at 5 per cent level of significance. [5]

Question 2

a. List and explain all the data sources and data types you know [10]

b. What do measures of central tendency and variation indicate? Describe the important measures of central tendency and variation pointing out the situation when one measure is considered relatively appropriate in comparison to other measures. [10]

c. The following is the distribution of body weights of 100 calves at their 1st lactation

Body weight (kg)	30-40	40-50	50-60	60-70	70-80
Calves	12	26	34	20	8

Find Mean, Median, Mode, Geometric Mean and Harmonic Mean of Fat content per sample. Comment on the answers that you obtained. [30]

d. The following table gives the yield of paddy in maunds per acre based on crop cutting experiments in a certain area during 2018-2019.

Yield (Maunds/Acre)	*Freq.*	*Yield (Maunds/Acre)*	*Freq.*
0	4	24	128
3	4	27	73
6	32	30	50
9	81	33	13
12	135	36	12
15	198	39	5
18	210	42	1
21	144		

Calculate the Range, Arithmetic mean, Standard deviation, standard error, Interquartile Range and Coefficient of variation of the distribution. [20]

e. Define skewness and arrange median, mode and mean in ascending order of their magnitude for positively skewed curve. Find the coefficients of 'skewness' and Kurtosis for the following data on iron content (percentage) in samples of leafy vegetable sold in markets and also draw diagrams. [15]

Iron 'content (%)	Samples
0-2	6
2-4	12
4-6	18
6-8	9
8 -10	5

f. The monthly income of a head of a family in a local farming area with 1000 families follows a normal distribution with mean income as RTGS$2 000 with a standard deviation as RTGS$350. Find the number of Families earning:

(i) between RTGS$2000 and 3,500 per month
(ii) below RTGS$1000 and
(iii) RTGS4,000 and above. [15]

Question 3

a. Explain all the data types and their possible sources. Why is it important to know the data types in any decision making process? [10]

b. Describe the important measures of central tendency and variation that you know. What do these measures of central tendency and variation indicate? [10]

c. The average number of mango fruits per tree in a particular region was known to be 520 with a standard deviation of 4.0. A random sample of 20 trees was selected and the average number of fruits was found to be 450 per tree. Test at 5% level of significance whether the average number of fruits per tree selected in the sample is in agreement with the average production in that region? [10]

d. The following is the distribution of body weights of 100 calves at their 1st lactation

Body weight (kg)	30-40	40-50	50-60	60-70	70-80
Calves	12	26	34	20	8

Find Mean, Median, Mode, Geometric Mean and Harmonic Mean of Fat content per sample. Comment on the answers that you obtained. [30]

e. What are the properties of a normal probability distribution? How would you graphically test that a given dataset is normally distributed? [15]

f. The following data represent the heights (in inches) of a random sample of 50 two-year old males.

36.0	36.2	34.8	36.0	34.6	38.4	35.4	36.8
34.7	33.4	37.4	38.2	31.5	37.7	36.9	34.0
34.4	35.7	37.9	39.3	34.0	36.9	35.1	37.0
33.2	36.1	35.2	35.6	33.0	36.8	33.5	35.0
35.1	35.2	34.4	36.7	36.0	36.0	35.7	35.7
38.3	33.6	39.8	37.0	37.2	34.8	35.7	38.9
37.2	39.3						

(a) Create a relative frequency distribution with the lower class limit of the first class equal to 31.5 and a class width of 1.
(b) Draw a histogram of the data.
(c) Do you think that the variable “height of 2-year old males” is normally distributed? Why? [25]