UGANDA MARTYRS UNIVERSITY
NKOZI
UNIVERSITY EXAMINATION
FACULTY OF SCIENCE

SEMESTER II, 2022 / 2023

THIRD YEAR EXAMINATION FOR BACHELOR OF SCIENCE WITH EDUCATION

BIO 3203: BIOSTATISTICS

DATE: MAY 26, 2023
TIME: 9:30AM – 12:30PM
DURATION: 3HRS

Instructions:

1. *Carefully read through ALL the questions before attempting*
2. *Answer all questions in section A and any **three** questions from section B*
3. *All Questions in section B carry equal marks*
4. *No names should be written anywhere on the examination booklet.*
5. *Ensure that your Registration number is indicated on all pages of the examination answer booklet.*
6. *Ensure your work is clear and readable. Untidy work shall be penalized*
7. *Any type of examination Malpractice will lead to automatic disqualification*

SECTION A: SHORT ANSWER QUESTIONS (40 MARKS)

Answer all questions in section A. Give short and precise answers to each of the following questions. Write your answers in the answer booklet provided.

1. What is meant by the term measures of dispersion of data, give three examples of such measurement? **04 marks**
2. Describe at least four functions of statistics. **04 marks**
3. Explain the uses of statistics in research. **03 marks**
4. State four reasons why a sample would be preferred in a research rather than whole population. **04 marks**
5. Describe the two general sources of data in research, give examples? **02 marks**
6. Give three ways in which collected data can be presented in a systematic way. **03 marks**
7. What is meant by the following as used in research, give examples where necessary?
   i) Variable
   ii) Precision
   iii) Accuracy.
   iv) Population **04 marks**
8. Identify the type of data (nominal, ordinal, interval and ratio) represented by each of the following. **10 marks**
   a. Blood group
   b. Temperature (Celsius)
   c. Ethnic group
   d. Job satisfaction index (1-5)
   e. Number of heart attacks
   f. Calendar year
   g. Serum uric acid (mg/100ml)
   h. Number of accidents in 3 - year period
   i. Number of cases of each reportable disease reported by a health worker
   j. The average weight gains of six, 1-year old dogs (with a special diet supplement) was 950grams last month.
9. Suppose the sample consists of birth weights (in grams) of all live born infants born at a private hospital in a city, during a 1-week period. This sample is shown in the following table:

3265	2759	2841	3200
3323	3649	3248	3609
2581	3260	3245	3314
3484	3031	2838	3101
4146	2069	3541	2834

a) Calculate the arithmetic mean of the birth weights (in grams) of all live born infants at a private hospital in a city, during a 1-week period. **3 marks**

b) Calculate the median of the birth weights (in grams) of all live born infants at a private hospital in a city, during a 1-week period. **3 marks**

SECTION B: ESSAY QUESTIONS (60 MARKS)

Answer only Three questions from this section.

10.

(a) What is meant by the following terms, give examples where necessary?

i) Descriptive statistics

ii) Inferential statistics. **04 marks**

(b) Data was collected to ascertain Areas of spray-able surfaces with DDT from a sample of 15 houses. The data collected from areas of sprayed houses is as follows (m^2):

101,105,110,114,115,124,125, 125, 130,133,135,136,137,140,145

Find the variance and standard deviation of the above distribution. **08 marks**

(c) A dairy farmer wishes to conduct a survey among a population of his cows to determine their daily milk production in litres. Estimate the sample size needed at 5 % level of significance if from past experience, the farmer feels that the population standard deviation is probably about 20 litres.

Where $n = \frac{z^2\sigma^2}{d^2}$ **4marks**

(d) A farmer wishes to conduct a survey among a population of 500 cows to determine their average daily protein intake. Determine the sample size needed at 5% level of significance if from a pilot study, the nutritionist estimated the population standard deviation to be 30 grams.

Using $n = \frac{Nz^2\sigma^2}{d^2(N-1)+z^2\sigma^2}$ **4marks**

11.

(a) Describe all the characteristics of the three measures of central tendency. **6marks**

(b) The data below shows the volume of blood cells count in cm^3 of a sample of 100 calves. Complete the table and answer the questions below.

(c) Calculate the; **10marks**

i) mean,

ii) median and

iii) Mode of the blood cell count.

(d) Briefly describe this data collected basing on the above calculations **4marks**

Table 1: Frequency distribution for volume of blood cells in cm^3

Class limit	Class boundaries	Class mark (x)	f	Cf (less than)
35-39	34.5-39.5	37.5	4	4
40-44	39.5-44.5	42.5	8	12
45-49	44.5-49.5		12	24
50-54	49.5-54.5		24	48
55-59	54.5-59.5		28	76
60-64	59.5-64.5		13	89
65-69	64.5-69.5		9	98
70-74	69.5-74.5		2	100
			$\sum f = 100$	

12.

(a) What is a sampling frame? **1mark**

(b) State any two considerations taken into account before determining sample size from a population. **2marks**

(c) State three advantages and disadvantages of simple random sampling. **6marks**

(d) Describe four types of non-probability sampling procedures. **6marks**

(e) Give three advantages and two disadvantages of stratified sampling. **5marks**

13.

(a) Describe how qualitative data can be presented during research. **3marks**

(b) State four reasons for constructing a frequency distribution. **2marks**

(c) A researcher made observations on the amount of time (seconds) it takes for an animal to swallow food particles in 30 different tests and record results below:

1.5	**2.0**	**2.0**	**3.0**	**2.0**
3.2	**2.3**	**1.5**	**2.0**	**2.0**
1.0	**1.0**	**2.5**	**3.4**	**2.1**
2.0	**4.0**	**3.0**	**2.0**	**2.0**
2.2	**2.0**	**2.0**	**2.0**	**2.0**
1.5	**2.0**	**1.0**	**1.0**	**1.0**

(i) Tabulate this results in a categorized table **3marks**

(ii) Determine all the measures of central tendency including the standard deviation, range, interquartile of the time recorded **9marks**

(iii) Present the above result in a suitable diagram **3marks**

14. Assume that among diabetics the fasting blood level of glucose is approximately normally distribute with a mean of 105 mg per 100 ml and SD of 9 mg per 100 ml. use Z

a) What proportions of diabetics have levels between 90 and 125 mg per 100 ml?
b) What proportions of diabetics have levels below 87.4 mg per 100 ml?
c) What level cuts of the lower 10% of diabetics?
d) What are the two levels which encompass 95% of diabetics?

08 marks

A study could be conducted to investigate whether pH of a certain lake significantly varies from a standard pH value of 7.20. Water samples were randomly collected from 12 locations in the lake and the associated pH values assumed to be normally distributed were recorded as follows.

Location	pH
1	6.5
2	7.1
3	7.3
4	8.2
5	8.5
6	6.9
7	7.4
8	6.7
9	7.0
10	8.7
11	6.6
12	8.1

Using a t test, determine whether the PH value was 7.20. **12 marks**

END