MANICALAND STATE UNIVERSITY OF APPLIED SCIENCES

FACULTY OF AGRIBUSINESS AND APPLIED SOCIAL SCIENCES

DEPARTMENT: APPLIED BUSINESS SCIENCES

MODULE: QUANTITATIVE ANALYSIS FOR BUSINESS

CODE: BMAN 103

SESSIONAL EXAMINATIONS
JUNE 2023

DURATION: 3 HOURS

EXAMINER: MR. B. MUTANDA

INSTRUCTIONS

1. *Answer **All** questions*
2. *Total marks 100*
3. *Show all your workings*

Additional material(s): Calculator and a Formula Booklet.

SECTION A: Answer all Questions

QUESTION 1

a. State and explain four components of a time series [8]

   b. Define the following terms:

     i. Quantitative data [1]

     ii. Qualitative data [1]

     iii. Kurtosis [1]

     iv. Skewness [1]

     v. Discrete data [1]

c. Briefly explain 3 probability sampling methods a Finance Manager can use to draw samples from the market [6]

d. Identify and explain challenges encountered in constructing index numbers [6]

SECTION B: ANSWER ALL QUESTIONS

QUESTION 2

a. The article "Hydro geochemical Characteristics of Groundwater in Zimbabwe Eastern Highlands Aquifer System" presents measurements of various properties of shallow groundwater in a certain aquifer. Following are measurements of electrical conductivity (in microsiemens per centimeter) for 23 water samples:

2099	528	2030	1350	1018	384	1499
1265	375	424	789	810	522	513
488	200	215	486	257	557	260
461	500					

i. Find the mean. [2]

ii. Find the standard deviation. [2]

iii. Find the median.   [2]

iv. Coefficient of variation   [1]

b. The following data gives monthly salaries (in dollars) of 50 employees of a certain sugarcane plantation in Mkwasine.

Salary	Number of Employees
10 - 20	9
20 - 30	15
30 - 40	20
40 - 50	6
60 - 70	2

Calculate the following:

   i. Mode   [4]

   ii. Median   [4]

   iii. Variance   [4]

c. The discrete random variable X has probability density shown in the table below

X	1	2	3	4	5
P(X=x)	0.2	0.3	a	0.1	0.1

Calculate the following:

   i. value of a [1]

   ii. P(2<X≤4) [1]

   iii. E(X) [2]

   iv. Var(X) [2]

QUESTION 3

a. An Agriculture Student finds that, when she takes a cutting from a particular plant, the probability that it roots out successfully is $\frac{1}{3}$. She takes nine cuttings, find the probability that

i) more than 5 cuttings root successfully [3]

ii) at least three cuttings root successfully [3]

b. State the characteristics of a normal distribution [4]

c. The time taken by a milk producing farmer to deliver to Dairiboard Zimbabwe follows a normal distribution with mean 12 minutes and standard deviation of 2 minutes. He delivers the milk every day. Calculate the probability that:

i) he takes more than 17 minutes on a particular day [2]

ii) he takes less than 10 minutes on a particular day [2]

iii) he takes between 9 and 13 minutes on a particular day [3]

d. In a sample of 100 steel wires the average breaking strength is 50 kN, with a standard deviation of 2 kN.

i. Find a 95% confidence interval for the mean breaking strength of this type of wire. [4]

ii. Find a 99% confidence interval for the mean breaking strength of this type of wire [4]

QUESTION 4

a. A farmers' cooperative decided to test a new brand of fertilizer, A, B and C, allocating them to 75 plots. The yield of the crop was classified as high, medium and low. The results are summarized in the table below.

		Fertilizer			
		A	B	C	Total
Yield	**High**	12	15	3	30
	Medium	8	8	8	24
	Low	5	7	9	21
	Total	25	30	20	75

Stating your hypothesis clearly, test at 5% level whether or not there is an association between yield and the brand of fertilizer used   [8 marks]

b. Manicaland State University Supplier of stationery recorded its quarterly sales figures ($000) for the years 2009 to 2012. The data is shown in the table below

Year	Q1	Q2	Q3	Q4
2009	48	52	16	35
2010	50	46	22	40
2011	68	34	26	35
2012	73	56	16	45

Calculate centered 4-point Moving Averages for the data   [8]

c. The information in the table shows the price and quantity of food stuff bought by a private boarding school in 2021 and 2022

Commodity	2021		2022	
	Price	Quantity	Price	Quantity
A	25	400	37	780
B	27	310	42	700
C	30	240	50	390

Calculate and provide a comment on the following:
 i. Laspeyre's Index
 ii. Paasche's Index and
 iii. Fisher's Index for 2001 taking 2000 as base year.   [9]

END OF EXAMINATION