



**MANICALAND STATE UNIVERSITY  
OF  
APPLIED SCIENCES UNIVERSITY**

**FACULTY OF ENGINEERING, APPLIED SCIENCES**

**&**

**TECHNOLOGY**

**DEPARTMENT OF MINING AND MINERAL PROCESSING**

**ENGINEERING MATHEMATICS 2**

**CODE: ENGT 124**

**SESSIONAL EXAMINATIONS**

**DECEMBER 2023**

**DURATION: 3 HOURS**

**EXAMINER: MR I.ZVAWANDA**

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***INSTRUCTIONS***

- 1. Answer ALL questions from Section A*
- 2. Answer any **three** questions from Section B*

***REQUIREMENTS***

*Statistical tables;*

*Non-programmable scientific calculator*

**SECTION A**  
**ANSWER ALL QUESTIONS IN THIS SECTION**

A1. Define the following terms as used in Statistics

- i) Primary data
- ii) Hypothesis
- iii) Skewness
- iv) Secondary data

[2, 2, 2, 2]

A2

- a) State and explain the four components of a time series
- b) Distinguish between type 1 error and type 11 error
- c) A typist makes 2 mistakes per page on average when typing. Find the probability that
  - i) She makes 3 mistakes on a given page
  - ii) Exactly 5 mistakes on 2 pages
  - iii) At least 1 mistake per given page

[8,2,2,3,3]

A3

- i) Outline the importance of statistics when carrying out data analysis
- ii) The ages of a random sample of Statistics students at MSUAS are as follows  
34 28 46 37 33 24 29 45 37 34 32 25 50 54 32 36 38 41 38 44 28 43  
40 49 30 46 27 34 61 33

Construct a stem and leaf diagram

[4,4]

A4

Patity Investments supplies light bulbs that have a length of life that is approximately normally distributed with a standard deviation of 20 hours .If a random sample of 40 bulbs has an average life of 800 hours , Find a 95% confidence interval for the population mean life of all bulbs supplied by this firm.

[6]

**SECTION B**  
**ANSWER ANY THREE(3) QUESTIONS IN THIS SECTION**

B5 The table below shows the monthly salaries received by 69 workers at Nyakaza Investments

Salary(\$)	Number of workers
0-500	12
500-1000	18
1000-3000	25
3000-5000	6
5000-7000	8

Calculate

- i) Mean
- ii) Mode
- iii) Median
- iv) Variance
- v) Pearson's coefficient of Skewness and comment
- vi) Range [3,3,3,4,5,2]

B6 i) State and explain any 6 properties of a Normal Curve

ii) Define a time series

iii) The average hourly rate paid to domestic worker is \$285. The housewives league wishes to test the claim. The league conducted a survey with a sample of

250 domestic workers. The results revealed a mean hourly rate of \$303 and a standard deviation of \$100. Test at the 5% level of significance whether the mean hourly rate is \$285.

iv) State any 4 methods of Data collection

[6,2,8,4]

**B6**

a) The weights measured to the nearest kilogram of 40 students were as follows

78 52 57 69 70 59 62 66 58 73 65 64 80 59 71 64 70 67 79  
 51 67 62 66 68 83 83 71 54 67 70 58 74 64 61 59 78 72  
 77 63 76

i Produce a tally showing a frequency distribution with seven classes 51- 55, 56 – 60, 61 – 65, 66 – 70 until all the numbers have been accounted for

ii Draw a histogram and a frequency polygon

b) A survey of first year University sought to establish any association between food preferred and gender.

Gender	Pizza	Chicken	Madora	Sadza
Male	6	10	25	50
Female	35	20	5	12

Use a 5% level of significance to test whether there is an association between food preferred and gender

[ 10, 10]

**B7**

a) State and explain any four probability sampling techniques

b) The following data gives the quarterly sales of Saurombe textiles from 2005 to 2008. The sales values are in millions of dollars

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2005	78	62	56	71
2006	84	64	61	82
2007	92	70	63	85
2008	100	81	72	86

Calculate the

- i four point moving average and
- ii Deseasonalise the data

[8 , 8, 4]

**B8**

a The average number of loaves of bread sold daily by a baker is normally distributed with a standard deviation of 300. The baker claimed that 3000 loaves are sold daily. An employer wants to test the accuracy of this statement . A random sample of 36 days showed that the average daily sales were 3150 loaves .Test at the 1 % level of significance if the bakery 's statement can be accepted.

b The weekly production of a Milling Company is known to be Normally distributed with means of 150 tonnes and a standard deviation of 5 tonnes. Find the probability that in a given weekly production

- i) Less than 142 tonnes will be produced
- ii) More than 150 tonnes will be produced
- iii) Between 148 and 158 tonnes will be produced

[ 9,3,3,5]

**END OF PAPER**