



The Open University of Sri Lanka
Faculty of Natural Sciences
Diploma in Food Science

Department	: Chemistry
Level	: 3
Name of the Examination	: Final Examination
Course Title and Code	: Basic Mathematics & Statistics for Food Science (ADD3200)
Academic Year	: 2022 - 2023
Date	: 01 st of July 2023
Time	: 9.30 a.m. – 11.30 a.m.
Duration	: two hours

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **04 questions**. **Answer all questions**.
3. The use of a non-programmable electronic calculator is permitted.
4. Write down all **relevant steps** and simplify your answer/s.
5. Use a pen not a pencil. Use the given book to write down answers.
6. Use blue or black ink to answer the questions.
7. Clearly state your **index number in your answer script**.
8. Involvement in any activity that is considered as an exam offence **will lead to punishment according to examination regulations**.

- 1) Find all the values of x that satisfy each of the following inequalities. In each case, represent the set of possible values using the number line.

a) $|x + 1| \geq 3$

c) $x - \frac{1}{x} > 4$

b) $|x - 2| < 5$

d) $x^2 - 2x < 3$

(20 marks)

ii) Let $x = \frac{1}{2-\sqrt{3}} + \sqrt{3}$.

a) Find positive integers a and b such that $x = a + \sqrt{b}$.

b) Simplify $\sqrt{2x}$ and show that $x - \sqrt{2x} = 1$.

(20 marks)

iii) Let $a = 1.2 \times 10^{-3}$.

a) Find the value of $\frac{a^2 + 12a}{0.0012}$.

b) Write your answer to part (a) above, as a rational number in the standard form.

(20 marks)

- iii) Write down each of the following real numbers in the Scientific notation.

a) 0.0000102 b) 3240.21005 c) -12.001 d) -0.92712 e) 1.0021

(20 marks)

- iv) Find the number of significant digits in each of the following and approximate each value to the second decimal place.

a) 10200.102 b) 0.00103 c) -2010.0139 d) -1.004001 e) -0.001204

(20 marks)

- 2) i) Find the prime factorizations of 120 and 270.

Based on the prime factorizations or otherwise, state whether each of the following statements is true or false. In each case, give reasons for your answer.

a) The number $\frac{120}{270}$ is a rational number in the standard form.

b) The number $\frac{120}{270}$ is a proper fraction.

c) The numbers 120 and 25 are relatively prime numbers.

d) The product of 120 and 270 is a square number.

e) The product of $\sqrt{120}$ and $\sqrt{270}$ is a surd.

(40 marks)

- ii) A square shaped cake with length 27 inches and width 12 inches is to be cut into equal sized, square shaped pieces. Calculate the largest possible side length for a piece, if the cake is cut with no left over from either side. How many such pieces can be cut from the entire cake?

(20 marks)

iii) If $\log_2 6 = m$, $\log_2 5 = n$, find the values of each of the following, in terms of m and n :

a) $\log_3 2$ b) $\log_2 30$ c) $\log_5 8$ d) $\log_5 \left(\frac{1}{25}\right)$

(20 marks)

iv) Substituting $\log_2 x = t$, find x that satisfy the equation $\log_2 x - 3 \log_x 2 - 4 = 0$.

(20 marks)

- 3) The following summary table was constructed from the fibre content measured on randomly selected packets of a certain production.

Fibre content (grams)	Number of packets
2.0 – 3.4	5
3.5 – 4.9	12
5.0 – 6.4	24
6.5 – 7.9	48
8.0 – 9.4	8
9.5 – 10.9	3

i) Calculate the sample mean and explain what it measures in relation to this study.

(25 marks)

ii) Calculate the sample median.

(15 marks)

iv) Construct a suitable graph to illustrate the information presented in the table and clearly state all the findings from the graph.

(25 marks)

iii) Out of the two measures calculated in parts (i) and (ii), which measure would be more appropriate to estimate the expected fibre content of a randomly chosen packet? Give reasons for your answer.

(15 marks)

iv) State whether each of the following statement about the fibre content measured in this study is true or false. In each case, give reasons for your answer.

a) The fibre content in this study is measured as an interval scale variable.

b) A bar chart is suitable to examine whether the variable representing the fibre content is symmetrically distributed or not.

(20 marks)

- 4) i) Find the missing value x in each of the following:

a) Ten observations arranged in ascending order are 12, 15, 20, 21, 25, x , 30, 40.50, 60. The sample mean is 30.1.

(10 marks)

- b) Ten observations arranged in ascending order are: 9, 10, 10, 12, 13, x , 17, 17, 18, 18. The sample median of the data is 14.

(10 marks)

- ii) The minimum, maximum, first quartile, and the third quartile of a set of data are 10, 103, 15, and 22 respectively.

- a) Calculate the range of the data.

(5 marks)

- b) Calculate the inter-quartile range of the data.

(5 marks)

- c) Which of the two measures of dispersion calculated in part (a) and (b), would you recommend for this data? Give reasons for your answer.

(15 marks)

- iii) The times spent per week (in minutes) by a group of students on homework is summarised in the following table.

Time spent (minutes)	Number of students
15 – 19	5
20 – 24	16
25 – 29	48
30 – 34	36
35 – 39	5

- a) What is the class width used in constructing the given frequency table.

(5 marks)

- b) Calculate the relative frequency corresponding to the third class interval and clearly explain what it measures in relation to this study.

(15 marks)

- c) Construct a suitable graph that can be used to calculate the percentiles of the data.

(15 marks)

- d) Using the graph constructed in part (a) or otherwise, calculate the first quartile of the data and explain what it measures in relation to this study..

(20 marks)