Faculty of Information and Communication Technology
ICT First Years and Foundation Unit

Tshwane University of Technology
We empower people

I declare that I am familiar with, and will abide to the Examination rules of Tshwane University of Technology

_____

Signature

SUMMATIVE ASSESSMENT
PAPER 3 (Sick Test)

Computational Mathematics and Discrete Mathematics (Extended) (Year 1)

COHF05D & DSMF06D

18 January 2022 Summative Assessment Duration: 120 min Total: 93 Full Marks: 90 Number of Pages: 22	Examiner: MS Sediela Co-Examiner: C Coetzee Moderator: D Masethe	
	Number on Class List	
	GROUP	

Student Number								

Surname	Initials

This paper consists of 22 pages

INSTRUCTIONS AND INFORMATION

- **Answer ALL** the questions.
- **Read ALL** the questions carefully.
- Non-programmable **calculators** are allowed.
- **No pencil** work will be marked, use a black/blue pen.
- Answers must be rounded to **2 decimals** (if not specified).
- All **exponents** in final answers must be **positive**.
- **Show all your calculations!**

Scan the QR Code with the Invigilator App now!!

QR Access Code: 75a7163a

- If you encounter difficulty with scanning of the QR code, you can also enter the QR Access Code at the bottom of the QR code in order to start the assessment.
- Once the QR code is scanned, you can place your smartphone next to you.
- The Invigilator App will notify you with a beep when an action is required.
- Ensure your phone's media volume is turned up to hear the notifications.
- Keep The Invigilator App open on your smartphone during the assessment.
- You are not allowed to leave or minimise the app at any point.
- You may access the **Learning Management System (myTUTor) in** the application if you only have one device by pressing the **'access LMS'** button.
- Please ensure you are connected to the internet in order to commence the examination as well as at the end of the examination. No internet connection is needed during the assessment.
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Scan and upload all the pages of your assessment (use the Invigilator app).

THEN…

Scan and upload the test to myTUTor (use OneDrive or any other scanning app).

QUESTION 1: Indicate if the following are true or false. **[½ x 10 = 5]**

	Questions	True	False
1.1	Some prime numbers are also composite number.		
1.2	All counting numbers are natural numbers.		
1.3	Cardinal numbers are number that represent quantity.		
1.4	Nominal numbers can be used in arithmetic calculations.		
1.5	$\frac{2}{9}$ is a rational number.		
1.6	$5 + (-5) = 0$ represents the Additive inverse property.		
1.7	$(7 + 2) \times (7 + 5) = 7(2 + 5)$ represents the distributive law.		
1.8	A thousandth is 10^{-3}.		
1.9	The graph $y = x^2$ is a straight-line graph.		
1.10	Every straight-line graph has a slope.		

Space for rough work

QUESTION 2 [9]

Show all your calculations (include units where applicable)		
2.1	In a test, a student lost 12.5% of the total marks through untidiness and $\frac{2}{7}$ of the remaining marks as a result of mistakes. What was his/her percentage for the test if the test had 40 questions (40 marks)? **Solution:**	**2½**
2.2	During a family trip, Bongani's mom bought 12 pieces of chicken and 16 breadrolls to prepare for dinner. She would like to make all the plates identical without any food left over. What is the greatest number of plates that Bongani's mom can prepare? **Solution:**	**2**

2.3	40% of Lerato's pin code is 3061.6. What is Lerato's pin code? **Solution:**	**1½**
2.4	The number of learners in a school increased by 200. After the increase there were 650 learners in the school. What was the percentage with which the number of students increased? **Solution:**	**1½**
2.5	It takes 84 seconds to cut a pipe into 4 smaller pipes. Cutting the pipe at the same rate, how many seconds will it take to cut a similar pipe into 6 smaller pipes? **Solution:**	**1½**

QUESTION 3 [10]

Show all your calculations		
3.1	Convert 5725_8 to binary and hexadecimal numbers.	**2**
3.2	Calculate the product of **111110_2** and **110_2**. **Solution:**	**2½**
3.3	Find $\mathbf{82_{10}}$ **and** $\mathbf{-82_{10}}$ in sign and size code representation using 8 bits. **Solution:**	**2**

3.4	Calculate the following by making use of the 2's compliment. Convert the answer to decimal. $$\mathbf{01110001_2 - 00011001_2 - 00100111_2}$$	**3½**

QUESTION 4 [16]

Show your calculation.

4.1 Tshepo is now 3 times as old as Caiphus. Eight years ago, their combined ages were 64 years. How old are Tshepo and Caiphus at present? ***(Use an equation to solve the problem)*** **4**

	Now	**8 years ago**
Tshepo		
Caiphus		

4.2 James and Maria are planning a wedding and would like to hire tables and chairs. The price to hire a table is 5 times as much as the price to hire a chair. They decided to hire 20 tables and 50 chairs. The total amount they spent was R1200.00. Determine the price of one table and the price of one chair. ***(Use equation(s) to solve the problem)*** **4**

4.3	Calculate the value of $\boldsymbol{k}$ if $\mathbf{7}\boldsymbol{y} + \mathbf{2}\boldsymbol{x} = \mathbf{14}\ \boldsymbol{and}\ \mathbf{6k}\boldsymbol{x} + \boldsymbol{y} = \mathbf{6}$ are parallel. **Solution:**	**4**
4.4	Simplify: $$\frac{\boldsymbol{x^2 + x - 2}}{\boldsymbol{x^2 - 4}} + \frac{\boldsymbol{2x - 3}}{\boldsymbol{2 - x}}$$ **Solution:**	**4**

QUESTION 5 [9]

Show all your calculations.

5.1 A community hall's floor must be tiled. The size of the floor of the hall is 30 meters by 15 meters. The construction company hired to tile the hall has recommended that the hall be tiled with tiles of size 20 cm x 20 cm. **6**

5.1.1	How many tiles will cover a square meter? **Solution:**	**(2)**
5.1.2	How many tiles are required to complete the job? **Solution:**	**(1)**
5.1.3	The tiles are sold in boxes with 25 tiles. You are not allowed to buy parts of boxes, only full boxes. How many boxes of tiles are required to complete the job? **Solution:**	**(1)**

	5.1.4	The construction company charges R80 per square meter for the job, excluding the tiles. The cost of the tiles is R85.00 per square meter. What does it cost to tile the community hall? **Solution:**	**2**	
5.2	Two trains started at 08:00 from the same point. The first train travelled east at the rate of 130 km/h, and the second train travelled west at the rate of 30km/h faster than the first train. At what time were they 725 km apart? **Solution:**			**3**
Space for rough work				

QUESTION 6 [14]

6.1 The data below shows COHF05D semester work marks of 18 learners. **10**

79	**68**	**52**	**76**	**80**	**61**	**38**	**40**	**52**
58	**31**	**58**	**46**	**53**	**66**	**80**	**52**	**75**

6.1.1 Complete the frequency table below, starting with the interval: $30 \leq SW \leq 40$ *etc*. **(4)**

Interval	Tally	Frequency	Cumulative frequency
$31 \leq SW \leq 40$			

6.1.2 Calculate the average marks. **(1)**

Solution:

6.1.3 What is the mode of the data set? **(1)**

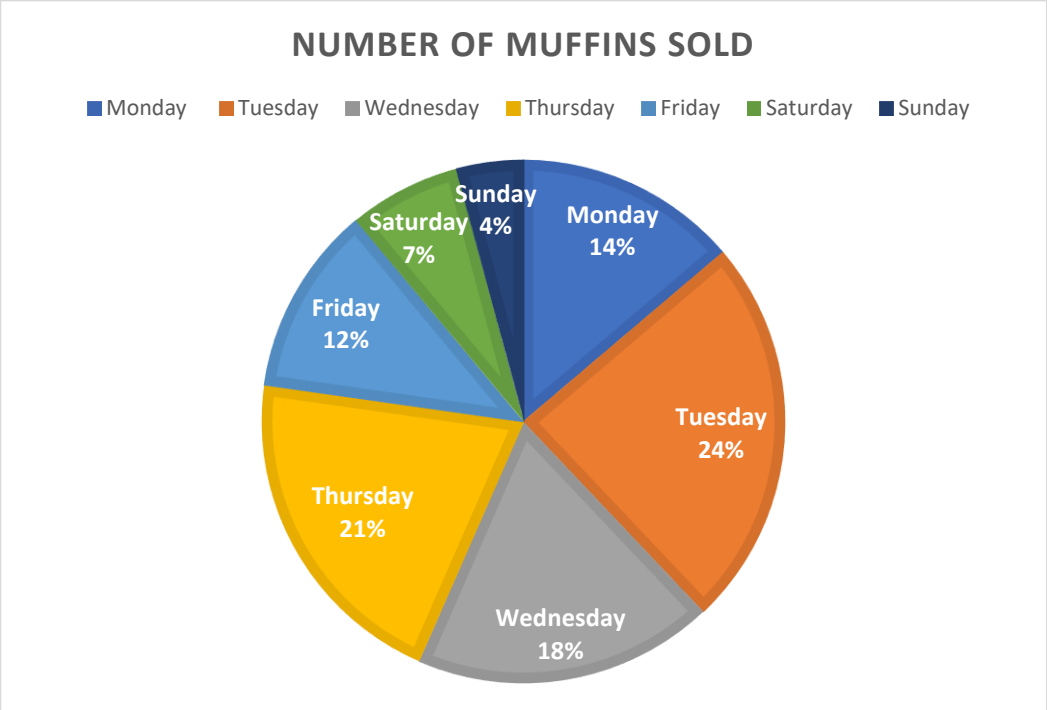
6.1.4 If the standard deviation is 15.15, between which marks do 70% of the data set lie? **(2)**

Solution:

6.1.5	Which graph is the most suitable to represent the above data set?		**(1)**
6.1.6	What type of data was captured during this study?		**(1)**

			Indicate the **correct descriptions** with an 'X'
Numerical	Discrete	Qualitative	
Numerical	Continuous	Qualitative	
Numerical	Discrete	Quantitative	
Numerical	Continuous	Quantitative	
Categorical	Discrete	Qualitative	
Categorical	Continuous	Qualitative	
Categorical	Discrete	Quantitative	
Categorical	Continuous	Quantitative	

6.2	Thabisile has gathered data about the number of muffins she sold during the week from Monday to Sunday. The graph below represents the number of muffins she sold from Monday to Sunday.	**4**



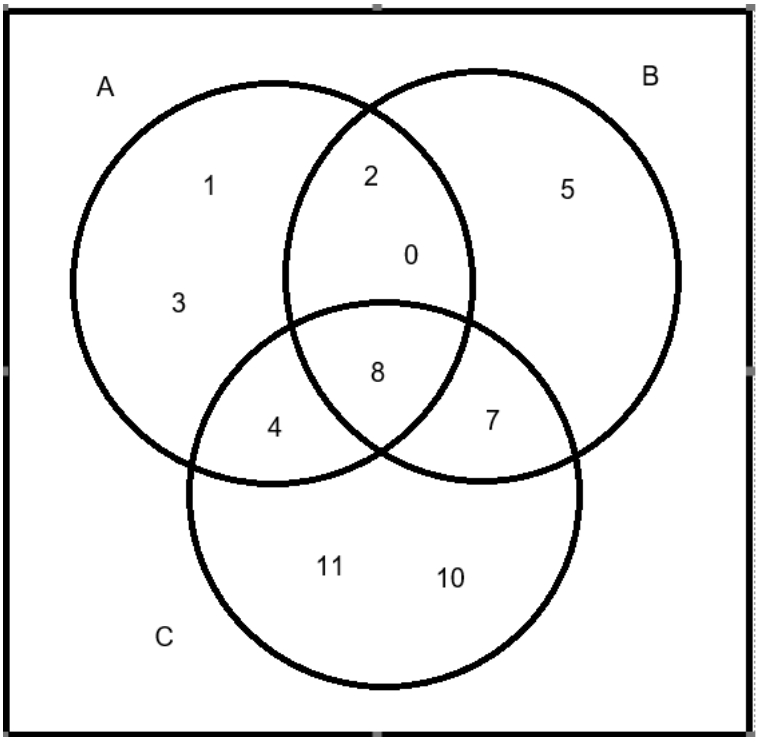
6.3.1	Which other graph may be used to represent the data?	**1**
6.3.2	What is the size of the sector for the muffins sold on Thursday? **Solution:**	**1**
6.3.3	If she baked 400 muffins for the week, on which day was the least number of muffins sold and how many muffins were sold on that day?	**1**
6.3.4	What is the difference between the MOST number of muffins sold and the LEAST number of muffins sold for the week?	**1**

Space for rough work

QUESTION 7 [18]

Show all your calculations

7.1 Given the following Venn diagram: **5**



List elements of the following sets.

	Question	Answer	
7.1.1	$\boldsymbol{A \cap B}$		**(1)**
7.1.2	$(\boldsymbol{A \cap B}) \cap \boldsymbol{C}$		**(1)**
7.1.3	$(\boldsymbol{A \cup B}) \cap \boldsymbol{C}$		**(1)**
7.1.4	$\boldsymbol{C} - (\boldsymbol{A \cup B})$		**(1)**
7.1.5	$\overline{\boldsymbol{B}} \cap \boldsymbol{A}$		**(1)**

7.2 Complete the following table: **1**

Set Builder Notation	Enumeration Method (Roster Method)
	$\{1, 4, 7, 11\}$
$\{\frac{3x}{2} \in \mathbb{N} \mid x \in \mathbb{N}, 1 \leq x < 5\}$	

7.3 — **5**

Given the following sets:

$\boldsymbol{Let\ C = \{Black, White, Red\}}$ and,
$\boldsymbol{\mathcal{U} = \{Green, Black, White, Red\}}$

Answer the following questions:

Question		Answer	
7.3.1	**n($\overline{C}$)**		(½)
7.3.2	**n(P($\overline{C}$)=**		(½)

7.3.3 Use a binary table to determine all possible subsets of set $\boldsymbol{C}$.
$\boldsymbol{C = \{Black, White, Red\}}$
(4)

Decimal Numbers	Binary Numbers			Subsets
	Black	White	Red	

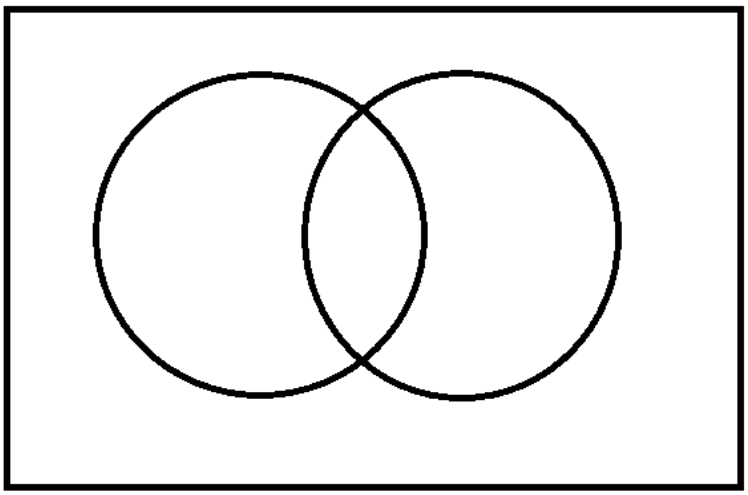
7.4 — **3½**

50 people completed a survey on their favourite ICT specialisation.

- 30 people said they like Information Technology (IT);
- 15 people said they liked Computer Science (CS);
- 5 people said they both IT and CS.

Answer the following questions (Show all steps):

2.5.1	How many people like IT only? **Solution:**	(½)

	2.5.2	How many people like CS only? **Solution:**	(½)		
	2.5.3	How many people like neither? **Solution:**	(½)		
	2.5.4	Fill in the number of people in the Venn diagram below: 	(2)		
7.6	Let A and B be finite sets: $\boldsymbol{If\ n(A-B)=50\ and\ n(A\cup B)=156\ and\ n(B-A)=36, determine\ n(B)}$ **Solution:**				**3½**

QUESTION 8 [12]

8.1 Given the propositions defined as follows: **3**

$$G: \textit{Grace will babysit today}$$
$$M: \textit{Michael will babysit today}.$$

8.1.1 **(1)**

Translate the following sentences in a well-formed symbolic form:

Sentence	Symbolic form	
Grace will not babysit today, but Michael will.		**(½)**
Grace will not babysit today if Michael will babysit today.		**(½)**

8.1.2 **(1)**

Translate the formed symbolic form in word:

Symbolic form	Sentence	
$\sim (G \vee M)$		**(½)**
$\sim (M \wedge N)$		**(½)**

8.1.3 Write the converse of the following statement in words. **(1)**

$$\textit{If Grace will babysit today}$$
$$\textit{then Michael will babysit today}.$$

8.2	Given the following argument: $$\textbf{\textit{Mrs Mbatha has gone to the conference, so she will organise a catch up class.}}$$ Identify the premise and the conclusion from the above argument. **Premise:** **Conclusion:**	**2**
8.3	Given the propositions defined as follows: $\boldsymbol{S}$: ***Sello submit three quotations.*** $\boldsymbol{T}$: ***Thando selected the best quotation*** $\boldsymbol{D}$: ***Daniel approved the quotation.***	**7**

8.3.1	Translate the following sentence in a well-formed symbolic form: $$\textbf{\textit{Sello submit three quotation and, Daniel approved the quotation if and only if Thando selected the best quotation.}}$$	**(1)**
8.3.2	Use the truth table (on the next page) to proof that the following statements are logical equivalent and give a reason: $$\boldsymbol{S} \longrightarrow [\sim (\boldsymbol{D} \vee \boldsymbol{T})] \textbf{\textit{ and }} \boldsymbol{S} \longrightarrow (\sim \boldsymbol{D} \wedge \sim \boldsymbol{T})$$	**(6)**

Complete the Truth Table (Question 8.3.2) for $S \longrightarrow [\sim (D \vee T)]$ and $S \longrightarrow (\sim D \wedge \sim T)$

S	D	T	$\sim D$	$\sim T$	$D \vee T$	$\sim (D \vee T)$	$S \longrightarrow [\sim (D \vee T)]$	$\sim D \wedge \sim T$	$S \longrightarrow (\sim D \wedge \sim T)$
T	T	T	F	F					
T	T	F	F	T					
T	F	T	T	F					
T	F	F	T	T					
F	T	T	F	F					
F	T	F	F	T					
F	F	T	T	F					
F	F	F	T	T					
Mark allocation (1 mark per column)					1	1	1	1	1

Space for rough work