QUALIFICATION : BACHELOR of SCIENCE IN APPLIED MATHEMATICS AND STATISTICS	
QUALIFICATION CODE: 07BSAM	LEVEL: 5
COURSE: FINANCIAL MAHEMATICS 1	COURSE CODE: FIM502S
DATE: NOVEMBER 2023	SESSION: 1
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY: QUESTION PAPER

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MODERATOR: *Prof, Adetayo Eegunjobi*

INSTRUCTIONS

1. Answer all questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.

PERMISSIBLE MATERIALS :

1. Non-Programmable Calculator

This paper consists of 3 pages including this front page

Question 1 [25 Marks]

1.1 Define the following terms:

      a) Effective rates of interest   [3]

      b) Nominal rates of interest   [3]

      c) Force of interest   [3]

1.2 Derive the formula for continuous compounding from compounding interest   [6]

1.3 Derive compound interest formula from simple interest rates   [5]

1.4 Define a sinking fund   [3]

1.5 Why do Banks charge interest   [2]

Question 2 [25 Marks]

2.1   Show that

$$S_{n]} = \frac{(1+i)^n - 1}{i}$$
                                                                           [3]

2.2   Show that

$$\frac{1}{S_{n]}} + i = \frac{1}{a_{n]}}$$
                                                                      [7]

2.3 Given that $d = 6\%$, compute the value of $i^{(12)}$ [8]

2.4 Given that $\delta = 0.1$ find the values of $i^{(4)}$ and $i^{(12)}$.   [5]

2.5 Show that $a_{\infty]} = 1/i$ [2]

Question 3 [25 Marks]

3.1 Define Amortization or Loan Schedule [3]

3.2 A loan of N$10, 000 is to be repaid over 10 years by a level annuity payable monthly in arrears. The amount of the monthly payment is calculated on the basis of an interest rate of 1% per month effective. Find the

    3.2.1   Monthly repayment. [4]
    3.2.2   Total capital repaid, and interest paid in the first and last years. [7]
    3.2.3   The interest paid in the final year [3]
    3.2.4   After which monthly repayment the outstanding loan is first
           less than N$5, 000. [8]

Question 4 [25 Marks]

4.1   As a savings program towards Alberto's college education, his parents decide to deposit N$100 At the end of every month into a bank account paying interest at the rate of 6% per year compounded monthly. If the savings program began when Alberto was 6 years old, how much money would have accumulated by the time he turns 18? [10]

4.3 Russa has purchased a farm worth N$50,000 through the bank. She has decided to pay back the loan in yearly arrears instalments over 5 years. If money is worth 8% p.a. schedule these payments on an amortization schedule. [11]

4.3.1 Use $a_{n]}$ to prove that after a third (3) payment the
Loan balance is N$ 22,331.51   [4]

END of EXAM