



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**Faculty of Health and Applied Sciences**

Department of Mathematics and Statistics

<b>QUALIFICATION:</b> Bachelor of Science ; Applied Mathematics and Statistics	
<b>QUALIFICATION CODE:</b> 07BSAM	<b>LEVEL:</b> 5
<b>COURSE:</b> FINANCIAL MATHEMATICS 1	<b>COURSE CODE:</b> FIM502S
<b>DATE:</b> January 2023	<b>SESSION:</b> Theory
<b>DURATION:</b> 3 Hours	<b>MARKS:</b> 100

<b>SUPPLEMENTARY/SECOND OPPORTUNITY EXAM QUESTION PAPER</b>	
<b>EXAMINER(S)</b>	Dr Victor Katoma
<b>MODERATOR:</b>	Prof Samuel Eegunjobi

**THIS QUESTION PAPER CONSISTS OF 2 PAGES**

(Excluding this front page)

**INSTRUCTIONS**

1. Answer ALL the questions.
2. Write clearly and neatly.
3. Number the answers clearly.

**PERMISSIBLE MATERIALS**

1. Non-programmable pocket calculator without the cover

**QUESTION 1 (25 MARKS)**

- 1.1 Show that  $\ddot{a}_{\overline{n}|} = \frac{1-v^n}{d}$  (5)
- 1.2 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
- 1.2.1 Monthly repayment. (4)
- 1.2.2 Total capital repaid and interest paid in the 1<sup>st</sup> and last year respectively. (6)
- 1.2.3 After which monthly repayment the outstanding loan is first less than N\$5,000. (5)
- 1.2.4 For which monthly repayment the capital repaid first exceeds the interest. (5)

**QUESTION 2 (25 MARKS)**

- 2.1 Define the nominal rates of interest (3)
- 2.2 Derive the compound interest formula from simple interest (7)
- 2.3 Deduce the continuous compounding formula from the compounding formula (10)
- 2.4 Show that  $a_{\infty|} = \lim_{n \rightarrow \infty} a_{n|} = 1/i$  (5)

**QUESTION 3 (25 MARKS)**

- 3.1 Given that  $\delta = 0.1$  find the values of  $i^{(4)}, i^{(12)}, i^{(365)}, d^{(4)}, d^{(12)}, d^{(365)}$  (12)
- 3.2 On 10 Jan in each of the years 1964 to 1979 inclusive, an investor deposited £5000 in a special bank savings account. On 10 Jan 1983, the investor withdrew his savings. Given that over the entire period the bank used an annual interest rate of 7% for its special savings accounts, find the sum withdrawn by the investor. (10)
- 3.4 Why do banks impose interest (3)

**QUESTION 4 (25 MARKS)**

4.1 Given that  $d = 6\%$ , compute the value of  $i^{(12)}$  (9)

4.2 Prove that  $S_{n|} = \frac{(1+i)^n - 1}{i}$  (7)

4.3 Define the following

4.3.1 Loan schedule (4)

4.3.2 Effective interest rates (5)

--END OF EXAMINATION--

