



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH, APPLIED SCIENCES & NATURAL RESOURCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

QUALIFICATION: Bachelor of Science in Applied Mathematics and Statistics	
QUALIFICATION CODE: 07BAMS	LEVEL: 6
COURSE CODE: FIM601S	COURSE NAME: Financial Mathematics 2
SESSION: JULY 2022	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

SUPPLEMENTARY/ SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER	Mrs. H. Y. Nkalle Dr. V. Katoma
MODERATOR:	Prof. A.S. Eegunjobi

INSTRUCTIONS
<ol style="list-style-type: none">1. Answer ALL the questions in the booklet provided.2. Show clearly all the steps used in the calculations.3. All written work must be done in blue or black ink and sketches must be done in pencil.

PERMISSIBLE MATERIALS

1. Non-programmable calculator without a cover.

THIS QUESTION PAPER CONSISTS OF 3 PAGES (Including this front page)

Question 1

- 1.1 Define the Net Present Value? [2]
1.2 Define the Internal Rate of Return? [2]
1.3 Define Discounted Cash flow? [2]
1.4 Zero-coupon bond? [2]

Question 2

Name 4 Instruments in the money markets. [4]

Question 3

Mention 3 ways in which Derivatives are used. [6]

Question 4

- (a) Write an expression to give the amount of interest earned from time t to time $t + s$ in terms of A only. [2]
(b) Use (a) to find the annual interest rate, i.e., the interest rate from the t years to time $t + 1$ years. [3]

Question 5

Calculate the present value of an annuity of amount N\$ 100.00 paid annually for 5 years at the rate of interest of 9%. [5]

Question 6

An investment of N\$ 200.00 returns N\$ 120.00 at the end of 1st year and N\$ 100.00 at the end of 2nd year. What is the internal rate of return (*IRR*)? [5]

Question 7

An investor is able to borrow N\$ 1000.00 at 8% effective for one year and immediately invest the N\$ 1000.00 at 12% effective for the same year. Find the investor's Internal rate of return on this Transaction. [3]

Question 8

Frans is considering a project which requires an amount of N\$3000.00 and another amount of N\$1000.00 *after one year*. In two years' time, when the project ends, she expects an inflow of N\$4500.00. what is the internal rate of return (*IRR*) of this project? Is the above Investment profitable? Assume that Frans can lend and borrow at the same fixed rate of 7.13% per annum. [10]

Question 9

Consider the following two cash-flow sequence:

Time (Year)	0	1	2	3
Project A	-80	96	1	5
Project B	-80	10	10	90

Show that $NPV(A) > NPV(B)$ if the interest rate is $r = 0.06$ or 6%. [10]

Question 10

Suppose a loan size of l_0 is repaid by nm equal installments at size x at times $\frac{1}{m}, \frac{2}{m}, \dots, \frac{nm}{m} = n$. Suppose the interest rate charged is $i\%$ per annum effective. Find an expression for the capital repayment in the k^{th} installment. [5]

Question 11

An investor is considering whether to invest in either or both of the following loans:

Loan A: For a purchase price of N\$ 20000, the investor will receive N\$ 1000 per annum payable quarterly in arrear for 15 years.

Loan B: For a purchase price N\$ 11000, the investor will receive an income of N\$605 per annum, payable annually in arrear for 18 years, and a return of his outlay at the end of this period.

The investor may borrow money at 4% per annum. Would you advise him to invest in either loan, if so, which would be the more Profitable? [10]

Question 12

A loan of \$5000.00 is repaid by level annual payment over 3 years with the interest rate of 4%. Represent the loan schedule in a table form. [10]

Question 13

Suppose an investor has a portfolio which includes security A and security B. The price at time 0 are as follows: $s_A = 6$ and $s_B = 11$. He assesses the prices at time 1 will be $S_1^A = 7$ and $S_1^B = 14$ if the market goes up and $S_1^A = 5$ and $S_1^B = 10$ if the market goes down. Check there is an arbitrage opportunity. [5]

Question 14

Suppose certificates of deposit is issued with a face value of N\$ 500000.00 and a coupon of 6% for 90 days. After 30 days, its yield has fallen to 5.75%. What is the price? [8]

Question 15

Consider the cash flow sequence, $a = (5, 9, 20, 4, 2)$, $b = (6, 7, 3, 1, 36)$ at time $t = 0, \dots, 4$.
Find the NPV of the cash flow assuming an interest rate of 7%. [6]

End of paper
Total marks: 100