NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES
SCHOOL OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

QUALIFICATION: Bachelor of science ; Bachelor of science in Applied Mathematics and Statistics	
QUALIFICATION CODE: 07BSAMS	**LEVEL:** 6
COURSE CODE: FIM601S	**COURSE NAME:** FINANCIAL MATHEMATICS 2
SESSION: JUNE 2023	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

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

INSTRUCTIONS
• Answer ALL the questions in the booklet provided. • Show clearly all the steps used in the calculations. • All written work must be done in blue or black ink and sketches must be done in pencil.

PERMISSIBLE MATERIALS

- Non-programmable calculator without a cover.

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

Question 1[25]

1.1 Define the following terms

1.1.1 Net Present Value [2]

1.1.2 Internal Rate of Return [2]

1.1.3 Discounted Cash flow [2]

1.1.4 Zero-coupon bond [2]

1.2 Name four (4) Instruments in the money markets. [4]

1.3 Explain three (3) ways in which Derivatives can be used. [6]

1.4 VK Investment cc has an existing debt of N$ 2,000000 on which it makes annual payments at an annual effective rate of LIBOR plus 0.5%. VK Investment cc decides to enter a swap with a notional amount of N$ 2000000 on which it makes annual payments at a fixed annual effective rate of 3% in exchange for receiving annual payments at the annual effective LIBOR rate. The annual effective LIBOR rates over the first and second years of the swap contract are 2.5% and 4% respectively. VK Investment cc does not make or receive any other payments. Calculate the net interest payment that VK Investment cc makes in the second year.

[7]

Question 2 [25]

2.1 Explain the difference between a Forward and Future contract [5]

2.2 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]

2.3 Consider a 3 × 9 FRA for £1,000,000 with an FRA rate of 3.4%. Suppose the reference rate is LIBOR and the 6-month LIBOR on the effective date is 3.7%. Assume ACT/360 and the loan is for a period of 180 days. Find how much the borrower receives from the lender on the effective date. [5]

2.4 Yvonne 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 $N\$4500.00$. Assume that Yvonne can lend and borrow at the same fixed rate of 7.13% per annum.

2.4.1 what is the internal rate of return (IRR) of this project? [7]

2.4.2 Is the above Investment profitable? Explain [3]

Question 3 [25]

3.1 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]

3.2 Why would you prefer the given interest rate i to be less than the internal rate of return (IRR) for the investment to be viable [5]

3.4 An investor is considering whether to invest in either 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. Which Loan is more profitable to invest in? [10]

Question 4 [25]

4.1 Suppose a CD is issued with a face value of £500,000 and a coupon of 6% for 90 days. (a) After 30 days, its yield has fallen to 5.75%. What is its price? (b) After a further 30 days its yield has risen back to 6%. What is the rate of return for holding this CD for the 30 days: day 30 to day 60. (Assume ACT/365.) [8]

4.2 A loan is being repaid by 10 equal annual payments of N$ 400. Suppose the effective annual interest rate is 12%. Find the loan outstanding immediately after the payment at the end of year six (6). [5]

4.3 Suppose A borrows £1,000 for 3 years at an effective interest rate of 7% per annum. Suppose further that A repays the loan by equal amounts of x at the ends of years 1, 2 and 3.

4.3.1 Find x [4]

4.3.2 Derive a loan schedule for this amortization [8]

END of EXAM