NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF COMMERCE
DEPARTMENT OF FINANCE
BACHELOR OF COMMERCE HONOURS DEGREE IN
Finance, Banking; Insurance & Risk Management ; Marketing; and Management
PART I 1ST SEMESTER EXAMINATION – NOV/DEC 2005
FINANCIAL MATHEMATICS I [CFI 1101]
TIME ALLOWED: 3 HOURS 30 MINUTES

INSTRUCTIONS
1. The paper is 3 hours and 30 minutes, 30 minutes of which is reading time. Candidates may write on the question paper but may not write in the answer book during the reading time.
2. Answer any *FOUR* questions.
3. Candidates should write answers only on the top page of an answer sheet. The reverse page may be used for rough work.
4. All workings must be shown.

PAPER SUMMARY

QUESTION	TOPIC
1	Valuation of Money Market Securities
2	Annuities
3	Amortisation of loans
4	Sinking Funds
5	Project Appraisal/Solution for IRR – Newton-Raphson method.

Question 1   [25 marks]

1.1   Distinguish between yield to maturity and realized yield to Horizon Date, highlighting their uses in money market portfolio management.
[7 ½ marks]

1.2   A 91 day Negotiable Certificate of Deposit [NCD] with a face value of $10 000 000 and a coupon of 20% is purchased when yield to maturity is 24% and there are 61 days of maturity remaining. It is sold 31 days later when yield to maturity is 27%.

   1.2.1   Calculate its price at the purchase and at the sale point. [8 marks]

   1.2.2   What is the realized yield at the Horizon Date?   [9 ½ marks]

Question 2   **[25 marks]**

2.1   Show that the Present Value of an annuity due of $1.00 is

$$PV = \frac{\left[(1+i)(1+i)^n - 1\right]}{i(1+i)^n}$$

where: PV   =   Present Value

i =   nominal rate of compound interest per period.

n =   number of periods.   **[12 marks]**

2.2   An annuity pays $1 000 000 per quarter, in advance, at the end of a grace period of 2 years, for 4 years. Interest of 36.5% is, however, compounded daily. What is the present value of the annuity?   **[13 marks]**

Question 3   **[25 marks]**

The terms of mortgage loan on a house are:
- Price $600 000 000
- Deposit $200 000 000
- Interest of 36% p.a. compounded monthly for 25 years
- Principal and interest to be amortized by equal monthly instalments

3.1   Calculate the monthly payment.   **[8 marks]**

3.2   Prepare a loan amortization schedule for the first **3 months.**   **[6 marks]**

3.3   Calculate the Seller's equity and Buyer's equity after 10 years and, new monthly payment if after 10 years interest is adjusted to 42% but the term of loan remains unchanged.
        [11 marks]

Question 4   **[25 marks]**

A plant, which costs $50 000 000, has an economic life of 10 years and a residual value of $2 000 000. Its replacement costs is expected to increase in tandem with the rate of inflation of 15% which itself is not expected to change during the life of the plant. Moreover, the opportunity cost of capital of the plant is $12 000 000 per year during its economic life.

What is the minimum percentage annual return on the investment before the deposit into a Plant Replacement Fund which accumulates at 17%.

Question 5   [25 marks]

5.1   What are the attributes of true economic profit to be used in capital budgeting appraisal?   **[10 marks]**

5.2   A project whose cost is $120 000 000 is expected to generate cashflows of $70 000 000, $50 000 000 and $40 000 000 respectively in years 1, 2, and 3 during its economic life of 3 years.

     5.2.1   Use the Newton – Raphson Method to calculate its internal rate of return [IRR]   **[12 marks]**

     5.2.2   What are the pros and cons of IRR as a measure of project profitability?   **[3 marks]**