NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF COMMERCE

DEPARTMENT OF FINANCE

BACHELOR OF COMMERCE HONOURS DEGREE IN FINANCE

Optional for: Accounting, Banking, Insurance & Risk Management, Marketing and Management

PART I 1ST SEMESTER SUPPLEMENTARY EXAMINATION – JULY 2007

FINANCIAL MATHEMATICS I [CFI 1101]

TIME ALLOWED: 3 HOURS 10 MINUTES

INSTRUCTIONS

1. The paper is 3 hours and 10 minutes.
2. Answer any ***FOUR*** questions.
3. Start each question on a fresh page.
4. All workings must be shown.

Question 1 **[25 marks]**

1.1 Distinguish between nominal and effective rate of interest. **[5 marks]**

1.2 The effective yield on an investment is 20%. What is the nominal yield if interest is compounded continuously? **[5 marks]**

1.3 A 184 day Negotiable Certificate of Deposit [NCD] with a face value of $10 000 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%.

1.3.1 Calculate its price at the purchase and at the sale point. **[7 ½ marks]**

1.3.2 What is the realized yield at the Horizon Date? **[7 ½ marks]**

Question 2 **[25 marks]**

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

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

where: 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 a mortgage loan on a house are:

- Price $400 000
- Deposit $100 000
- 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. **[10 marks]**

3.2 Prepare a loan amortization schedule for the first 4 **months.** **[8 marks]**

3.3 Calculate the Seller's equity and Buyer's equity after 10 years. **[7 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 cost 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% interest compounded half yearly. Ignore depreciation and Taxation. **[25 marks]**

Question 5 **[25 marks]**

5.1 What are the attributes of true economic profit that should 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 Calculate the internal rate of return [IRR] of the project. **[8 marks]**

5.2.2 What are the pros and cons of IRR as a measure of project profitability? **[7 marks]**