

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FUCULTY OF COMMERCE

DEPARTMENT FINANCE

B.COMM (HONOURS) DEGREE IN FINANCE

FNANCIAL MATHEMATICS 1 – CFI 1101

FEBRUARY 2010 – FIRST SEMESTER EXAMINATIONS

DURATION: 3 HOURS

Instructions to Candidates

- 1. Attempt all 6 questions**
- 2. Show calculations where this is appropriate**

Requirements

- 1. Scientific calculator**
-

Question 1.

(i) Using a clearly labeled time line distinguish between simple interest rate and simple discount rate. [3]

(ii) An investor is considering two investments. One is a 3-month deposit account which pays a rate of return of 4% p.a. convertible half yearly. The second is a 3-month Treasury Bill. Calculate the annual simple rate of discount available from the Treasury Bill if both investments provide the same effective rate of return. [4]

[Total 7]

Question 2.

(i) Briefly explain the term ‘nominal rate of interest’. [2]

(ii) By defining the term ‘annuity’, describe any three variations that can be done to the stream of payments under an annuity [3]

(iii) At time $t = 0$ an investor purchased an annuity-certain which paid her \$10,000 per annum annually in arrear for three years. The purchase price paid by the investor was \$25,000.

(a) Calculate, to the nearest 0.1%, compound rate of interest per annum achieved by the investor from her investment in the annuity [4]

(b) What is the effective monthly rate of interest for this transaction? And hence determine the value of the monthly payment. [5]

[Total 15]

Question 3.

(i)

Briefly explain the following terms:

(a) Equivalent yield [2]

(b) Yield to Maturity [3]

(ii)

John bought a 180 day NCD and sold it to Yvonne 50 days latter, who latter sold it to Maka with 90 days to maturity. The 180 day NCD had a coupon of 9% and the following yields were obtainable on the market;

10% for the first 90 days

12.5% for the remainder of the time.

Present in tubular format the cash-flows for each of the mentioned three dealers if:

(a) The coupon was to be shared in proportion to holding period at maturity. [6]

(b) If the buyer would settle all the dues to the buyer at the purchase date. [9]

[Total 20]

Question 4.

(i)

The yield at issue on a 60 day Commercial paper is 6.825%. Determine the equivalent discount rate. [3]

(ii)

A 91 day TB is purchased 19 days after issue when the discount rate is 14.2%. Determine the realized yield. [3]

(iii)

Suppose \$100 is invested at 7.5% per annum for 4 years. Determine its future value if interest is capitalised:

(a) Every two years [2]

(b) Half yearly [2]

(c) Monthly [2]

(d) Weekly [2]

(e) Continuously [2]

(iv)

Given that $S = P \left(1 + \frac{j_m}{m} \right)^m$ under a nominal rate of interest j_m .

Clearly defining your terms derive the relationship between the effective rate of interest j_e and the rate of continuous compounding (the force of interest) δ . [4]

[Total 20]

Question 5.

(i)

Draw up an amortisation schedule for a loan of \$14 000 with interest at 12% compounded annually and a term of 5 years. [9]

(ii)

Mr Makozho has \$2 500 available for the purchase of a housing stand in Bulawayo, Pinnacle Properties will require \$10 800 to develop the stand and hand it over a completed house to the owner. Upon purchasing the stand Mr Makozho is cleared for a mortgage load from CBZ Building society at an interest rate of 18% and a term of 25 years. Mr Makozho's employment contract entitles him to a housing subsidy of \$38 per month.

(a) Calculate the total monthly payments before and after deduction of the subsidy. [3]

(b) The total interest paid over the term of the loan. [2]

(c) If inflation rose by 1.5% than originally anticipated, compare the total real cost of the mortgage payments with the principal borrowed. [4]

(d) Comment briefly on your result in (c) above. [2]

[Total 20]

Question 6.

(i)

Explain what is meant by mutually exclusive projects [2]

(ii)

An investor must select between three alternative proposals: A, B and C. The initial investment outlays and the cash flows are set out in the table below.

Year	Proposal A (\$)	Proposal B (\$)	Proposal C (\$)
0	(760)	(800)	(800)
1	300	310	400
2	330	310	420
3	330	310	440
4	300	310	

(a) Calculate each project's NPV and IRR [10]

(b) Which project(s) should be accepted if they are independent? [1]

(c) Which project should be accepted if they are mutually exclusive? [1]

(d) If the investor's cost of capital $K = 21\%$, how might a change in the cost of capital produce a conflict between the NPV and IRR rankings of these three projects? [2]

(iii)

Highlight the importance of the International Fisher effect theory given two trading nations. [4]

[Total 20]

******END OF EXAMINATION******