BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF COMMERCE

DEPARTMENT OF BANKING AND FINANCE

FINANCIAL MATHEMATICS (BS114)

DURATION: 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Answer any **four** questions.
2. Answer each question on a fresh page.
3. No cell phones are allowed in the examination room.
4. You may use non programmable calculators.

QUESTION ONE

a) You are faced with two investment options whose interest is determined as follows:

- 39.50% per annum compounded semi-annually.
- 38% per annum compounded monthly.

Determine the investment that you should choose. (8)

b) You invest $20 000 000 today the rate of interest of 36.5% compounded daily. In how many years could you double the amount of your investment? (6)

c) An annuity certain with payments of $200 at the end of each quarter is to be replaced by an annuity with the same term and present value, but with payments at the beginning of each month instead. Calculate the revised payments, assuming an annual force of interest of 12%. (5)

d) Explain the effects of ignoring time value of money in some areas of finance. (6) **[25 marks]**

QUESTION TWO

Describe the features of the following derivative market instruments.

a) Options (6)

b) Forward contracts (6)

c) Futures (6)

d) Swaps (7)

[25 Marks]

QUESTION THREE

a) An amount of $6,000 is invested at a rate of 8% per annum. Determine the value of the investment in 5 years' time, if simple interest is added once at the end of the period. (5)

b) An amount of $6,000 is invested at a rate of 8% per annum. Calculate the value of the investment in 5 years' time, if interest is convertible:

i) annually (4)

ii) every 6 months (4)

c) Explain the differences in results between (a) and (b)(i); and between (b)(i) and (b)(ii) above. (6)

d) An investor is considering two ways of investing $20,000 for a period of 10 years: Option A offers 6% per annum convertible every 3 months; Option B offers 6.4% per annum convertible every 6 months. Determine the better option. (6)

[25 Marks]

QUESTION FOUR

a) Treasury bonds yield 16%. An average stock has a 14% expected rate of return and the company beta is 1.51. Use CAPM to determine the expected return. (5)

b) A 10% coupon bond is currently trading at $88 per $100 nominal and it has a remaining term to maturity of 12 years. Coupons are payable annually. Calculate

the approximate yield to maturity of the bond.
(5)

c) Calculate the price of a zero-coupon bond that has the same yield and term to maturity as the bond in (b) above. (5)

d) A preference share has a par value of $1.00 and a coupon dividend of rate of 20% per annum. Determine the value of the preference share if the required rate of return is 25% per annum.
(5)

e) A company has just paid dividends of 175c. The company has a return on equity of 20% and growth rate of 8%. The required rate of return is 15%. Determine the value of the stock.
(5)

[25 Marks]

QUESTION FIVE

a) A firm borrows $10 000 and the loan is to be repaid in three equal payments at the end of each of the three years. Interest on the loan is 15% per annum. Determine:

i) The amount of money the company is expected to pay annually. (5)

ii) The interest payments annually for the three years (9)

iii) The total amount that will be used to fully amortise the loan. (6)

b) If you deposit $1500 today into an account that pays 6.5% interest compounded annually, determine the time it takes to double the amount. (5)

[25 marks]

QUESTION SIX

a) Distinguish between the money market and the capital market, giving examples in each case. (6)

b) Explain any two reasons why NCDs are an attractive money market instrument.
(4)

c) Determine the maturity value of an NCD given the following information:

Amount invested	$2 500 000
Issue Date	1 March2020
Maturity Date	30 June 2020
Interest	10%

(5)

d) Calculate the proceeds from a Bankers Acceptance given the following information:

Nominal value	$2 000 000
Discount rate	15%
Tenor in days	91days

(5)

e) A customer signed a promissory note agreeing to pay $300 000 in six months' time. You then decide to discount the note with a bank at a discount rate of 12%. Determine the amount you will receive from the bank. (5)

[25 Marks]

END OF EXAMINATION