BINDURA UNIVERSITY OF SCIENCE EDUCATION
FACULTY OF COMMERCE
DEPARTMENT OF BANKING AND FINANCE
FINANCIAL MATHEMATICS (BS114) 3 HOURS

INSTRUCTIONS TO CANDIDATES

OCT 2024

1. Answer any FOUR questions.
2. All questions carry equal marks.
3. Non-programmable calculators are allowed into the exam room

QUESTION ONE

a) Assume the following cash flows for two projects:

Year	0	1	2	3	4
Project A	-$800	$230	$240	$230	$350
Project B	-$600	$150	$250	$300	$200

Required:

i.	Calculate the NPV of each project.	(10)
ii.	Compute the Internal Rate of Return (IRR)	(10)
iii.	Which project should be chosen and why?	(5)

[25 marks]

QUESTION TWO

A loan of $1 000 000 with an interest rate of 15% which is recalculated every year, is repaid at the end of each year within a 7 years period. Construct a loan amortization table showing the principal and interest payments **[25 marks]**

QUESTION THREE

a) As a potential investor, Jane is faced with four investment options with four banks. BancABC pays interest of 22% compounded annually. CBZ pays 20% compounded semiannually, FBC pays 19% compounded quarterly and Barclays pays 18% compounded daily (assuming 365 days per year). Determine the bank that Jane must invest with. (10)

b) Suppose you make an investment of $1000. The return in the first year is 12%, the second

year it is 6% and the third year it returns 8%. How much will this investment be worth suppose there are no withdrawals made? (6)

c) Your company proposes to buy an asset for $33500. This investment is very safe. You will sell the asset in 3 years for $40000. You have another investment option where you could invest the $33500 elsewhere for 3 years at 10% with no risk. Which investment choice would you make and why? (5)

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

Nominal value	$1 000 000
Discount rate	17.4%
Tenor in days	91days (4)

[25 marks]

QUESTION FOUR

a) Construct an amortization table for a loan worth $35000 payable in 7 years at an annual interest rate of 14%. (15)

b) Determine the future value of $10 000 invested today over three years at a simple interest rate of 10% per annum. (2)

c) An investment pays an annual interest of $20 in perpetuity and the applicable discount rate is 25%. Calculate the present value of the perpetuity. (3)

d) An individual sets aside $200 at the end of each year for retirement starting from when she is 30 years old and is expected to retire at 65. She expects to make 7% a year on her investments. Calculate the expected value of her retirement fund (5)

[25 marks]

QUESTION FIVE

a) The State of Kentucky issued a zero coupon bond with a par value of $1 000.00 that matures in 20 years at a discount rate of 4.3%. Determine the price of the bond. (4)

b) A share is expected to pay a dividend of 20 cents in year 1, 24c cents in year 2 and 30 cents in year 3. The share is expected to be sold in year 3 at 220 cents and the investor's required rate of return is 18%. What is the value of the share? (6)

c) Consider a stock with dividends that are expected to grow at 20% per year for four years, after which they are expected to grow at 5% per year, indefinitely. The last dividend paid

was $1.00, and Ke = 10%. Calculate the value of this stock using the multistage growth model. (10)

d) A firm is about to issue preference shares with a par value of $1 and a coupon dividend rate of 20% per annum. If the required rate of return is 25% per annum, what will be the value of the preference share? (5)

[25 marks]

QUESTION SIX

a) Calculate the maturity value of an NCD with a principal of $100 000 issued on the 1st June 2021 and matures on 30th September 2021 at an interest rate of 15% per annum? (5)

b) Calculate the proceeds of an NCD with a maturity value of $1 044 000, contract date 29 October 2020 maturity date 31 December 2020. The interest rate is 12.5%. (5)

c) A discount security with a nominal value of $1 000 000 and a tenure of 90 days is issued at $946 845. Determine the discount rate. (5)

d) Determine the issue price of a discount security with a tenure of 91 days and a nominal value of $1 000 000 which is issued at a discount of 15% per annum. (5)

e) Calculate the discount of a Bill which is issued with a redemption value of $1 million and matures in 90 days from the date of sale. The bill is sold at the rate of 28%. (5)

[25 marks]

END OF EXAMINATION