

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

INSTRUCTIONS TO CANDIDATES

1. Answer any FOUR questions.

2. All questions carry equal marks.

3. Non-programmable calculators are allowed into the exam room

QUESTION ONE

Your company intends to borrow USD\$150 000 to finance the purchase of new machinery. The Finance manager is considering taking a 12% loan from First Capital Bank that will be amortized over the next 8 years in equal instalments. Using a loan amortization schedule, determine the amount of money the company is expected to pay annually.

[25 marks]

QUESTION TWO

You are the Financial Analyst of Damon Electronics Company. The Director of Capital budgeting has asked you to analyse two proposed capital investments project X and Y. Each project has an initial cost of \$100 000 and the cost of capital for each project is 15%. The project's expected net cash flows are as follows:

Year	Project X	Project Y
0	(100 000)	(100 000)
1	65 000	35 000
2	30 000	35 000
3	30 000	35 000
4	10 000	35 000

Showing workings, calculate the Net Present Value and Internal Rate of Return for each project and justify which of the two projects must be chosen

[25 marks]

QUESTION THREE

- a) You are looking at an investment that will pay \$125 000 in 5 years if you invest \$10 000 today. What will be the rate of interest charged on the investment? (4)
- b) Suppose you are offered an investment that will allow you to double your money in 6 years. You have \$10 000 to invest. What is the implied rate of interest? (4)
- c) 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)
- d) You would like to buy a new car. You have \$50 000, but the car costs \$68 500. If you can earn 9%, how much do you have to invest today to buy the car in two years assuming the price will stay the same and do you have enough? (5)
- e) 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 at 10% with no risk. Which investment choice would you make and why? (6)

[25 marks]

QUESTION FOUR

- a) Determine the future value of \$10 000 invested today over three years at a simple interest rate of 10% per annum. (3)
- b) An investment pays an annual interest of \$20 in perpetuity and the applicable discount rate is 25%. Calculate the present value of the perpetuity. (5)
- c) You want to purchase a new car and you are willing to pay \$45 000. If you can invest at 10% per year and you currently have \$15 000, how long will it be before you have enough money to pay cash for the car? (5)
- d) An individual sets aside \$350 at the end of each year for retirement starting from when she is 22 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 (6)
- e) You need \$400 000 in 15 years. If you can earn 9.8% per year interest, how much do you need to invest today (6)

END OF EXAMINATION

[25 marks]

- a) A \$1000 par value bond has two years to maturity and pays a coupon of 12% p.a. and the market discount rate is 10%. Calculate the value or price of the bond (5)
- 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? (5)
- 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 $K_e = 10\%$. 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)

QUESTION SIX

[25 marks]

- 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)

QUESTION FIVE

[25 marks]