THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

DEPARTMENT OF MATHEMATICS & COMPUTER SCIENCE

SECOND SEMESTER EXAMINATIONS – OCTOBER 2022

FIRST YEAR BACHELOR IN COMMERCE IN

ACCOUNTANCY, APPLIED ECONOMICS, BUSINESS MANAGEMENT, BUSINESS IT

MA124 –QUANTITATIVE METHODS 2

TIME ALLOWED: 3 HOURS

INFORMATION FOR CANDIDATES:

1. Write your name and student number clearly on the front of the examination answer booklet/s.
2. You have 10 minutes to read this paper. You must not begin writing during this time.
3. This paper contains five (5) questions. You should attempt all the questions.
4. Make sure you have 4 pages, including cover page and formula sheet.
5. All answers must be written in examination answer booklets provided. No other written materials will be accepted.
6. Start the answer for each question on a new page.
7. Do not use red ink or pencil.
8. Notes, textbooks, mobile phones and other recording devices are not allowed in the examination room.
9. Scientific and business calculators are allowed in the examination room.

MARKING SCHEME

Marks are indicated at the beginning of each question. Total mark is 80.

Question 1 **[5 + 15 = 20 Marks]**

(a) At the end of each quarter for the next 5 years, we plan to invest K500 into an account that bears interest at 8% p.a. compounded quarterly. What extra initial payment must be made into this account so that the final account balance (at the end of the fifth year) is K14,000?

(b) K10,000 is borrowed on a reducing balance loan at an interest rate of 6% p.a. compounded monthly. For this loan, equal quarterly repayments will be made for the loan duration for 4 years. Calculate the lump sum required to terminate this loan after 2.5 years.

Question 2 **[5 + 5 = 10 Marks]**

(a) For an investment at 3% annual interest compounded every 3 months, how long will it take to double your money?

(b) Jethro and Abby borrowed K3,000 and K3,500 respectively at the same rate of simple interest for 3 years. If Abby paid K150 more interest than Jethro, calculate the rate of interest per annum.

Question 3 **[5 + 10 = 15 Marks]**

(a) A loan of K4,500 is taken at an interest rate of 12% p.a. flat which is to be repaid by making 24 equal monthly repayments. How much would the borrower save if he decides to terminate this loan at the end of the 12^{th} month?

(b) You take out a bank loan of K2,500 to be repaid in full at the end of 21 months, with a quarterly interest of 15.5% p.a. being paid for the duration of the loan. To help finance the final repayment, you make regular quarterly deposits of K300 into a sinking fund which pays interest of 9% p.a. compounded quarterly. At the end of 21 months, how much money will you have to find to pay off the loan (the balance for the sinking fund account)?

Question 4 **[5 + 5 + 5 + 5 = 20 Marks]**

(a) A company must pay an invoice for K500, dated 17/09/2022. The terms of settlement are 15%/10, 10%/30, 5%60 and n/90. If the company settles this invoice on the 18/10/2022, how much will the company have to pay?

(b) An item that costs K2,055 has a trade discount of 7.5% applied, then another cash discount for cash payment. If the final amount of discount offered on this item is K268.18, calculate the cash payment percentage discount.

(c) An item was sold at clearance sale for K99. This represented a loss of 8.5% on cost to the retailer. What was the retailer's cost price for this item?

(d) An item that cost K133.50 is to be sold to yield a profit of 18% based on the selling price. Find the selling price of this article.

Question 5 **[5 + 10 = 15 Marks]**

(a) We wish to set up an annuity, where the first payment is K500, and each subsequent payment increases by 4.25%. Payments are to be made at the end of each half year for 6 years. If the account in which the principal is invested yields 8.5% p.a. compounded half yearly, how much must be invested into the account to pay for the annuity?

(b) At the end of each 4-month periods for the next 6 years, we will receive K400, K600, K500, K800, K700 and K500 respectively. If inflation is running at a constant rate of 10% p.a, calculate the periodic interest rate (i_e) and the net present value (NPV) for this gift after 6 years.

End of Examination

Formula Sheet

Simple Interest

$SI = P \times R \times T$ $\quad A = P(1+RT)$

Compound Interest

$A = P(1+i)^n$ $\quad i_e = (1+i)^m - 1$ $\quad A = P \times e^{rT}$

Ordinary Annuity

$$FV = \frac{PMT((1+i)^n - 1)}{i} \qquad PV = \frac{PMT(1-(1+i)^{-n})}{i}$$

Annuity Due

$$FV = \frac{PMT(1+i)((1+i)^n - 1)}{i} \qquad PV = \frac{PMT((1+i)(1-(1+i)^{-n}))}{i}$$

Flat Rate Loan

$$PMT = \frac{P(1+rT)}{n}$$

Reducing Balance Loan

$$PMT = \frac{PV \times i}{1-(1+i)^{-n}} \qquad TP = \frac{PMT[(1-(1+i)^{-(n-t)})]}{i} + PMT$$

Interest Only Loan

$$IPMT = P \times r \times \rho \qquad FPMT = P(1+r\rho)$$

Formula for Perpetuity

$$PMT = P \times i$$

Formula for an Annuity with Equal Payments

$$P = \frac{PMT(1-(1+i)^{-n})}{i}$$

Formula for an Annuity with Increasing Payments

$$P = \frac{PMT \times n}{(1+i)}$$

Net Present Value

$NPV = \sum_1^n Value_m \times (1+i)^{-m}$, where m is a counter that runs from 1 to n